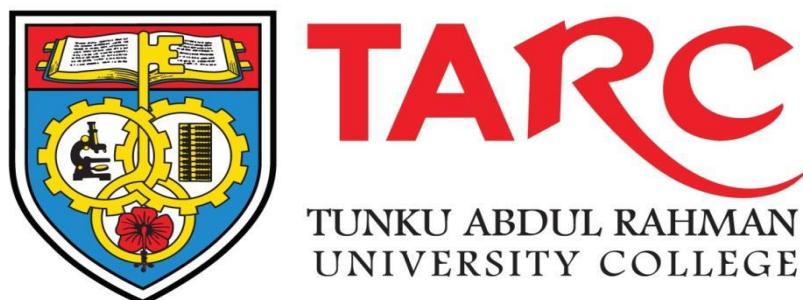


FYP Management System

Assessment & Form Management

By

TAN YI YING



**FACULTY OF COMPUTING AND
INFORMATION TECHNOLOGY**

**TUNKU ABDUL RAHMAN UNIVERSITY COLLEGE
KUALA LUMPUR**

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FYP Management System
Assessment & Form Management
By
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A project report submitted to the
Faculty of Computing and Information Technology
in partial fulfillment of the requirement for the
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Declaration

The project submitted herewith is a result of my own efforts in totality and in every aspect of the project works. All information that has been obtained from other sources had been fully acknowledged. I understand that any plagiarism, cheating or collusion or any sorts constitutes a breach of TAR University College rules and regulations and would be subjected to disciplinary actions.

Tan Yi Ying

Bachelor of Information Technology (Honours) in Software Systems Development

Abstract

In this era of globalization that emphasizes on efficiency, accuracy and speed, quality output is on everyone's mind, including educators in the academic industry. Currently, coordination tasks related to final year projects (FYPs) are still carried out manually at TAR UC. This is extremely inefficient, as it incurs a great amount of resources in terms of time and manpower for carrying out these tasks. The main aim of this project is to develop an automated system to computerize the entire FYP process. The FYP Management System consists of the following modules: Cohort, Supervisor and Student Maintenance, Project Management and Registration, Auto-assignment of Supervisors to Students, Supervisor Workload Tracking, Student Assessments, Forms and Template Management, as well as Security. Besides benefiting the faculties and their FYP committees with increased efficiency and effectiveness in carrying out the important tasks related to FYP management, this system also plays a crucial role in the acquisition and organization of data that is needed to facilitate the uploading of project artifacts to TAR UC's I2Hub project repository. This documentation will focus on two modules which are Assessment Module and Form Module. Assessment management includes rubrics design and the ability to change the format and content of rubrics as well as to enable the supervisors and moderators to enter and edit marks. Form management includes the design of Form 1, 2 and 3, and the ability to allow students to complete and submit the forms and proposal digitally. Supervisors and moderators may then access the students' proposals in order to assess them. This project would turn out to be one of the best system by computerizing the process of FYP tasks especially for the management of the assessment and form parts. Computerizing the FYP management system will minimizing the manual load and ease the work of the FYP committees and programme leader.

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First of all, I would like to thank Tunku Abdul Rahman University College (TARUC) for giving me this opportunity for doing final year project. Moreover, I would like to thank Dr. Lee Wah Pheng and Dr. Lim Yee Mei to introduce this academic service project and I would be very proud to be the first batch student to be involved in this FYP Management project.

Moreover, I feel really thankful to my project supervisor, Ms Kathleen Tan Swee Neo, for her guidance, frequent support and encouragement throughout the complete of this final year project. I would like to say thank you to her and I am really appreciate for all the efforts that she spent.

A warm thank is given to my teammates, Tee Ren Mian, Tee Sheng Kang and Yap Kai Jean. Thanks for being patient to me and willing to accept my ideas when the ideas are right. They are also discussing the project issues and figure out the solutions together all the time. A successful project can only be completed with team member who has good team work.

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Table of Content

Declaration.....	i
Abstract.....	ii
Acknowledgement	iii
1 Introduction	2
1.1 Objectives	2
1.1.1 To automate the coordination tasks in the FYP management process.....	2
1.1.2 To provide a better scalable data management	3
1.1.3 To provide timely generation of useful reports.....	3
1.2 Problem Statement	4
1.2.1 Problem Statements	4
1.2.2 Proposed Solutions.....	5
1.3 Background	5
1.4 Advantages and Contributions	6
1.5 Project Plan	7
1.5.1 Project Scope	7
1.5.2 Milestones	8
1.5.3 Software Development Model	9
1.5.4 Testing Approach.....	10
1.6 Project Team and Organization.....	10
1.7 Chapter Summary and Evaluation.....	10
2 Literature Review	13
2.1 Company Background.....	13
2.2 Project Background.....	17
2.3 Literature Review.....	19
2.3.1 Model-View-Controller	19
2.3.2 Relationship between Model, View and Controller.....	21
2.3.3 GRASP Patterns.....	23
2.3.4 Differences between MVC Controller and GRASP Controller	25
2.3.5 Differences between the Architecture of MVC and MVP.....	25
2.4 Feasibility Study.....	29
2.4.1 Economically Feasibility	29
2.4.2 Operational Feasibility.....	29
2.4.3 Technical Feasibility.....	29

2.5	Chapter Summary and Evaluation.....	29
3	Methodology and Requirements Analysis.....	32
3.1	Methodology	32
3.1.1	Fact Gathering.....	32
3.1.2	Fact Recording	33
3.2	Requirement Analysis	34
3.2.1	Project Scope	34
3.2.2	Development Environment	35
3.2.3	Operation Environment.....	38
3.2.4	Non-functional Requirements	38
3.2.5	Functional Requirements	38
3.2.6	Use Case Diagram.....	41
3.2.7	Discussion	46
3.3	Chapter Summary and Evaluation.....	46
4	System Design	48
4.1	Data Design	48
4.1.1	Class Diagram.....	48
4.1.2	Entity Relationship Diagram (ERD).....	49
4.1.3	Data Dictionary.....	50
4.2	Process Design	58
4.2.1	Activity Diagram	58
4.3	Algorithm Design.....	65
4.4	Report Design.....	66
4.5	User Interface Design.....	67
4.6	Chapter Summary and Evaluation.....	97
5	Implementation and Testing.....	99
5.1	Implementation / Coding.....	99
5.1.1	Libraries Installation	99
5.1.2	Implementation of Algorithms.....	102
5.1.3	Follow-up.....	105
5.2	Testing Strategies	106
5.2.1	Test Approach.....	106
5.3	Test Plan.....	107
5.3.1	Test Design Techniques	107
5.3.2	Test Completion Criteria.....	108

5.3.3	Metrics to be collected	108
5.3.4	Test Data Requirements	109
5.3.5	Test Environment Requirements.....	111
5.4	Test Cases.....	112
5.5	Chapter Summary and Evaluation.....	160
6	System Deployment	162
6.1	Deployment Environment	162
6.2	Deployment Process / Steps	162
6.2.1	On-site Setup.....	162
6.3	Issues and Solutions	169
6.4	Chapter Summary and Evaluation.....	169
7	Discussions and Conclusion	171
7.1	Summary	171
7.2	Achievements	172
7.3	Contributions.....	172
7.4	Limitations and Future Improvements	173
7.5	Issues and Solutions	174
7.6	Conclusion.....	175
References	176	
Appendices.....	178	

Chapter 1

Introduction

1 Introduction

In this era of technological advancement, most of the processes especially those from the business sectors, are computerized. This is because by utilizing the computing resources offered by computers, one can achieve their objectives accurately as well as in a short timeframe, compared to that of without using computers but rather performing manually. Nevertheless, the FYP management system in TARUC is still planned and assigned manually for now, which is extremely ineffective. This would require a great amount of resources in terms of time and manpower for carrying out the work. Since the process is carried out manually, records have to be entered manually by FYP committee or supervisors into the computer system. With the current way of storing students' FYP forms, proposals and abstracts in the Google Drive manually, as time goes and more data is stored in the Google Drive, without proper management of data or without database, the Google Drive's storage will get messier. Moreover, different parties may need different kinds of reports. The staff may have to produce these kinds of reports manually by searching the database and compiling the data manually. The main idea of this project is to develop an automated system to computerize the entire process in an automatic and optimized way. This will improve the overall efficiency of the tasks. Report generation function is also incorporated to ease the FYP committee in producing reports. The project will mainly benefit FYP committee as this system will computerize the processes in structuring FYP tasks, saving the time of the FYP committee and supervisors so that they are available for other tasks of higher priority.

1.1 Objectives

1.1.1 To automate the coordination tasks in the FYP management process

Currently, the FYP management system in TARUC is planned and assigned manually. This can be very frustrating as it is very ineffective. Most importantly, accuracy of information is very important for a firm. Accuracy can be very low if the process is carried out manually and, human error is also sometimes inevitable. With the advancement of technology at this moment, however, it is possible to computerize this process. The main objective of this project is to computerize the process of managing and structuring the FYP tasks, to ease the FYP committee and supervisors in managing the FYP tasks in every cohort. This in turn will save lots of precious time and manpower needed for this tedious task. On the other hand, accuracy is greatly improved as human error of planning manually is eliminated. For example, to reduce the input errors of supervisors and simplify the process of editing the rubric's contents and format, rubrics will be designed in a form format and all the formula will be well set to prevent marks calculation errors due to wrong formula applied. When FYP committee

wants to edit the rubric's format or contents, the alignment of the rubrics will also be adjusted automatically each time after a change is made based on the space that the contents need. The compiled version of final marks and grades for FYP Project I and II will also be generated by according to the names and courses. Besides, an online proposal management module is created to allow students to fill in the Form 1, 2 and 3 online, submit proposal online, and allow them to update the forms or proposals any time before the deadline. This may save a lot of time and reduce the waste of resources such as paper as the students do not need to print them out.

1.1.2 To provide a better scalable data management

Some of the computerized systems are implemented without advanced data management technique. This may cause the system performance to degrade over time as more data is accumulated without good management or, possibly data loss if accident happens without executing backup function at a scheduled basis. The proposed system in this project will implement advanced data management technique, as well as good database design, to secure and assure the system performance in a long run.

1.1.3 To provide timely generation of useful reports

With the current method of producing reports manually, there may be some hassles in this. As there are different parties such as FYP committee, supervisors, and so on, each of them may need different kinds of specific reports. Producing these reports manually can be a tedious task as the users have to collect and gather the required data from the database manually and, finally compile all these data into various kinds of reports. Again, the concerns of accuracy and human error are emphasized when reports are to be produced manually. The proposed system in this project will implement report generation function to automatically generate various kinds of predefined reports. Hence, limited and precious resources in terms of time and manpower can be saved. This will be more efficient and accurate compared to manual way as human errors are sometimes inevitable.

1.2 Problem Statement

1.2.1 Problem Statements

1. Students have to download the Form 1, 2 and 3 from Google Drive, fill in and print out to submit to their respective supervisors. Students are also required to download the FYP proposal template from Google Drive, print out and submit the proposal to their supervisors after they have completed it. This process is very inconvenient when the students realize that they have filled in something wrong in the forms or are required to make any changes to the proposal, they need to edit the original forms or proposal and print it out again. They would need to print the documents all over again if they have modified something.
2. When FYP committees are required to change the rubrics' format for Project 1 and Project 2, they need to adjust the whole rubrics as the measurement such as the alignment of Google Sheet will be gone while inserting or deleting any rows or columns. There are times when FYP committee members mistakenly clicked somewhere else in the Google Sheet that will affect the formula column. This may lead to the wrong formula or deletion of certain formula for the particular column accidentally, thus wrong marks will be generated. It is because all the columns in Google Sheet are very sensitive especially when formula is set. The efficiency of the process will be greatly reduced as there are many room for accidental errors.
3. With the current way of storing students' FYP forms and proposals in the Google Drive manually, as time goes and more data is stored in the Google Drive, without proper management of data or without database, the Google Drive's storage will get messier.
4. If management requests the FYP committee to search for project related to something such as projects using a certain platform or technology, the FYP committee has to search for the relevant projects information manually by asking, emailing or texting the supervisors. This process is very tedious and lengthy as they have to wait for the replies from the supervisors.
5. If reports are required, the FYP committee have to produce the report manually by carrying out searching, filtering and surfing on the Google sheets and then compile the data altogether to become useful information, the report. Different parties may require different kinds of reports, thus FYP committees may have to produce different kinds of report accordingly as well. Indeed in this era of technological advancement, this manual process would be too time-consuming and seriously waste a great amount of precious resources in terms of manpower especially.

1.2.2 Proposed Solutions

All the above-mentioned tasks are very tedious and time-consuming, therefore the solutions below are proposed in order to solve the problems stated above.

1. An online forms management module shall be provided to allow students to fill in the Form 1, 2 and 3 online, submit proposal online, and allow them to update the forms or proposals any time before the deadline. This may save a lot of time and reduce the waste of resources such as paper as the students do not need to print them out.
2. Rubrics will be designed in a form format and all the formula will be well set to prevent marks calculation errors due to wrong formula applied. When FYP committee wants to edit the rubric's format or contents, the alignment of the rubrics will also be adjusted automatically each time after a change is made based on the space that the contents need. Supervisors are also able to enter the students' marks for Project I and II and the final marks will be calculated automatically. The compiled version of the summary, final marks and grades for FYP Project 1 and 2 will be generated by the respective programme and student names.
3. Implement advanced database design and management to the proposed FYP management system. By having an advanced database, the FYP's data such as projects' details can be managed in a more proper way compared to storing them in the Google Drive.
4. Search function for project details is included with the existence of database. FYP committees or supervisors can search the project details by retrieving the data from the database. This function can reduce the tedious task of FYP committee having to wait for the replies from supervisors.
5. Report generation function is to be implemented into the system as to ease the FYP committees' work when preparing different kinds of reports for different parties. Reports should be generated at a scheduled basis for instance every time after a cohort's FYP lifecycle. This would greatly reduce the manpower needed while accelerating the speed of production of outputs needed.

1.3 Background

Tunku Abdul Rahman University College ('TAR University College'), formerly known as Tunku Abdul Rahman College ('TAR College'), is a premier institution of higher learning in Malaysia set up in 1969 by the Malaysian Chinese Association (MCA) to provide quality and affordable tertiary education to Malaysians (TARUC, 2018). Currently in TARUC, the FYP management system is designed and assigned manually, which would cost a lot of time to the

FYP committees, for planning FYP related tasks such as schedule, assigning supervisors to the specific course or for students, managing the changing of rubrics, assessments and etc. This project is set up to computerize the current manual process in managing and structuring the FYP tasks to improve the overall efficiency of the task and to save a lot of resources in terms of manpower and time for FYP committee in TARUC. This solution benefits four parties, the University College, its FYP Committees, Supervisors, and students. FYP committees will be benefited the most as this system will computerize the processes in FYP tasks, saving the time of FYP committees so that they are available for other tasks of higher priority. In addition, sustaining the records of information, simplifying and reducing the workload of the FYP committees while producing its outputs at highest precision and quality that are intended. Moreover, with good and computerized FYP management system, the number of errors made by the supervisors such as wrong calculation of marks due to the Google Sheets sensitivity will be reduced as sensitivity issues are avoided. Students will also be benefited in the aspects of uploading and editing their forms, proposal or documents. This will save them from having stresses or frustrations when using the old process as new process is simplified. It will indirectly make the reputation of the University College better as its status is getting higher by implementing a computerized system.

1.4 Advantages and Contributions

This system is designed to ease the process of designing and structuring the FYP tasks for FYP committees, supervisors and students. One of the bright sides of the system that makes the system stands out from the others is that, we have the intent of implementing advanced database design and management techniques into the system. This will improve the performance, efficiencies, reduce errors and redundancies of the system.

In addition, it also helps to reduce stress of the users, as well as to generate reports with higher accuracy. Amount of resources needed are reduced too. Moreover, with good database design and management, this will probably future-proof the system, making the FYP committees and manager hassle-free in a long run.

1.5 Project Plan

The proposed FYP Management System comprise of 8 modules as shown in Figure 1.1.

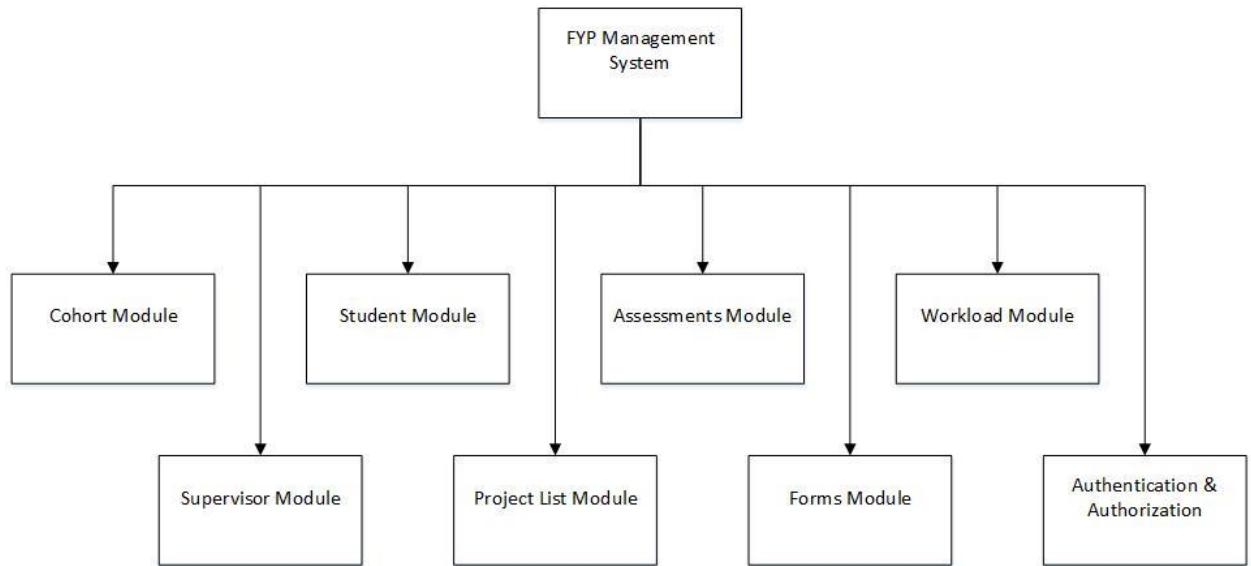


Figure 1.1: Functional Modules of FYP Management System

1.5.1 Project Scope

This project focuses on the assessments and forms management module.

❖ Functional features

- The system should provide the facilities for uploading the Form 2 Proposal, Form 4 Project Appointment Report and assessment rubrics to the database.
- The system should provide the facilities for downloading the Form 1 Student Details, Form 2 Proposal, Form 3 Project Proposal Moderation and Form 4 Project Appointment Report from the database.
- The system should provide the facilities for filling in the Form 1 Student Details and Form 3 Project Proposal Moderation then store into database.
- The system should provide the facilities for compiling final marks and grades for Project 1 and 2 and export into excel files.
- The system should provide the facilities for importing data from excel files into the database.
- The system should provide the facilities for searching the project details by retrieving the data from the database.
- The system should provide facilities for generating various types of informative reports and export into excel files.

❖ **Non-functional features**

- The security of sensitive and confidential information should always be protected and invisible to users without correct privilege.
- The system should be able to carry out its operations at optimum performance.
- A certain coding standards are followed in order to make sure that the development team is following so that it can be easily maintainable.

1.5.2 Milestones

The project schedule of the FYP Management System is shown in Table 1.1.

Table 1.1: Project Schedule

Milestone	Milestone Goal	Deadline
Distribution of Task	To confirm project scope and individual task.	23/3/2018
Database Design	To produce a blueprint of database.	25/5/2018
Introduction (Documentation)	To document project scope.	8/6/2018
Background Research (Documentation)	To carry out background research to gather requirements.	29/6/2018
Methodology and Requirement Analysis (Documentation)	To present the results of the gathered requirements.	13/7/2018
System Design (Documentation)	To present design diagrams.	27/7/2018
Coding or Changes	To start coding the system or make changes if necessary.	27/9/2018
Desk Checking	To perform check in algorithms manually.	1/10/2018
Combination of Modules	To combine all the works or modules into a complete system.	11/10/2018
Presentation of Results and System Preview	To present test case or experiment plan	26/10/2018

Final Testing	To run tests on the system. For example, unit test, integration test and etc.	9/11/2018
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1.5.3 Software Development Model

The software process model that we chose is waterfall model. It is also referred to as a linear-sequential life cycle model. In a waterfall model, each phase must be completed before the next phase can begin and there is no overlapping in the phases (CERTIFICATION, 2017). The waterfall model diagram is shown in Figure 1.2 below. There are several reasons for us to choose this process model. The first reason is because the user requirements are very well known, clear and fixed. There are no ambiguous requirements. Apart from this, waterfall model is suited for milestone-focused development like our system. Due to the inherent linear structure of a waterfall project, such applications are always well-suited for organizations or teams that work well under a milestone- and date-focused paradigm. With clear, concrete, and well understood stages that everyone on the team can understand and prepare for, it is relatively simple to develop a time line for the entire process and assign particular markers and milestones for each stage and even completion.

Agile model is also selected as the software development model for the entire project, after having meeting with the supervisor and team members. According to (ISTQB EXAM CERTIFICATION, 2017), agile development model is also one type of incremental model and, software is developed in incremental and rapid cycle. He also stated that small increments that are released are based on the functionalities of previous increments. The model emphasizes frequent and rapid delivery of working software product.

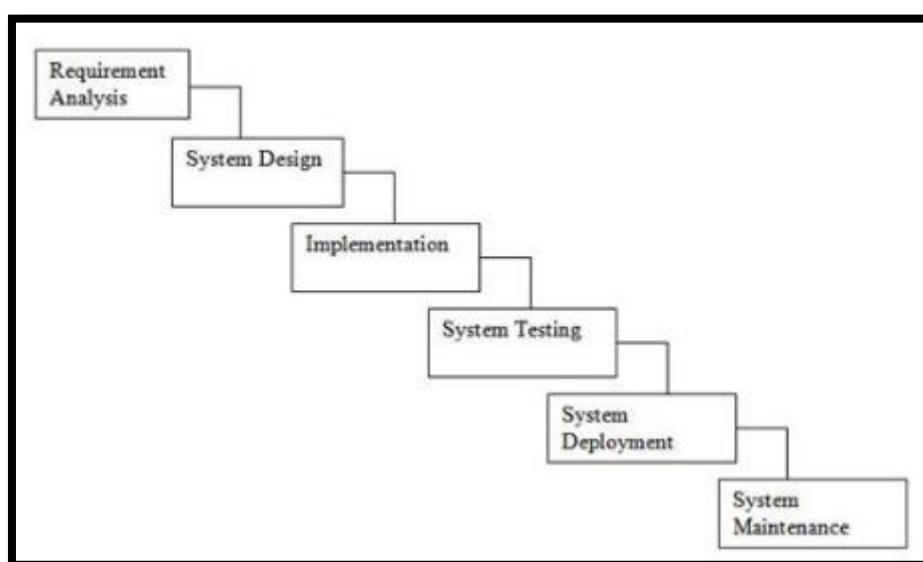


Figure 1.2: Waterfall Model Diagram

1.5.4 Testing Approach

Each of the functions or modules will be tested by our team members to ensure that each function is functioned well and come out with the expected result.

- ❖ **Level:** Unit Test, Integration Test, System Test, User Acceptance Test
- ❖ **Category of Technique:** Manual Testing

1.6 Project Team and Organization

The project team and organization of the FYP Management System is shown in Table 1.2.

Table 1.2: Project Team and Organization

System Modules	Tee Sheng Kang	Tee Ren Mian	Tan Yi Ying	Yap Kai Jean
Supervisor, Cohort and Data Management	x			
Student and Cohort Management		x		
Assessments and Forms Management			x	
Project List and Workload Management				x

1.7 Chapter Summary and Evaluation

In this chapter, as a summary, the main objectives of the system were discussed. Objectives that have been listed are to automate the coordination tasks in the FYP Management Process, provide a better and scalable data management and provide timely generation of the useful reports. Besides, the problem statements of the current FYP management process and the proposed solution were discussed. Furthermore, the background of TARUC, the current FYP management process and the target users or beneficial users for FYP Management System were mentioned. Other than that, the advantages of the system towards the beneficial users such as FYP committee, staff and students were listed. The functional requirements of the Assessments and Forms Modules in the system and the non-functional requirements for the overall system were included in this chapter. Lastly, the project schedule and the software development model used in the project had been highlighted. Waterfall model is used as the software development model. Testing approach such as Unit Test, Integration Test, System Test and User Acceptance Test were also mentioned in this section.

Chapter 2

Literature Review

2 Literature Review

The company background, project background, literature review, feasibility study of the project will be included in this chapter. The literature review in this chapter will be focused on Model-View-Controller (MVC) architecture pattern. Some comparison between MVC with the other architecture patterns will be highlighted as well.

2.1 Company Background

According to (TARUC, 2018), Tunku Abdul Rahman University College ('TAR UC'), formerly known as Tunku Abdul Rahman College ('TAR College'), is a premier institution of higher learning in Malaysia set up in 1969 by the Malaysian Chinese Association (MCA) to provide quality and affordable tertiary education to Malaysians. The University College has a remarkable reputation in academia and industries for its high academic standards and well-trained graduates. It has a track record of excellence for over four decades and, the University College has a huge student population of about 28,000 pursuing tertiary education in its KL Main Campus and five campuses which are in Sabah, Pahang, Perak, Johor and Penang. TAR University College has produced more than 190,000 graduates, many of them are high achievers and leaders in different professions and industries, contributing to the development of our nation. There are seven main faculties in the University College. They are Faculty of Engineering and Technology (FOET), Faculty of Communication and Creative Industries (FCCI), Faculty of Social Science and Humanities (FSSH), Faculty of Computing and Information Technology (FOCS), Faculty of Applied Sciences (FOAS), Faculty of Built Environment (FOBE) and Faculty of Accountancy, Finance and Business (FAFB). The department organization chart for TAR University College is showed in Figure 2.1 while the faculty organization chart for TAR University College is showed in Figure 2.1. The University College offers more than 100 programmes at pre-university, Diploma and Degree levels. These programmes cover several fields, ranging from professional programmes in accountancy, engineering and built environment, business and management, finance and ICT, to disciplines in applied science, microelectronics, mass communication, creative arts, hospitality management and social science as well as Foundation and A Level.

The University College primarily targets students who had just finished their SPM, STPM, A-Level or Diploma, from other institutions or schools. A lot of renovation works were carried out in the past few years to refresh all the obsoleted facilities. Until now, a lot of renovation and refreshing works are still going on as well as adding new facilities, in order to gain competitive advantage and also to support the increasing student population.

The current system used in managing FYP tasks is not computerized, and rather in traditional manual way with partial computerization, which is ineffective and inefficient. It is carried out manually with the use of Google sheets, which would cost a lot of time to the FYP committee, for planning FYP related tasks such as schedule, assigning supervisors to the specific programme or for students, managing the assessment of rubrics, assessments and etc.

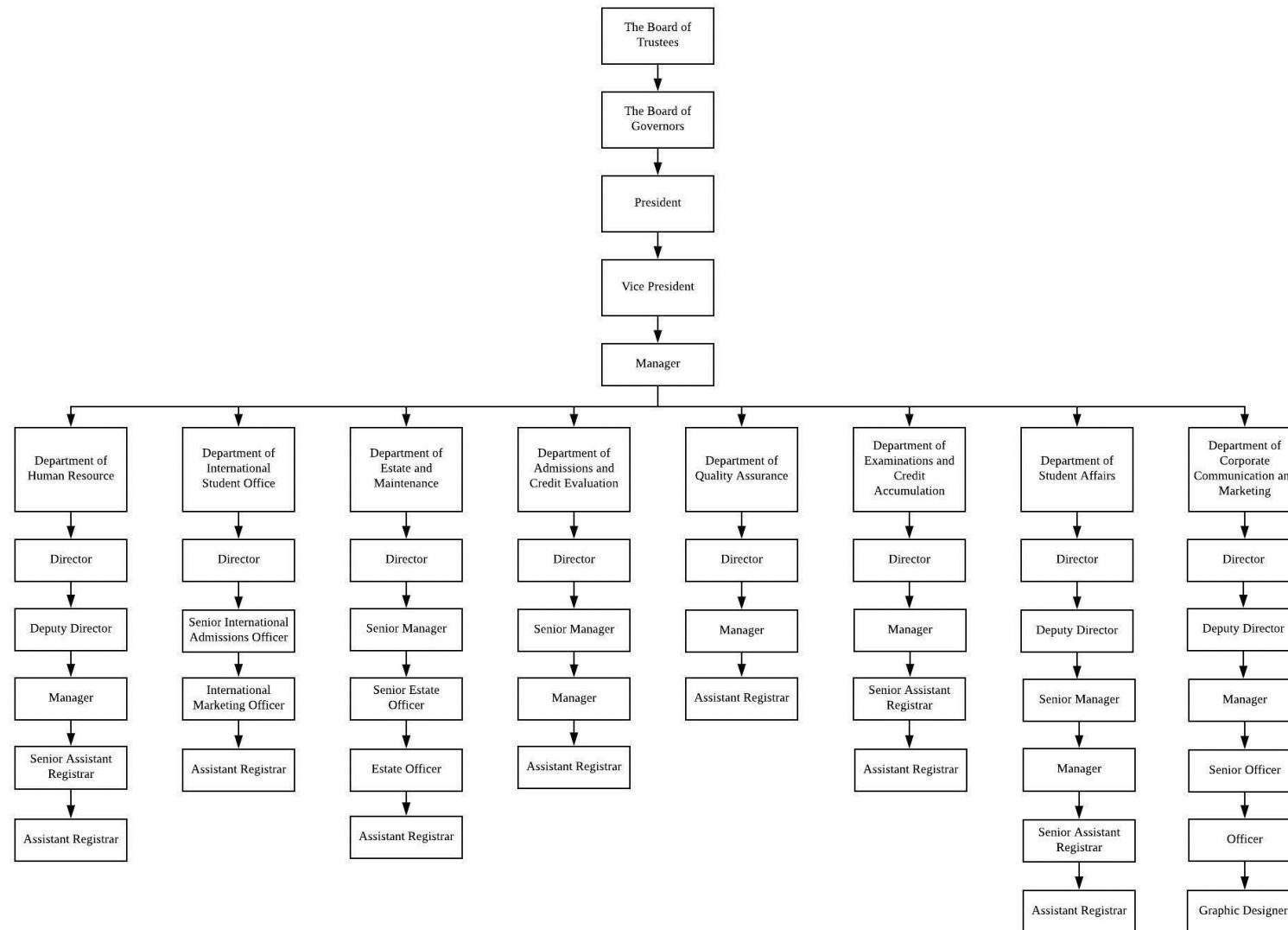


Figure 2.1: Department organization chart for TAR University College

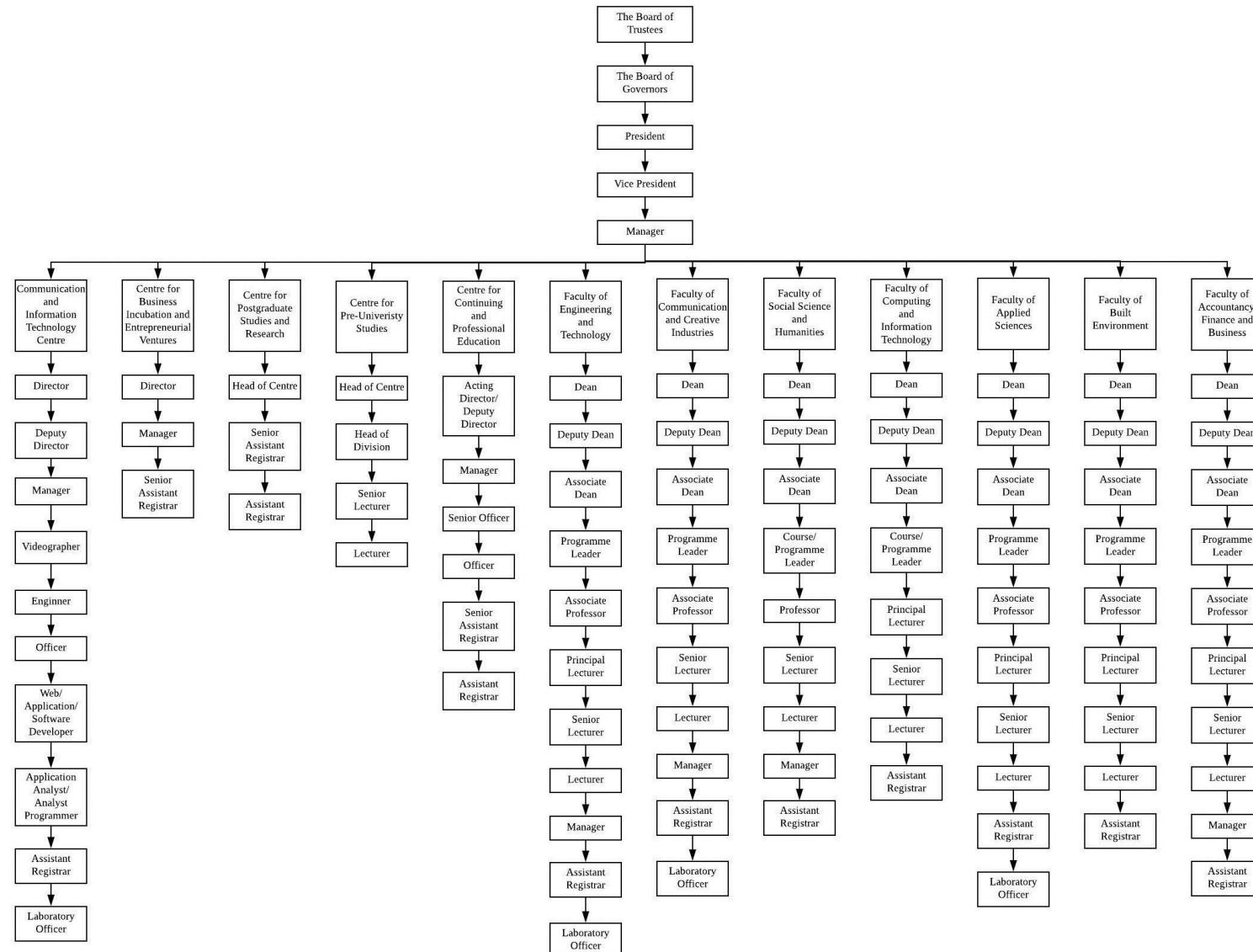


Figure 2.1: Centre and faculty organization chart for TAR University College

2.2 Project Background

TAR University College belongs to private sector. There are some projects or systems which are similar to the project that we are working on, found on the Internet.

The FYP management system is similar to a typical course management system (CMS) or a project management system. One of the articles found on the Internet which is similar to the proposed FYP management system is “The Development of a Final Year Project Management System for Information Technology Programmes” done by Leung Chun Hang, Lai Chung Lun, Yuan Tsun Kit, Pang Wai Man, Jeff Tang, Ho Wai Shing and Wong Tak Lam (Leung et al., 2015). The students developed an online platform which facilitates the final year projects (FYP) process implemented by their information technology programme. In order to allow different parties to contribute and communicate more efficiently, they have designed and developed a comprehensive web-based system to better support the three kinds of users, they are the FYP programme organizer (PO) or administrator, project supervisors/marker and the project group members. Their system is divided into five modules based on their functionalities, they are project allocation module, communication module, project management module, file sharing & repository, and submission & grading module. Our system also contains similar functional modules as theirs.

While Clocking IT (ClockingIT.com, 2008) is a general project management system with licensing free of charge. It provides basic management function like task management with priority assignment to tasks, so that project manager can better arrange manpower and plan the schedule of project. Moreover, it has chat function and forum for ease of communication, while at the same time, it provides share folders for user to access documents and source code simultaneously. This system also included some advanced functions like Gantt chart generator which is a standard tool for project scheduling.

Ross Clement and Peter Bounds (Clement and Bounds, 2018) shared similar goal as our system in facilitating the management of FYP. While, their focus was to better connect students with potential supervisors before the project allocation starts. Their system also included tools for assessment submission and collection which are normal functions in a CMS.

The HKU CS Project Management System (cs.hku.hk, 2018) is a project management system that developed in the University of Hong Kong, Department of Computer Science. The system can show project information, news, schedules and project allocation. In the main page of this system, it includes functions like blogs, calendar and forms downloading. Also, there is a list of projects

and related information, as well as some advanced function like providing a virtual machine for students as servers for their FYP.

Generally, the project aims to automate the FYP management process in institutions which are still involving manual process. After implementing this project, if successful, FYP committee from the institution will be benefited the most because they are the personnel who are responsible for managing the FYP tasks every cohort. Besides, supervisors will be benefited also as the number of errors made by the supervisors such as wrong calculation of marks due to the Google Sheets sensitivity will be reduced as sensitivity issues are avoided. Students will also be benefited in the aspects of uploading and editing their forms, proposal or documents. Currently, the existing processes for all three parts (or processes) are as follows:

The process flows for Project I are as follow:

1. FYP Committee identify the cohort(s) for FYP.
2. FYP Committee identify the supervisors for the specific cohort.
3. FYP Committee prepare and maintain the project list and assessment rubrics for the particular cohort.
4. Supervisors update the student accepted list.
5. FYP committee assign supervisors to the remaining students who do not have supervisor.
6. Students submit the hardcopy of Form 1 - Student Details, Form 2 - Project Proposal, Form 3 - Project Proposal Moderation by printed them out and emailed the softcopy of the forms to their supervisor.
7. Moderators moderate and enter marks for the proposals.
8. Supervisors enter the marks for the proposals and the other criteria in Project I.
9. Mark List for Project I is compiled by programmes.

The process flows for Project II are as follow:

1. Students submit abstract, search keywords, full text, poster and source code.
2. Supervisors and moderators enter marks for Project II.
3. Mark List for Project II is compiled by programmes.
4. Programmer leaders select samples for digitization.

The process flows for FYP Showcase and Competition are as follow:

1. FYP showcase committee specify the competition tracks.
2. Supervisors recommend projects for FYP showcase.
3. FYP committee prepare judging forms.
4. Management identify judges for semi-finals and finals.
5. Students submit competition abstract and poster.
6. Semi-finals judging.
7. Booklet committee extract abstract for booklet.
8. Finals judging.
9. Competition committee generate soft skills form details for students' participation and wins.
10. Competition committee submit soft skill record form.
11. Competition committee maintain students' external competitions and participation.

2.3 Literature Review

Web application frameworks are managed by using different design strategies. Design strategies are applied by using different design processes. In each design process, requirement specifications are changed into different design model that describe the detail of different data structure, system architecture, interface and components. Web application framework is implemented by using Model View Controller (MVC) and Model View Presenter (MVP). These web application models are used to provide standardized view for web applications. Model-View-Controller is a well-known software architectural pattern and is widely used in its original form or its variations. General Responsibility Assignment Software Patterns (GRASP), a widely known Object-Oriented guideline, is a set of techniques that help on developing object-oriented designs in a rational and explainable way.

2.3.1 Model-View-Controller

Model-View-Controller (MVC), introduced by Trygve Reenskaug in the Smalltalk community in the late 1970s was one of the first solutions to approach the Smart UI problem (Fowler, 2003). According to Reenskaug (2007), he stated that, "*MVC was created as an obvious solution to the*

general problem of giving users control over their information as seen from multiple perspectives.” MVC is an architecture pattern that has been created with the objective of providing ways for increasing the modularity of the software systems, dividing the responsibilities and facilitating the development, understandability and modifiability of software applications. MVC is used to divide an application, or just a small part of an application into three parts, model, view and controller as shown in Figure 2.3.1.1. It was originally developed to map traditional input, processing and output (Sommerville, 2011) as shown below:

Input → Processing → Output

Controller → Model → View

- Model

The model represents data and the rules that govern access to and updates of this data. Model is responsible for actual data processing, like database connection, querying database, implementing business rules (Pressman and Maxim, 2015). It delivers data to the view without taking any consideration about the presentation and transformation of data. The data processed by the Model layer of MVC is transparent from its presentation so this technology has an edge that multiple views can be attached with the same data without any code idleness. Also different presentations of the data are independent from each other but based on the same data and are observing for the changes in the model. This improves the code maintenance with minimized errors and increased reusability. Model notifies the view when a state change occurs in the model triggering application of that change in the view.

- View

The view renders the contents of a model. It specifies exactly how the model data should be presented. When the model data changes, the view must update its presentation as needed. This can be achieved by using a push model, in which the view registers itself with the model for change notifications, or a pull model, in which the view is responsible for calling the model when it needs to retrieve the most current data (Dey, 2011).

- Controller

The controller translates the user's interactions with the view into actions that the model will perform. In a stand-alone GUI client, user interactions could be button clicks or menu selections, whereas in an enterprise web application, they appear as GET and POST HTTP

requests. Depending on the context, a controller may also select a new view -- for example, a web page of results -- to present back to the user (Dey, 2011).

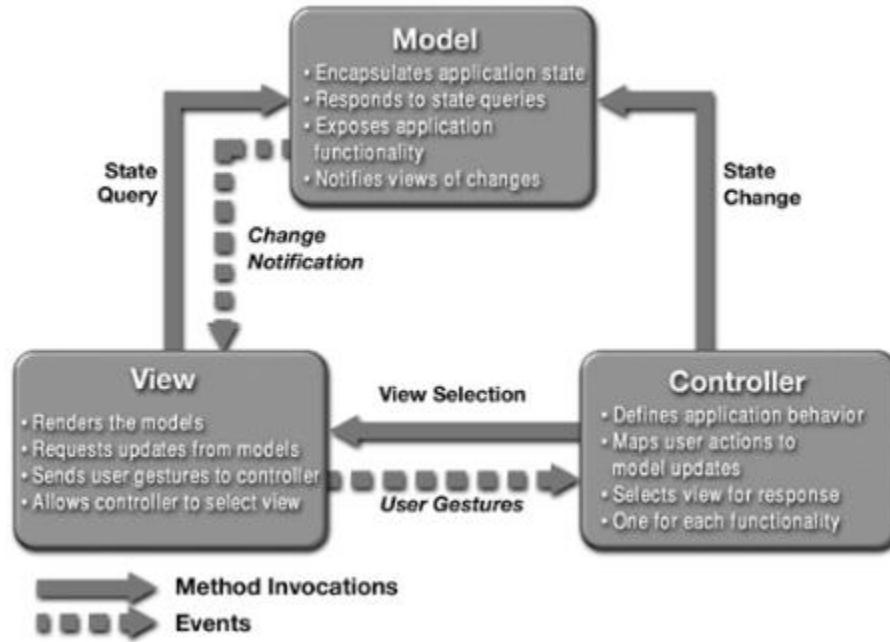


Figure 2.3: Interactions between MVC

2.3.2 Relationship between Model, View and Controller

According to Aihara and Torkar (2009), the relationship between the model, view and controller can be in two distinct forms, called passive and active and are closely related to the behavior of the model.

- Passive Relationship

In the passive relationship, the model does not activate any action on the controller or the view. In this case, the role of the model is passive, being basically executing commands from the controller and providing information to the view. Generally in this situation, the controller is responsible for updating the view according to the changes that are executed into the model (Aihara and Torkar, 2009). Figure 2.4 shows the relationships in the passive mode.

- Active Relationship

In the active relationship, the model informs the view about its updates. In this way, when a model is updated, it informs the views that are related to this model about this update. Then, the views can take the necessary actions to refresh themselves. In the case where the model is isolated from the view in a lower layer, the model is not allowed to have a direct reference to

the view. For this case, the usage of the Observer pattern makes this communication possible: the model keeps reference to an interface, which is implemented by the view. Figure 2.5 shows the relationships in the active relationship. In this figure, the actions that exist in the passive relationship as well are dashed in order to emphasize the relationships in the active relationship. There are some situations where the model needs to inform not just the views, but also the controllers about its updates. In this case, views and controllers will implement the Observer pattern and receive the updates from the models. One of the cases is where the controller needs to control if some user interface controls are enabled or disabled, based on the model (Aihara and Torkar, 2009). This situation is shown in Figure 2.6.

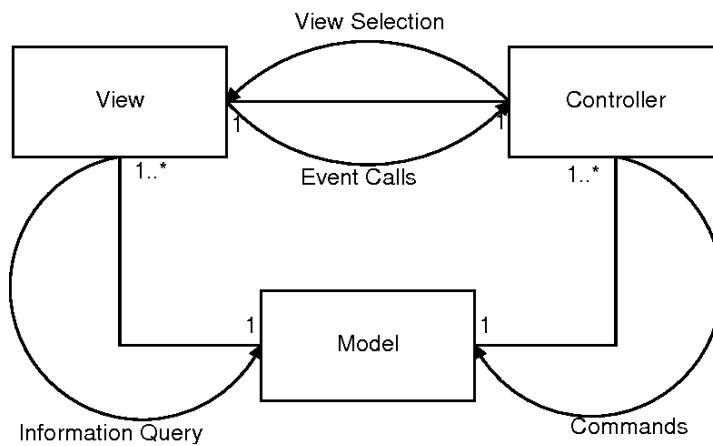


Figure 2.4: Relationship in passive MVC relationship

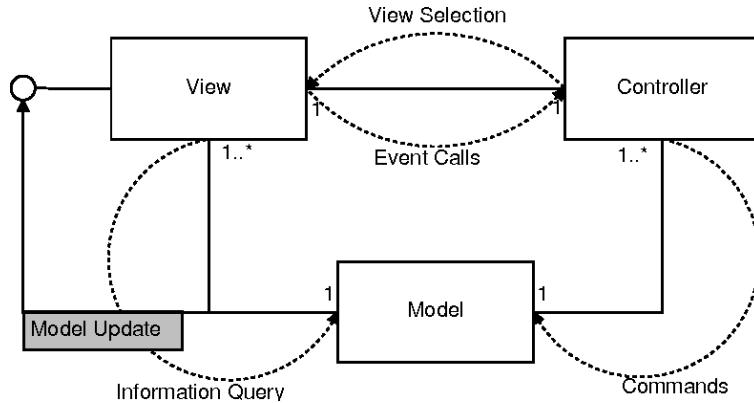


Figure 2.5: Relationship in active MVC relationship

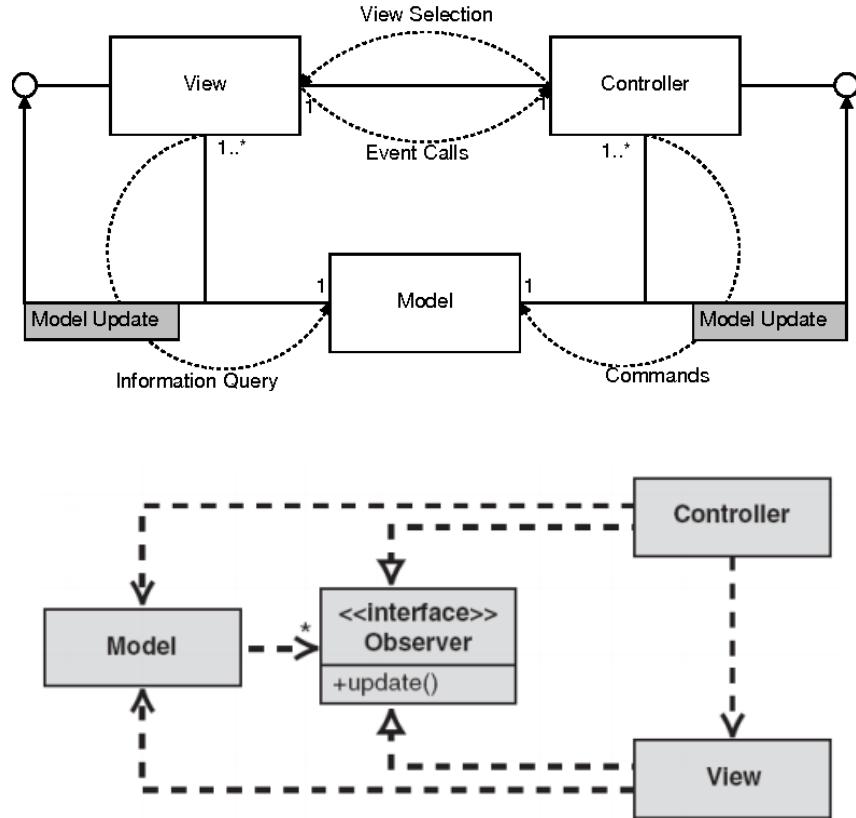


Figure 2.6: Relationship in active MVC relationship with Observer in controller and view

2.3.3 GRASP Patterns

Larman, in his book *Applying UML and Patterns: An Introduction to ObjectOriented Analysis and Design and Iterative Development* proposed the General Responsibility Assignment Software Patterns (GRASP), which is a set of techniques that help on developing object-oriented designs in a “methodical, rational, explainable way” (Larman, 2002). Those patterns are based on the concept of responsibility, which is related to what an object does (actions) and knows (information). According to (Aihara and Torkar, 2009), there are nine GRASP patterns, the summary of the patterns are described in the Table 2.1 below:

Pattern	Description
Information Expert	<p>Problem: Finding the responsible for providing a specific information.</p> <p>Solution: Assign the responsibility of providing an information to the class that has the necessary tools for that.</p>

Creator	<p>Problem: Finding the responsible for creating a new instance of a class.</p> <p>Solution: The creation of an object of Class1 shall be invoked by Class2 if: 1. Class2 contains or aggregates Class1 2. Class2 has the values that are need to create objects of Class1</p>
Controller	<p>Problem: Centralize the interactions between the user interface and the system.</p> <p>Solution: Create classes that are responsible for handling the requests from the user interface.</p>
Low Coupling	<p>Problem: Reduce the dependency, change impact and improve the code reuse.</p> <p>Solution: Keep in mind the aim of lowering the coupling when assigning responsibilities to the classes.</p>
High Cohesion	<p>Problem: Maintain the objects understandable and manageable.</p> <p>Solution: Keep in mind the necessity of maintaining the cohesion of the design when making decisions</p>
Polymorphism	<p>Problem: Handling alternatives based on type.</p> <p>Solution: Use polymorphic behavior on the operations of the classes where the behavior vary.</p>
Pure Fabrication	<p>Problem: How to maintain cohesion and coupling and improve the solution proposed by expert.</p> <p>Solution: Create an artificial behavioral class that contains a set of highly cohesive operations.</p>
Indirection	<p>Problem: How to avoid direct coupling between two entities.</p> <p>Solution: Create an intermediate class that will represent one class to the other element.</p>

Protected Variations	Problem: Protect the system against variations and instabilities. Solution: Identify the points of predicted variations and instabilities. Create a mechanism to protect the system against those instabilities
Model-View Separation	Problem: How to reduce the coupling between the business logic and user interface. Solution: Separate those two elements into different layers.

Table 2.1: GRASP patterns

2.3.4 Differences between MVC Controller and GRASP Controller

As the term Controller exists in Model-View-Controller and GRASP patterns, Diogo Satoru Aihara had clarified the difference that exists between those two controllers. In both cases, the term controller is applicable as they centralize the manipulation of actions (Aihara and Torkar, 2009).

In the case of Model-View-Controller, controllers are responsible for handling the commands from the user. In this way, controllers are the elements that concentrate the manipulation of user commands inside the user interface. Moreover, each controller acts independently and is directly connected to its corresponding model element.

However, in the case of the GRASP controller, the controller is responsible for concentrating, inside its own package, the calls that this package will receive, making it a single entry point for communications. This controller has been designed with the intention of providing an element of indirection between the user interface and the business logic entities, reducing the coupling among those two packages.

Considering that the MVC controllers have direct contact with their respective models, the existence of those two controllers is mutually exclusive as the GRASP controllers existence is based on the fact that it concentrates all communications that would exist between the package that it belongs (in this case, business logic). Therefore, with the usage of MVC controller, the GRASP controller is not used and vice-versa.

2.3.5 Differences between the Architecture of MVC and MVP

Software infrastructure design is getting change day by day and the selection criteria of good design is based upon data transfer flow between application and target users. Figure 2.7 Figure 2.8 and Table 2.2 shows the comparison of MVC and MVP. MVP architecture shows that view has no direct relation with model while MVC has two “read data cases”. In MVC, view can read data directly from the model and perform declarative data binding of its controls (Qureshi and Sabir, 2013). Controller fetch data from model send it to the view then view again repeat the same process for controller (Qureshi and Sabir, 2013). Most of the data update clauses based upon the view that send updated form of the data and the controller check the state of the data and perform updates (Qureshi and Sabir, 2013).

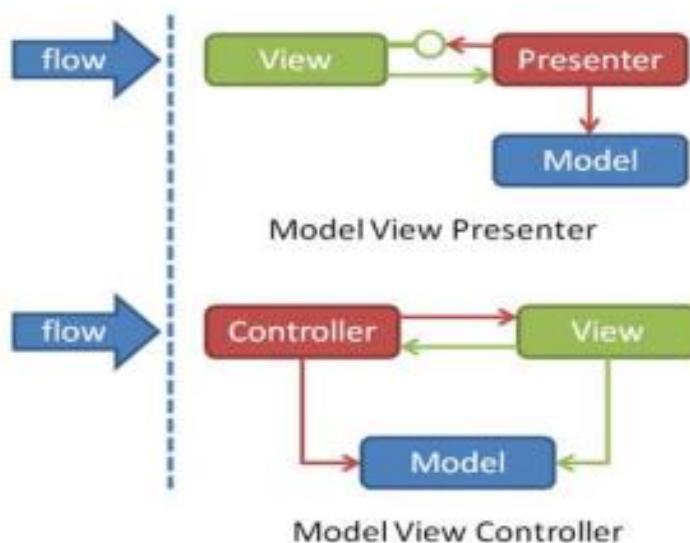


Figure 2.7: Comparison of MVC and MVP

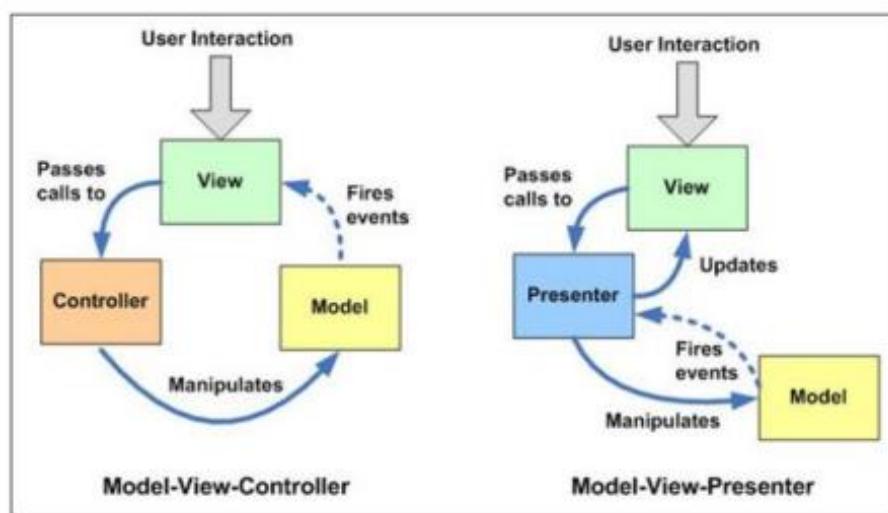


Figure 2.8: Comparison of MVC and MVP

Table 2.2: Comparison of MVC and MVP

MVP	Criteria	MVC
Presenter directly communicate to its corresponding view, and it is easy to supply the user information for a particular model. One can easily change the role of the multiple views for same presenter. No business logic is implemented in view.	Role of the View	Model is unable to directly link to its associated view.
There is no controller.	Role of the Controller	It allows any number of controller to handle the view, mostly in web application one view can be handled by different events, button can be accessed by using mouse, or focus, or pressing enter key. So, it is some time necessary to implements different action listener for multiple events. Figure 2.9 shows the navigation between view and controller.
Presenter is responsible for binding the Model to the View. It is the only one who can read and retrieve the data from the model. Presenter indirectly communicates with the view by using interface view.	Role of the Presenter	There is no presenter.
It is not allowed that one can maintain a direct reference with the presenter, for updating state of change associated with the events. View knows about the model in	Role of the Model	Model not only captures the state of one process attached to it but how that process works. Two different models can be created based upon different tasks

MVP but vice versa is not possible. Therefore, page cannot be updated that apply MVP pattern until we refresh it.		performed by different set of data. Page can be updated in the case of MVC architecture.
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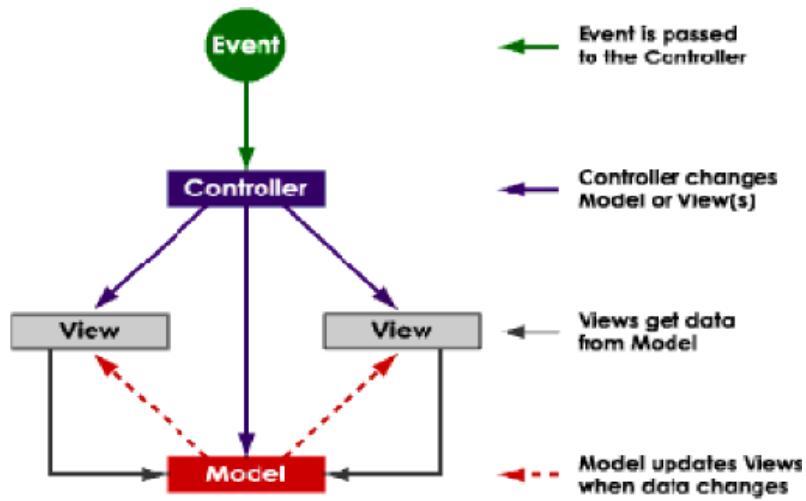


Figure 2.9: Navigation between view and controller

2.4 Feasibility Study

2.4.1 Economically Feasibility

This system will be deployed on the existing hardware thus no cost is required for installing and running the FYP management software. It is economically feasible.

2.4.2 Operational Feasibility

For the operational aspect, the costs and benefits of after the deployment of the FYP management system are taken into account. Firstly, for the related staff such as FYP committee, the need of having to work overtime for the staff is eradicated especially during the days when the workload is heavy. It is because the FYP committee is also the lecturers or tutors of TARUC, besides managing FYP tasks, they have to manage their own works too. This is mainly due to the reason that by automating the FYP processes, the demands of manpower are greatly reduced and, this in turn will reduce the workload of staff and the need to hire extra staff to cope with the extra work. Besides, the accuracy of results produced will be much higher compared to the involvement of manual process before the deployment of the FYP management system. With the new system, human errors are minimized as well. Thus, with the implementation of the new system, the cost for the entire FYP management process will be reduced as the need to work overtime and to hire extra staffs are eradicated as well as human errors are minimized. Hence, in a long run, the project is operationally feasible.

2.4.3 Technical Feasibility

For the technical aspect, all the developers in Research and Development team of this project are of IT background. The development tool used for the project is NetBeans IDE 8.2 which will provide a platform for us to develop this web-based FYP management system. With the guidance of project supervisors, the development for this project should be able to carry out smoothly. Hence, the project is technically feasible.

2.5 Chapter Summary and Evaluation

This chapter provided a description of the organization background as well as the project background. The components and relationships of MVC are discussed. The model is responsible for the business logic, which is the “behavior and data” of the application; the view is responsible for handling the presentation of the user interface; the controller is responsible for handling the requests from the user, when he/she interacts with the user interface. There are two distinct form of relationship between MVC which are passive relationship and active relationship. Besides, the

difference between the architecture of Model View Controller (MVC) and Model View Presenter (MVP) are listed in a table form. MVP architecture shows that view has no direct relation with model while MVC has two “read data cases”. The summary of 9 patterns of GRASP are provided in a table form and the comparison of controllers between GRASP and MVC are mentioned. In MVC, controllers are responsible for handling the commands from the user, they are the elements that concentrate the manipulation of user commands inside the user interface. However, in GRASP controller, the controller is responsible for concentrating, inside its own package, the calls that this package will receive, making it a single entry point for communications.

In addition, the economic feasibility, operational feasibility and technical feasibility of the project were discussed. In economic feasibility, a procurement of a new server is suggested in order to run the FYP management software optimally, with all the costs included. In operational feasibility, the costs and benefits after the implementation of the FYP management software are studied. For instance, lower demands for manpower, eliminate overtime work, higher accuracy for results produced and etc. In technical feasibility, the development team is of IT background and with the assistance and guidance of project supervisor, the development work should be able to carry out smoothly.

Chapter 3

Methodology and Requirements Analysis

3 Methodology and Requirements Analysis

This chapter discusses the methodology use in this project, the project scope, development and operational environment and also functional and non-functional requirements.

3.1 Methodology

Currently, the problems that users are facing are that the FYP management system is not entirely computerized and a lot of manual processes are still involved. This directly affects the efficiency and accuracy of the entire process. The demand of manpower increases as well. Users are looking forward to computerize the entire process so as to reduce their workload and stress in managing the FYP tasks. The software development model used is Hybrid of Agile and Waterfall model.

3.1.1 Fact Gathering

In this section of fact gathering firstly, literature review on similar system is done. Literature review is a basis for research in almost all academic fields. The knowledge or useful technique gathered from literature review can be applied into the system if possible and this will definitely make the system better. In this case, reports, journals, research papers and other reliable sources are studied to extract and summarize the background information of the similar systems for FYP management system. The purpose of summarizing the background information of the similar system is to have a better understanding of the functions and design of the other FYP management system. Besides, a study on the characteristic of Model-View-Controller (MVC) and the comparison of MVC with the other software architectural patterns are carried out in the literature review part. After carried out the study, a deeper understanding of the MVC software architectural patterns were acquired. MVC is the most suitable patterns to be applied in FYP Management System because it enables the full control over the rendered HTML and provides clean separation of concerns.

Secondly, document inspection is done. Some sample documents such as the process flow of FYP, supervisor list, student accepted list, supervisor-student list, student FYP details, rubric forms and mark summary are provided by FYP committee, Ms Kathleen. The sample documents of process flow are attached in Appendix A while the other documents are attached in Appendix B. The sample documents provided are inspected to get to know the overall FYP management process better. This will be important for everyone in the team of developers to know the actual or hidden requirements better and so to develop a system which satisfies the users. For example, the slides of the process flow of FYP provided by the FYP committee, provides everyone in the

team an overview about the flow of the overall process of FYP and the basic requirements of the system. The rubric form sample provided gives an outline of designing the template of the assessment rubric while the sample of mark summary gives an idea of what details should be included in the report and how the information should be displayed.

3.1.2 Fact Recording

i. Organizational Chart

An organizational chart is a diagram that shows the structure of an organization and the relationships and relative ranks of its parts and positions or jobs. Organizational charts were drawn to display the department, centre and faculty structure of TAR University College.

ii. Use Case Diagram

A use case diagram is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. In this case, use case diagram is used to obtain the complete and unambiguous specification of the requirements that are discussed and required by the clients, FYP committee. Besides, use case diagram is able to document the functionality of the system from the users' perspective. The interactions between the user and the system are able to show from the use case diagram.

iii. UML Class Diagram

UML Class diagram is a type of static structure diagram that describes the structure of a system. In this case, class diagram is used in FYP Management System to show the system's classes, their attributes, operations (or methods), and the relationships among objects.

iv. Entity-Relationship Diagram (ERD)

Entity-relationship diagram (ERD) is a data modeling technique that graphically illustrates an information system's entities and the relationships between those entities. It is a conceptual and representational model of data used to represent the entity framework infrastructure. An ERD provides a visual starting point for database design that can also be used to help to determine the FYP Management System requirements.

v. Activity Diagram

Activity diagram is basically a flowchart to represent the flow from one activity to another activity. The activity can be described as an operation of the system. The control flow is drawn from one operation to another. Activity diagram were included in this project to allow the developer to clearly understand the steps and sequences from one activity to another activity.

3.2 Requirement Analysis

3.2.1 Project Scope

The entire FYP management system is generally divided into three process or sub-systems. They are Process 1: Project I, Process 2: Project II, Process 3: FYP Showcase and Competition.

For Process 1: Project I, the main function of this process or sub-system is to carry out all the FYP tasks of Project I.

For Process 2: Project II, the main function of this process or sub-system is to carry out all the FYP tasks of Project II.

For Process 3: FYP Showcase and Competition, the main function of this process or sub-system is to carry out the FYP tasks that are related to showcase and competition.

The process and tasks handled in Project I and II were broke down into several modules, which are Cohort Module, Supervisor Module, Student Module, Project List Module, Assessment Module, Forms Module, Workload Module and Authentication and Authorization. The functional modules of the system is shown in the Figure 3.1.

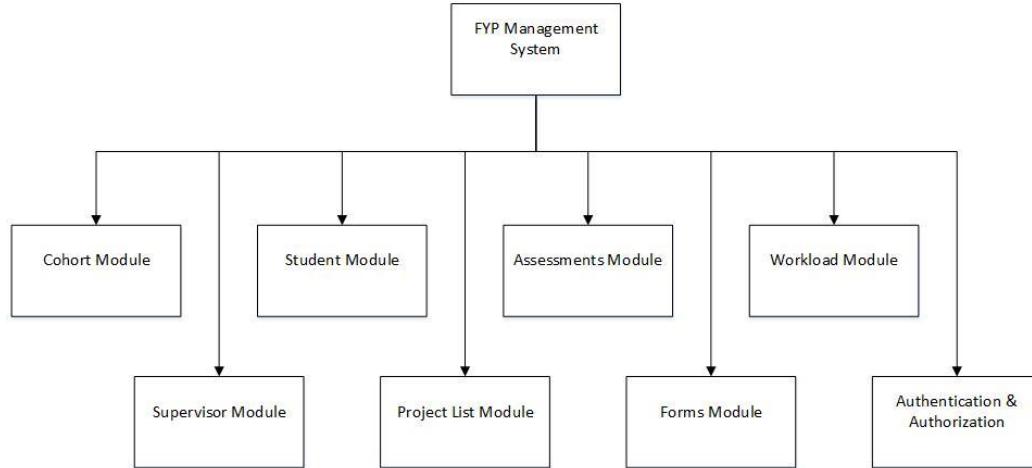


Figure 3.1: Functional Modules of FYP Management System

The module that I handle is Forms and Assessments Module in Process 1, Project I and Process 2, Project II.

There are several tasks to be handled in this module as in the following:

1. Forms Module

This module will implement the facilities to create, upload, download, retrieve and update different kind of forms for the FYP committee, supervisors, moderators and students.

2. Assessments Module

This module will implement the facilities to upload, download, create, retrieve, update, compile the final marks and grades into report and export it to excel file or PDF format for the FYP committee and the students.

3.2.2 Development Environment

For the development of this project, various software tools and hardware used are as follows:

1. Visual Studio Code 1.25

Visual Studio Code is a source code editor developed by Microsoft for Windows, Linux and macOS. It includes support for debugging, embedded Git control, syntax highlighting, intelligent code completion, snippets, and code refactoring. This development tool is selected because it is multi-tabbed and it enables the developers to organize files by folder or project for installed languages. Besides, there is a

comprehensive list of extensions available for installing in the online marketplace, the steps of installing is as easy as clicking one button.

2. Laravel

It is a free, open-source PHP web framework, intended for the development of web applications following the model–view–controller architectural pattern and based on Symfony. This web application framework is chosen because it makes the best use of HTML, builds the efficient websites and applications and makes the development process quite easier. In this case, Laravel Web Development simplifies the web development process by easing the common tasks such as routing, authentication, sessions, and caching.

3. Bitnami WAMP Stack

This tool provides a complete, fully-integrated and ready to run WAMP development environment. It includes MySQL server and Apache Web Server as a package. Developers do not need to spend extra time downloading, installing and setting up these database and web server themselves. Thus they have more time to focus on business logics of the program to be developed.

4. Apache Web Server

This is a free and open-source cross platform web server. It is the most widely used web server software. Most developers like it because it is fast, reliable and secure. Also, it is not difficult to set up and configure. Developers can get the web server up within a short period of time.

5. MySQL

This is an open-source relational database management system which is developed by Oracle Corporation. It is the most popular open source database because it delivers reliable, high-performance and scalable web-based database application. Besides and most importantly, it comes with integrated transaction safe, ACID-compliant database with full commit, rollback, crash recovery and row-level locking capabilities.

6. HeidiSQL

HeidiSQL is a free and open-source administration tool for MySQL and its forks, as well as Microsoft SQL Server and PostgreSQL. It is an excellent tool for managing a MySQL database and is a serious alternative to applications such as phpMyAdmin. It is selected

as the development tool because it provides a powerful graphic interface for managing tables, logs, and users of a MySQL database.

7. Programming Language

- PHP 7.1.16
- HTML 5
- SQL

8. IBM Rational Software Architect for WebSphere Software

This software tool is used to create use case diagram and activity diagram of the sub-system. It provides simple and easy to use interface with clear navigation. This tool is able to create not only use case diagram but other diagrams as well, such as sequence diagram, UML class diagram, state machine diagram and etc.

9. Lucidchart

It is a web-based commercial service which allows users to collaborate and work together in real time to create flowcharts, organisational charts, website wireframes, UML designs, mind maps, software prototypes, and many other diagram types. In this case, this software tool is used to design the draft version of the database as well as Entity Relationship Diagram (ERD), UML class diagram and organizational structure chart. It is used because it is not too complex and, once the database or class design is completed, the diagram can be downloaded easily in a various kind of format such as JPEG, PDF, PNG and etc.

10. Microsoft Office Word 2013

The software tool, Word, in Microsoft Office Professional Plus 2013 suite is used to compile the data dictionary. The tool is used because the user interface is simple and easy to use. Besides, it provides powerful features such as ruler, margin and etc. which make formatting a document a lot easier.

11. Operating System: Microsoft Windows 7

12. Hardware

- Processor: Intel x86-64 Processor (E.g. Intel Xeon E3 family, i3, i5 and i7)

- family)
- Memory: 8GB DDR3 1600MHz RAM
 - HDD: 1TB 7200rpm

3.2.3 Operation Environment

Minimum Hardware Requirement:

Processor	Intel Pentium or AMD Athlon or equivalent (x86-64)
Memory	2GB RAM or higher
Storage	5GB or higher available space
Additional Notes	Software execution maybe sluggish. Suggest having more storage for huge database.

Software Requirement:

Operating System	Microsoft Windows 7 x64 or Windows Server 2008 R2 or equivalent
Database	MySQL
Development Tool	Visual Studio Code (version 1.25)

3.2.4 Non-functional Requirements

1. Maintainability
 - A certain coding standards are followed in order to make sure that the development team is following so that it can be easily maintainable.
2. Performance
 - The system should be able to carry out its operations at optimum performance.
3. Integrity
 - The security of sensitive and confidential information should always be protected and invisible to users without correct privilege.

3.2.5 Functional Requirements

There are several functions included in the forms and assessment modules. The functional structure of forms module is shown in Figure 3.2 and the functional structure of assessment module is shown in Figure 3.3.

1. Forms Module

i. Create forms

The system should provide the facilities for the students to create form by filling in Form 1 Student Details and Form 3 Project Appointment Report.

ii. Upload forms

The system should provide the facilities for the students to upload Form 2 Proposal.

iii. Upload forms template

The system should provide the facilities for the staff to upload the form template for Form 2 Proposal and Form 4 Project Appointment Report.

iv. Download forms

The system should provide the facilities for the supervisors to download the Form 2 Proposal.

v. Download forms template

The system should provide the facilities for the students to download the template of Form 2 Proposal and Form 4 Project Appointment Record.

vi. Retrieve forms

The system should provide the facilities for retrieving the Form 1 Student Details, Form 2 Proposal, Form 3 Project Proposal Moderation and Form 4 Project Appointment Report.

vii. Update forms

The system should provide the facilities for the students and supervisors to update the Form 1 Student Details, Form 2 Proposal and Form 3 Project Proposal Moderation.

2. Assessment Module

i. Create assessment rubrics

The system should provide the facilities for staff to create the assessment rubrics for Project I and Project II by uploading a new version of assessment rubric.

ii. Retrieve assessment rubrics

The system should provide the facilities for the supervisors to retrieve the assessment rubrics for Project I and Project II.

- iii. Update assessment rubrics

The system should provide the facilities for supervisors to update the assessment rubrics by entering the marks and comments for Project I and Project II.

- iv. Generate report by compiling final marks and grades

The system should provide the facilities for the supervisors to compile the final marks and grades for Project I and II and generate it as a mark summary report.

- v. Export final marks and grades list

The system should provide the facilities for the supervisors to export the final marks and grades list into PDF file for Project I and II.

3.2.6 Use Case Diagram

The use case diagram for Form Module is shown in Figure 3.4 while the use case description of each use case is shown in Table 3.1, 3.2, 3.3, 3.4 and 3.5.

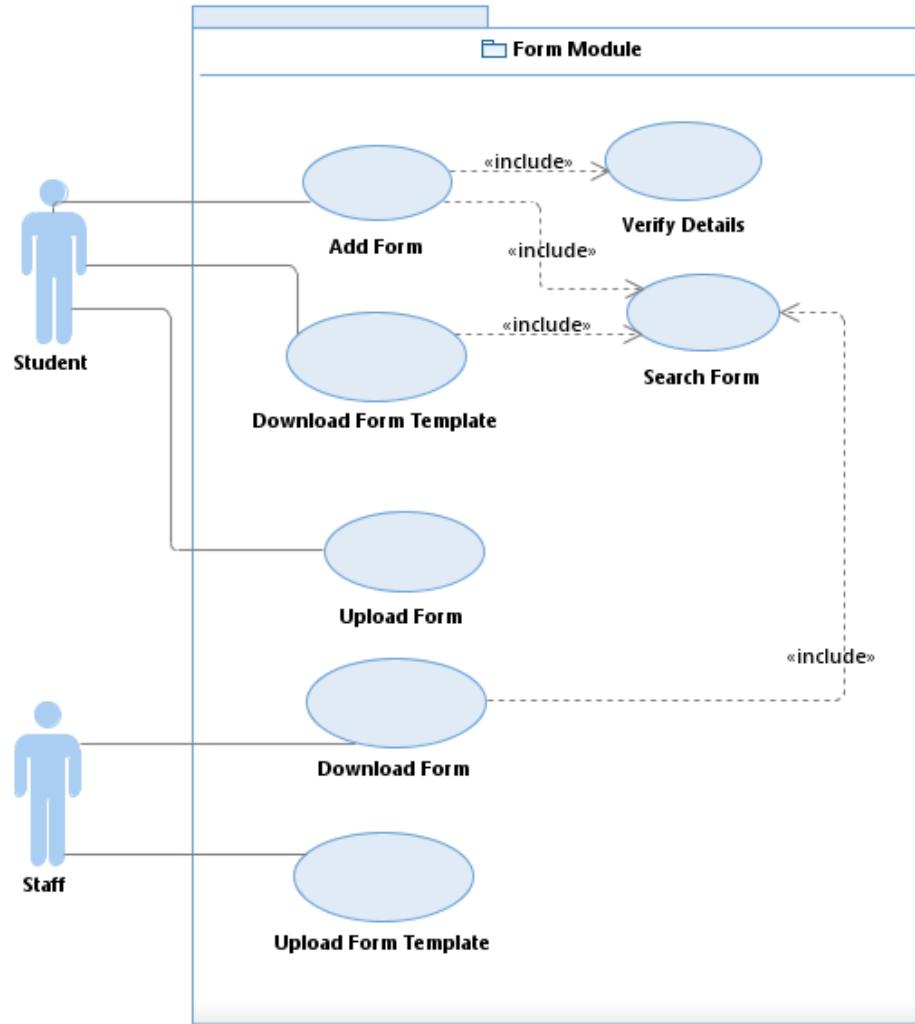


Figure 3.4: Use Case Diagram for Form Module

Table 3.1: Use case description for add form

Use Case	Add Form
Brief Description	This use case allows student to fill in Form 1 and Form 3.
Actor	TARUC Student
Precondition	TARUC student log in to his or her account.
Main Flow of Event	
Actor Action	System Response
1. Select form type.	1. Display instructions and request for form type.
2. Enter details.	3. Display selected form type. 5. Validate details entered.
	6. Save details entered and display successful message.
Alternative Flow	-
Post-condition	System update student form details into database.

Table 3.2: Use case description for download form template

Use Case	Download Form Template
Brief Description	This use case allows student to download template for Form 2 and Form 4.
Actor	TARUC Student
Precondition	TARUC student log in to his or her account.
Main Flow of Event	
Actor Action	System Response
1. Select form template type.	1. Display instructions and request for form template type.
2. Save the file to his or her device.	3. Get form template from storage. 4. Download to student web browser.
Alternative Flow	-
Post-condition	-

Table 3.3: Use case description for upload form

Use Case	Upload Form
Brief Description	This use case allows student to upload Form 2.
Actor	TARUC Student
Precondition	TARUC student log in to his or her account.
Main Flow of Event	
Actor Action	System Response
1. Select file to be uploaded.	1. Display instructions and request for file to be uploaded.
2. Provide confirmation.	3. Display confirmation dialog. 4. If confirm upload, display upload successful message.

Alternative Flow	A1. Step 4: If cancel download, cancel the process.
Post-condition	System stores the uploaded form into system folder.

Table 3.4: Use case description for download form

Use Case	Download Form
Brief Description	This use case allows staff which are supervisors and moderators to download Form 2.
Actor	TARUC Staff
Precondition	TARUC staff log in to his or her account.
Main Flow of Event	
Actor Action	System Response
	1. Display instructions and Form 2 submission list.
2. Select Form 2.	3. If select all, download all Form 2 to staff web browser.
4. Save the file to his or her device.	
Alternative Flow	A1. Step 3: If select certain Form 2, download selected Form 2 to staff web browser.
Post-condition	-

Table 3.5: Use case description for upload form template

Use Case	Upload Form Template
Brief Description	This use case allows staff to upload template for Form 2 and Form 4.
Actor	TARUC Staff
Precondition	TARUC staff log in to his or her account.
Main Flow of Event	
Actor Action	System Response
	1. Display instructions and request for file to be uploaded.
2. Select file to be uploaded.	3. Validate file type. 4. If file type is valid, display upload successful message.
Alternative Flow	A1. Step 4: If file type is invalid, display error message.
Post-condition	System stores the uploaded form template into system folder.

Figure 3.5 shows the use case diagram of Assessment Module. The use case description of each use case is shown in Table 3.6, 3.7 and 3.8.

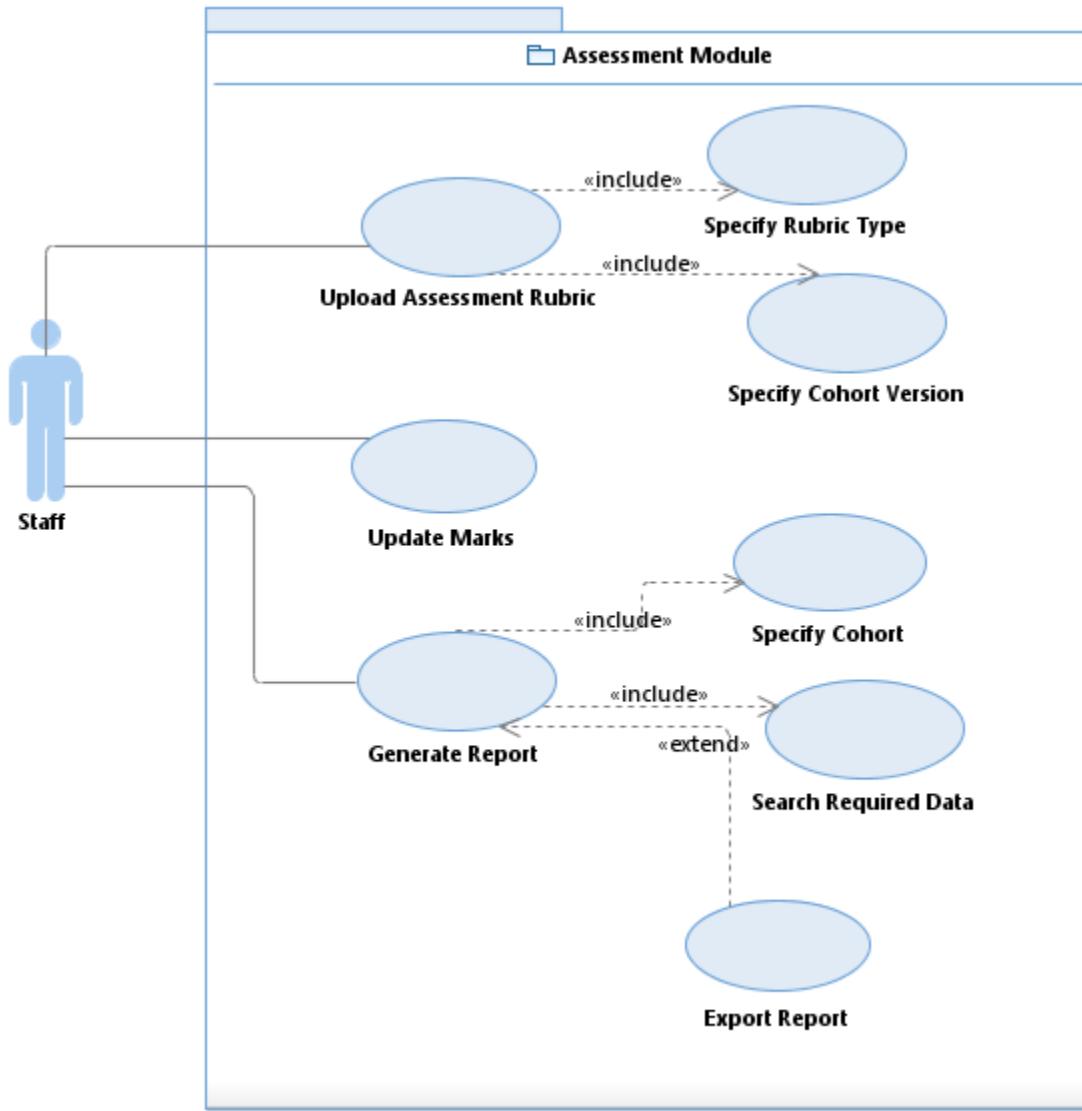


Figure 3.5: Use Case Diagram for Assessment Module

Table 3.6: Use case description for upload assessment rubric

Use Case	Upload Assessment Rubric
Brief Description	This use case allows staff to upload form two.
Actor	TARUC Staff
Precondition	TARUC staff log in to his or her account.
Main Flow of Event	
Actor Action	System Response
	1. Display instructions and request for rubric type.
2. Select rubric type.	3. Request for rubric upload.
4. Select rubric to upload.	5. Save new rubric and display successful message. 6. Request for rubric version for existing cohort.
7. Select rubric version for existing cohort.	8. Request for confirmation.
9. Provide confirmation.	9. If confirm, display successful message.
Alternative Flow	
	A1. Step 9: If cancel, cancel the process.
Post-condition	System stores the uploaded form into system folder.

Table 3.7: Use case description for update marks

Use Case	Update marks
Brief Description	This use case allows staff to update marks.
Actor	TARUC Staff
Precondition	TARUC staff log in to his or her account.
Main Flow of Event	
Actor Action	System Response
	1. Display instructions and assessment screen.
3. Select FYP group.	2. Request for FYP Group. 4. Request for selected FYP group student name.
5. Select student name.	6. Request for assessment type.
7. Select assessment type.	8. Display selected assessment type. 9. Request for marks and comments.
10. Enter marks and comments.	11. Request for confirmation.
12. Provide confirmation.	13. If confirm, display successful message.
Alternative Flow	
	A1. Step 13: If cancel, cancel the process.
Post-condition	System updates the marks in the database.

Table 3.5: Use case description for generate report

Use Case	Generate report
Brief Description	This use case allows staff to generate report.
Actor	TARUC Staff

Precondition	TARUC staff log in to his or her account.
Main Flow of Event	
Actor Action	System Response
	1. Display instructions and report generation screen.
3. Select cohort.	2. Request for cohort.
	4. Generate report.
6. Provide export confirmation.	5. Request for export confirmation.
	7. If confirm, export file in PDF format.
Alternative Flow	A1. Step 7: If cancel, end the process.
Post-condition	-

3.2.7 Discussion

The problem faced during requirement phase is the database design was not finalized and, there are many unclear or ambiguous attributes. This may make the development teams confused as they have no idea how the database stores data. For instance, facultyID attribute in faculty table stores ‘1’ or ‘FOCS’ is still unknown. Certain data are redundant and not useful for example, version of the project list in project table. Solution was a meeting for discussion was conducted with the development teams and supervisors. After the meeting, some of the ambiguities were solved.

3.3 Chapter Summary and Evaluation

In this chapter, the general problems that users faced, user objectives, software development model, fact gathering and fact recording are discussed. In fact gathering, literature review and document inspection are used. In fact recording, diagrams such as use case, deployment, structure chart and flowchart are used to depict the proposed system. In the requirement stage, a lot of ambiguities were discovered. However, these ambiguities were solved by having a meeting with the development teams of the FYP management system. Besides, the project scope with brief descriptions for overall FYP management system is documented. The development environment with various hardware and software tools used are provided and described in details. Then, operation environment with suggested hardware specifications which are required to run the proposed system are provided, as well as software requirements. Moreover, functional and non-functional requirements of the forms and assessment module in the process one and two of the system are documented. Lastly, discussions about problem faced during requirement phase and ways to resolve were discussed.

Chapter 4

System Design

4 System Design

In this chapter, detailed system design of the proposed system will be illustrated and described using various diagrams.

4.1 Data Design

4.1.1 Class Diagram

The purpose of designing class diagram is to describe the structure of FYP Management System by showing its classes, attributes, operations or methods and the relationship among the objects. Figure 4.1 shows the class diagram of Form and Assessment module.

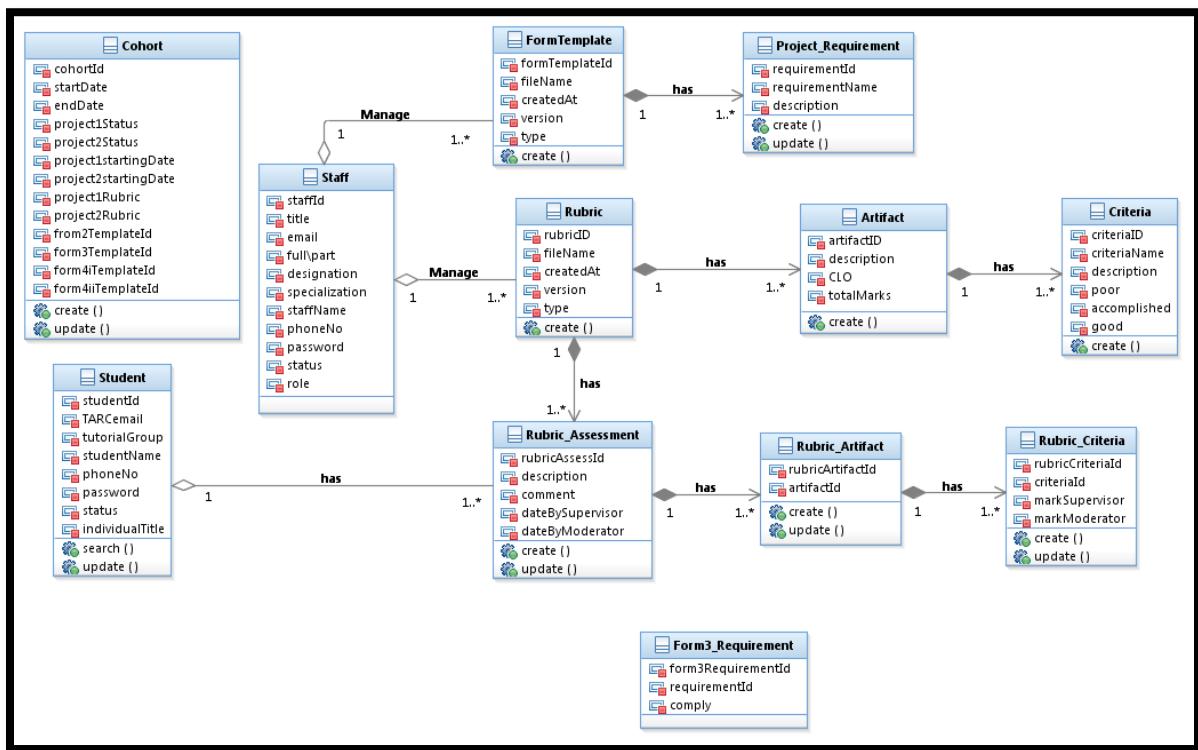


Figure 4.1: Class Diagram for Form and Assessment Module

4.1.2 Entity Relationship Diagram (ERD)

The entity relationship diagram in the Figure 4.2 graphically illustrates FYP management system's entities and the relationships between the entities. In simple terms, it is a picture or a framework of FYP's processes.

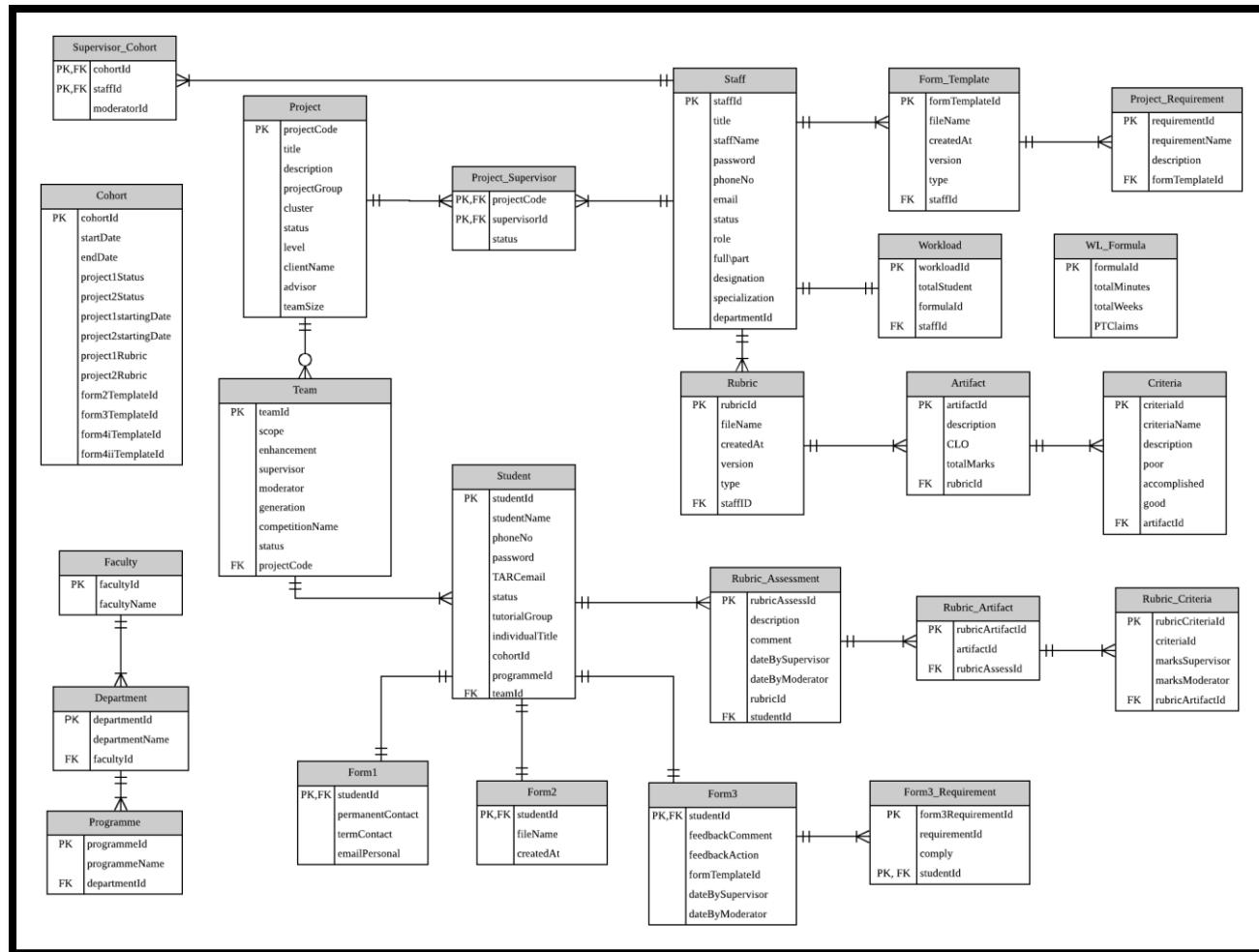


Figure 4.2: Entity Relationship Diagram (ERD) for database design

4.1.3 Data Dictionary

Table below shows the data dictionary that will be using in Form and Assessment module. The entities included are rubric, rubric assessment, artifact, criteria, form1, form2 and form3. The data dictionary for the other entities will be attached in Appendix C.

Entity Name	Attributes	Data Type	Description
Student	studentId (PK)	Varchar(10)	Unique ID of a student. Eg. 17WMR09542
	studentName	Varchar(50)	Name of a student. Eg. Yap Kai Jean
	password	Varchar(30)	Password of a student account. Eg. 31913786Yap666
	phoneNo	Varchar(30)	Phone number of a student. Eg. 0102181190
	TARCEmail	Varchar(50)	TARC email of a student. Eg. yapkj-wa15@student.tarc.edu.my
	status	Varchar(10)	Status of a student. Eg. Active, Inactive
	tutorialGroup	Integer	Tutorial group of a student. Eg. 7
	individualTitle	Varchar (999)	Individual title of a student. Eg. Assessment & Form Management
	programmeId	Varchar(10)	Unique ID of a programme. Eg. RSD
	cohortId	Integer	Unique ID of cohort. Eg. 201705Y2
	teamId (FK)	Varchar(50)	Unique ID of a team.

Entity Name	Attributes	Data Type	Description
Staff	staffId (PK)	Varchar(50)	Unique ID of a staff.
	title	Varchar(10)	Title of staff. Eg. Doctor, Associate Professor, Professor, Ms, Mr
	staffName	Varchar(30)	Name of staff. Eg. Kathleen Tan
	password	Varchar(30)	Password of staff account. Eg. 123456789Tan666
	phoneNo	Varchar(30)	Phone number of staff. Eg. 0163111000
	email	Varchar(50)	Email of staff. Eg. tansn@tarc.edu.my
	status	Varchar(20)	Status of staff. Eg. Active, Inactive
	role	Varchar(50)	The role of staff. Eg. Admin, Faculty Admin, FYP Committee, Lecturer
	full\part	Varchar(20)	Type of staff. Eg. Full Time, Part Time
	designation	Varchar(30)	Designation of staff. Eg. Dean, Associate Dean, Senior Lecturer, Lecturer
Student	specialization	Varchar(50)	Specialization of staff. Eg. Computer Science and Physics, Management of Information Technology
	departmentId	Varchar(10)	Unique ID of a department. Eg. DECA

Entity Name	Attributes	Data Type	Description
Form_Template	formTemplateId (PK)	Integer	Unique ID of a form template, it is auto-increment.
	fileName	Varchar(50)	The file name of form template to be uploaded. Eg. Form 2 - V1 (Form 2 - Version 1)
	createdAt	DateTime	The date and time of form template to be uploaded. Eg. 29/08/2018 11:56:24
	version	Integer	The version of form template to be uploaded. Eg. 1
	type	Varchar(30)	The type of form template to be uploaded. Eg. Form 2 - Proposal, Form 4 - Project Appointment Record
	staffId (FK)	Integer	The ID of staff.

Entity Name	Attributes	Data Type	Description
Rubric	rubricId (PK)	Integer	Unique ID of a rubric, it is auto-increment.
	fileName	Varchar(50)	The file name of rubric to be uploaded. Eg. Rubric V1 (Rubric - Version 1)
	createdAt	DateTime	The date and time of rubric to be uploaded. Eg. 29/08/2018 11:56:24
	version	Integer	The version of rubric to be uploaded. Eg. 1
	type	Varchar(30)	The type of rubric to be uploaded.

			Eg. Project I, Project II
	staffId (FK)	Integer	The ID of staff.

Entity Name	Attributes	Data Type	Description
Artifact	artifactId (PK)	Integer	Unique ID of an artifact, it is auto-increment.
	description	Varchar(100)	The name of each artifact in rubric. Eg. Project Proposal, Literature Review & Requirements Analysis
	CLO	Integer	The CLO of each artifact. Eg. 1, 2, 3, 4
	totalMarks	Integer	The total marks allocated for each artifact. Eg. 20, 30, 40, 10
	rubricId (FK)	Integer	The ID of rubric.

Entity Name	Attributes	Data Type	Description
Criteria	criteriaId (PK)	Integer	Unique ID of a criteria, it is auto-increment.
	criteriaName	Varchar(999)	The name of the criteria.
	description	Varchar(999)	The description of each criteria. Eg. The proposed project is useful/meaningful.
	poor	Varchar(10)	The marks for the poor status.
	accomplished	Varchar(10)	The marks for the accomplished status.
	good	Varchar(10)	The marks for the good status.
	artifactId (FK)	Integer	The ID of artifact.

Entity Name	Attributes	Data Type	Description
Rubric_Assessment	rubricAssessId (PK)	Integer	Unique ID of rubric assessment, it is auto increment.
	description	Varchar(100)	Description of rubric assessment. Eg. BACS3403 PROJECT 1 RUBRIC
	comment	Varchar(100)	Comment of rubric assessment. Eg. Good work put in.
	rubricID	Integer	The ID of rubric.
	dateBySupervisor	DateTime	The date that supervisor has made changes to the student assessment. For instance, supervisor enters mark.
	dateByModerator	DateTime	The date that moderator has made changes to the student assessment. For instance, moderators enter mark.
	studentId (FK)	Varchar(10)	The ID of student. Eg. 17WMR09519

Entity Name	Attributes	Data Type	Description
Rubric_Artifact	rubricArtifactId (PK)	Integer	Unique ID of rubric artifact, it is auto increment.
	artifactId	Integer	Unique ID of an artifact.
	rubricAssessId (FK)	Integer	Unique ID of rubric assessment.

Entity Name	Attributes	Data Type	Description
Rubric_Criteria	rubricCriteriaId (PK)	Integer	Unique ID of rubric criteria, it is auto increment.
	criteriaId	Integer	Unique ID of a criteria.
	markSupervisor	Integer	The marks entered by

			supervisor.
	markModerator	Integer	The marks entered by moderator.
	rubricArtifactID (FK)	Integer	Unique ID of rubric artifact.

Entity Name	Attributes	Data Type	Description
Form1	studentId (PK, FK)	Varchar(10)	The ID of student. Eg. 17WMR09519
	permanentContact	Varchar(12)	The permanent contact number of a student. Eg. 012-1234567
	termContact	Varchar(12)	The term contact number of a student. Eg. 012-1234567
	emailPersonal	Varchar(50)	The personal email of a student. Eg. student1@gmail.com

Entity Name	Attributes	Data Type	Description
Form2	studentId (PK, FK)	Varchar(10)	The ID of student. Eg. 17WMR09519
	fileName	Varchar(50)	The file name of the proposal to be uploaded. Eg. Form 2 – Proposal
	createdAt	DateTime	The date and time of Form 2 to be uploaded. Eg. 29/08/2018 11:56:24

Entity Name	Attributes	Data Type	Description

Form3	studentId (PK, FK)	Varchar(10)	The ID of student. Eg. 17WMR09519
	feedbackComment	Varchar(100)	The comment feedback of the proposal.
	feedbackAction	Varchar(100)	The action to be taken for the feedback in the comment.
	dateBySupervisor	DateTime	The date that supervisor has made changes to the Form 3. For instance, supervisor enters feedback.
	dateByModerator	DateTime	The date that moderator has made changes to the Form 3. For instance, moderators enter marks.
	formTemplateId	Integer	Unique ID of a form template.

Entity Name	Attributes	Data Type	Description
Project_Requirement	requirementId (PK)	Integer	Unique ID of project requirement, it is auto-increment.
	requirementName	Varchar(50)	The project requirement. Eg. Relevance and contribution, IT content, Technical Skill, Methodology, etc.
	description	Varchar(100)	The description of the project requirement. Eg. The project is IT-related and has substantial amount of IT content.
	formTemplateId (FK)	Integer	Unique ID of a form template.

Entity Name	Attributes	Data Type	Description

Form3_Requirement	form3RequirementId (PK)	Integer	Unique ID of a form3 requirement, it is auto-increment.
	requirementId	Integer	The ID of project requirement.
	comply	Varchar(50)	To indicate the requirement has been complied or not. Eg. Complied, Not Complied
	studentId (PK, FK)	Varchar(10)	The ID of student. Eg. 17WMR09519

4.2 Process Design

4.2.1 Activity Diagram

- a. Fill in Form 1 – Student Details

This process enables students to fill in their personal details such as permanent and term house phone number, personal email and etc. The activity diagram of this function is shown in the Figure 4.3 below. Firstly, students are required to provide their personal details. After that, if students submit the form, the student details will be stored into database and a successful message will be displayed.

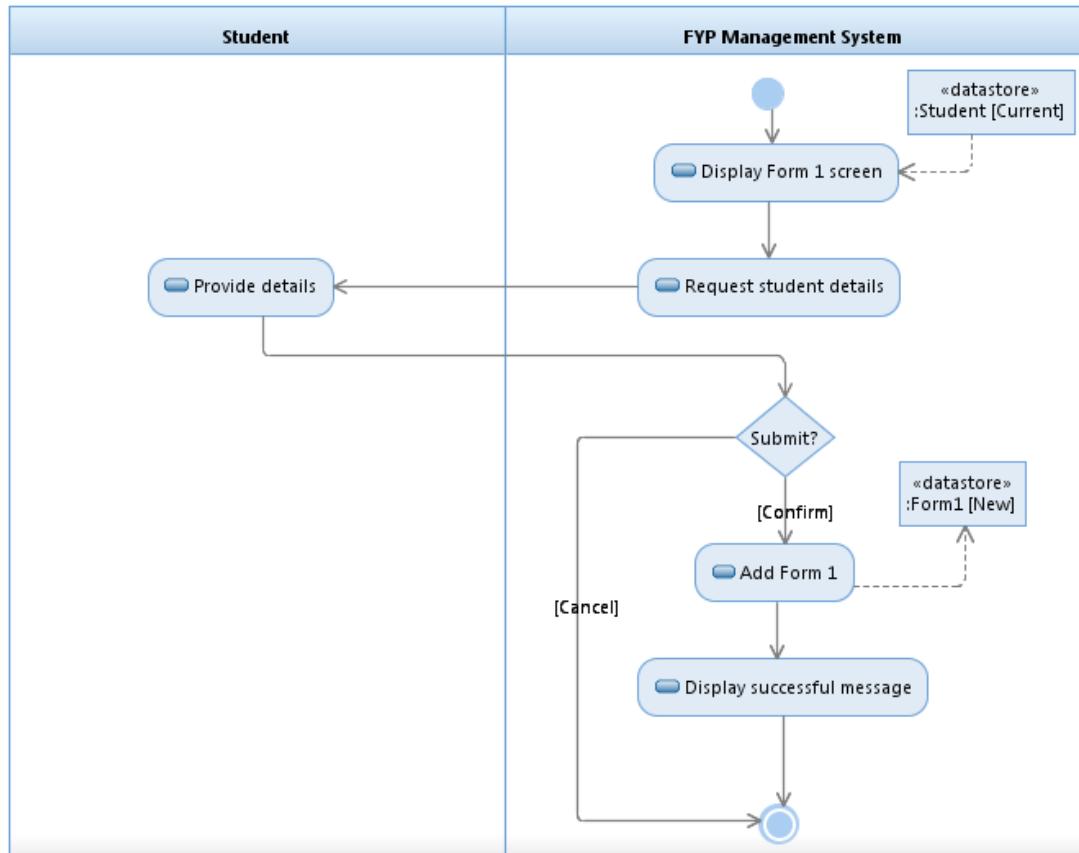


Figure 4.3: Activity Diagram for the function of filling in Form 1 – Student details

b. Upload Form 2 – Proposal

This process is to allow students to upload their Form 2, which is proposal. The activity diagram of this function is shown in the Figure 4.4 below. Firstly, students are required to choose the proposal file from their computer and upload it. After that, if students submit it, their proposal will be stored into database and a successful message will be displayed to indicate they have submitted it successfully.

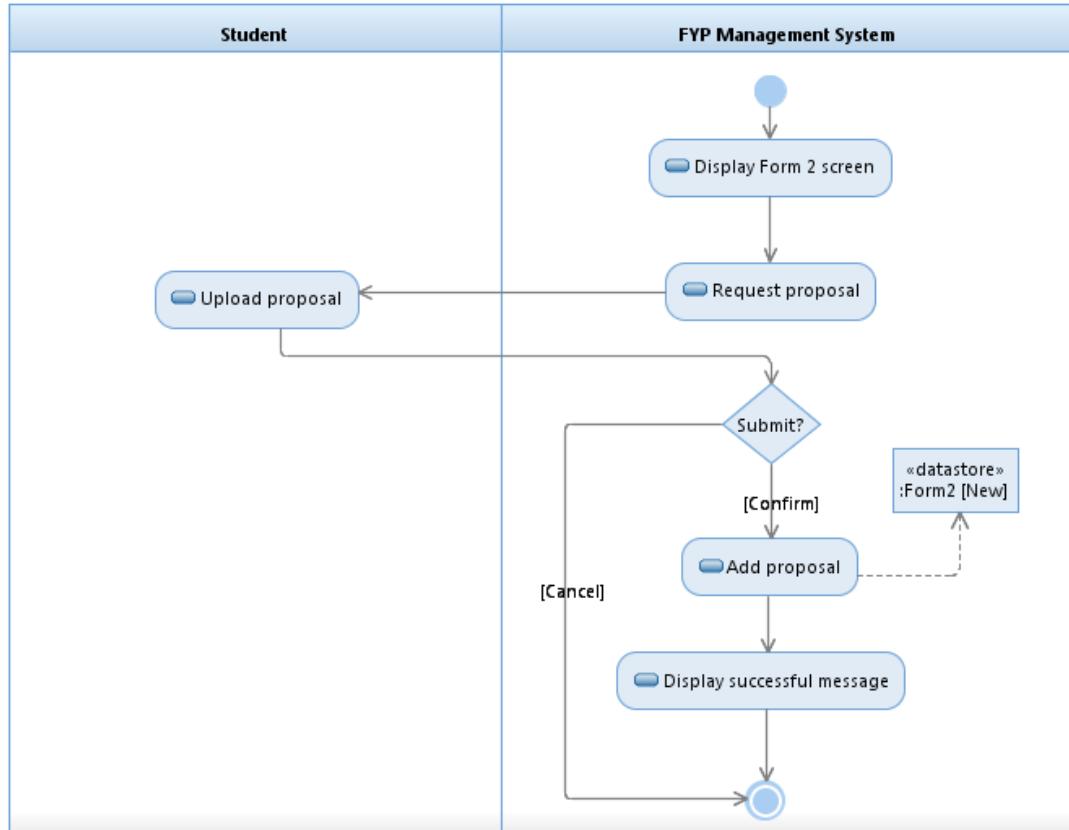


Figure 4.4: Activity Diagram for the function of uploading Form 2 - Proposal

c. Fill in Form 3 – Project Proposal Moderation

This process enables the staff, which is moderators to fill in the Form 3, proposal moderation details. The activity diagram of this function is shown in the Figure 4.5 below. Firstly, moderators are required to provide the proposal moderation details such as project requirements, feedbacks and marks. After that, if moderators submit the form, the proposal moderation details will be stored into database and a successful message will be displayed.

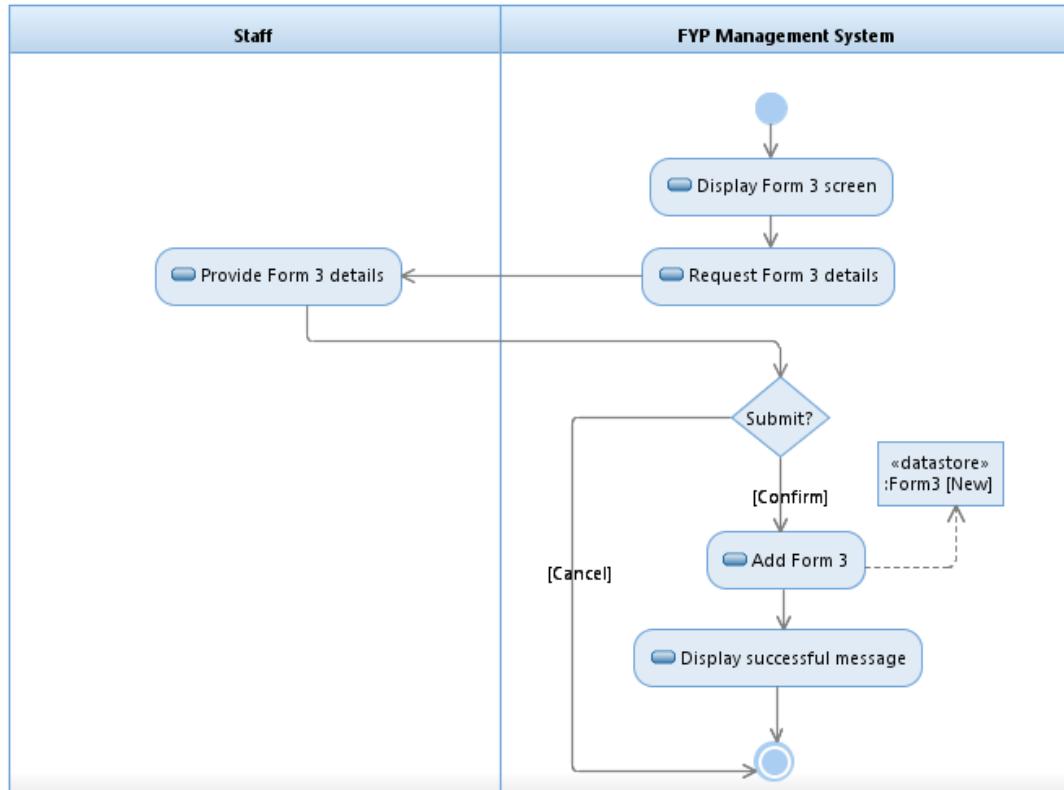


Figure 4.5: Activity Diagram for the function of filling in Form 3 - Project Proposal Moderation

d. Download Form 2 – Proposal

This process enables the staff, which is supervisors and moderators to download the Form 2, proposal. The activity diagram of this function is shown in the Figure 4.6 below. Firstly, staff is required to select the proposals to be downloaded. If staff selects all, all the proposal will be downloaded, else, only the selected proposal will be downloaded.

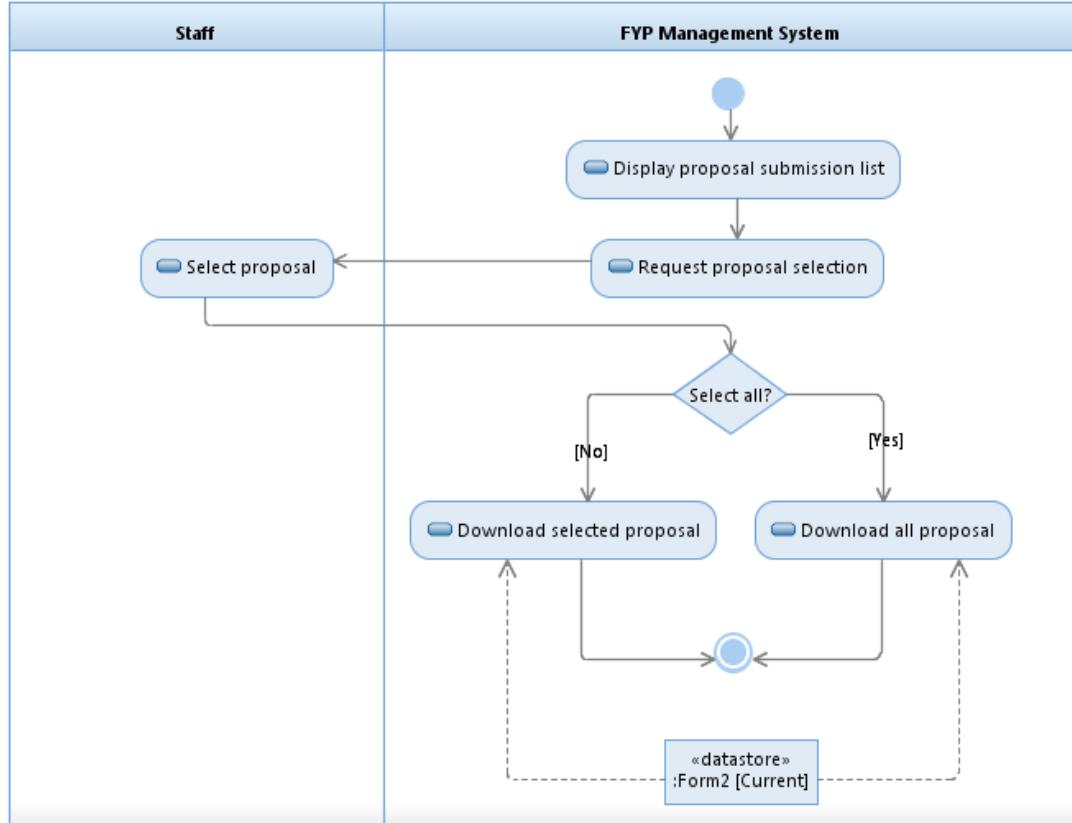


Figure 4.6: Activity Diagram for the function of downloading Form 2 - Project Proposal
Moderation

e. Upload new assessment rubric

This process enables the staff to upload new version of rubric. The activity diagram of this function is shown in the Figure 4.7 below. Firstly, staff is required to select the type of rubric, rubric for Project I or Project II. Then, staff has to choose the rubric file from their computer and upload it. After uploaded, the new version of rubric will be stored into database and an uploaded successful message will be displayed. Next, staff is required to select the rubric version to be used for the specific cohort and provide confirmation. Lastly, the rubric assessment in-used will be updated and a successful message will be displayed.

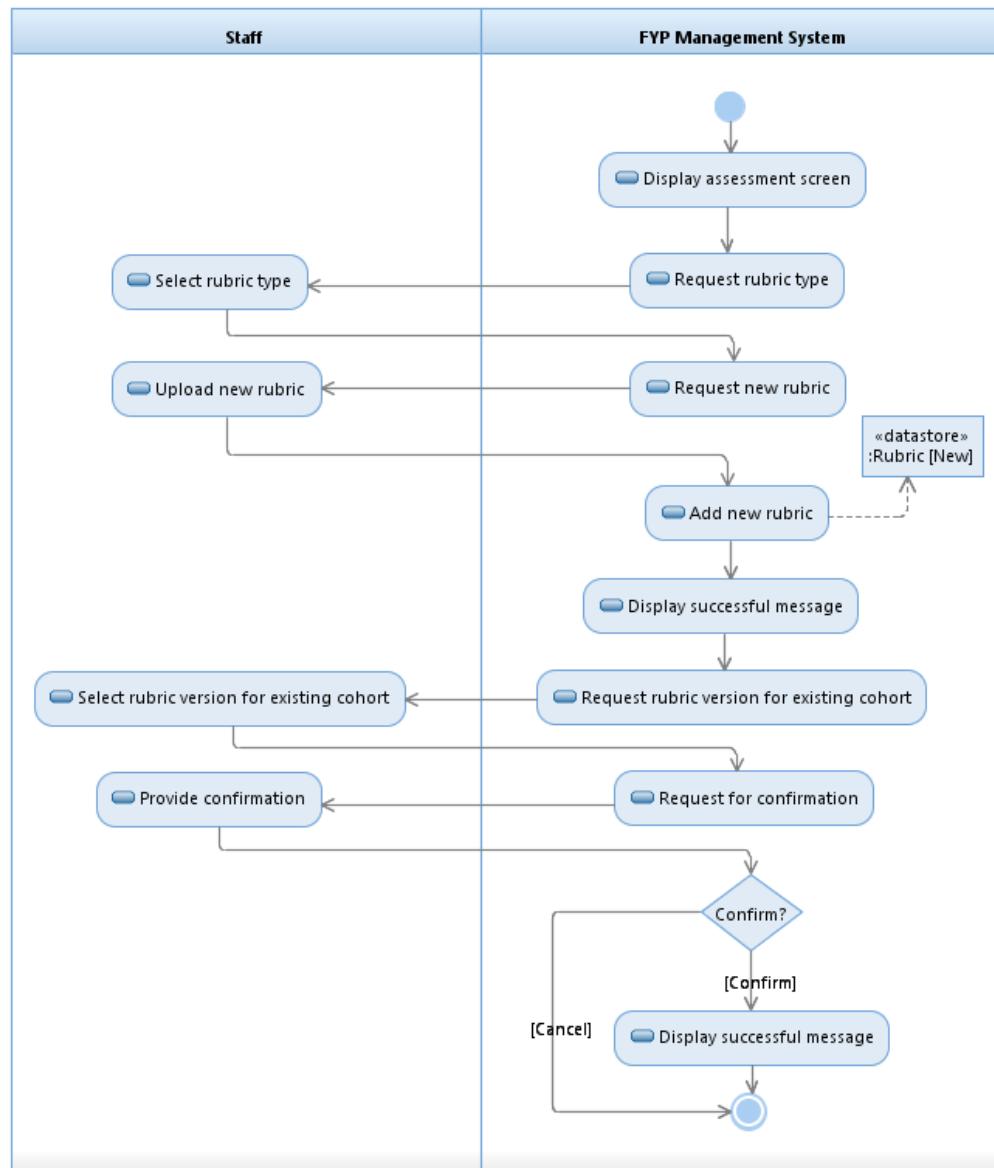


Figure 4.7: Activity Diagram for the function of uploading new version of assessment rubric

f. Enter marks in assessment rubric

This process enables the staff, which is supervisors to enter the marks in the assessment rubric. The activity diagram of this function is shown in the Figure 4.8 below. Firstly, staff is required to select the FYP group, student name and type of assessment rubric. Then, the selected assessment rubric type will be displayed and supervisors are required to enter the marks and comments. After supervisors have confirmed and saved it, the marks and comments entered will be stored into database. Lastly, a successful message will be displayed.

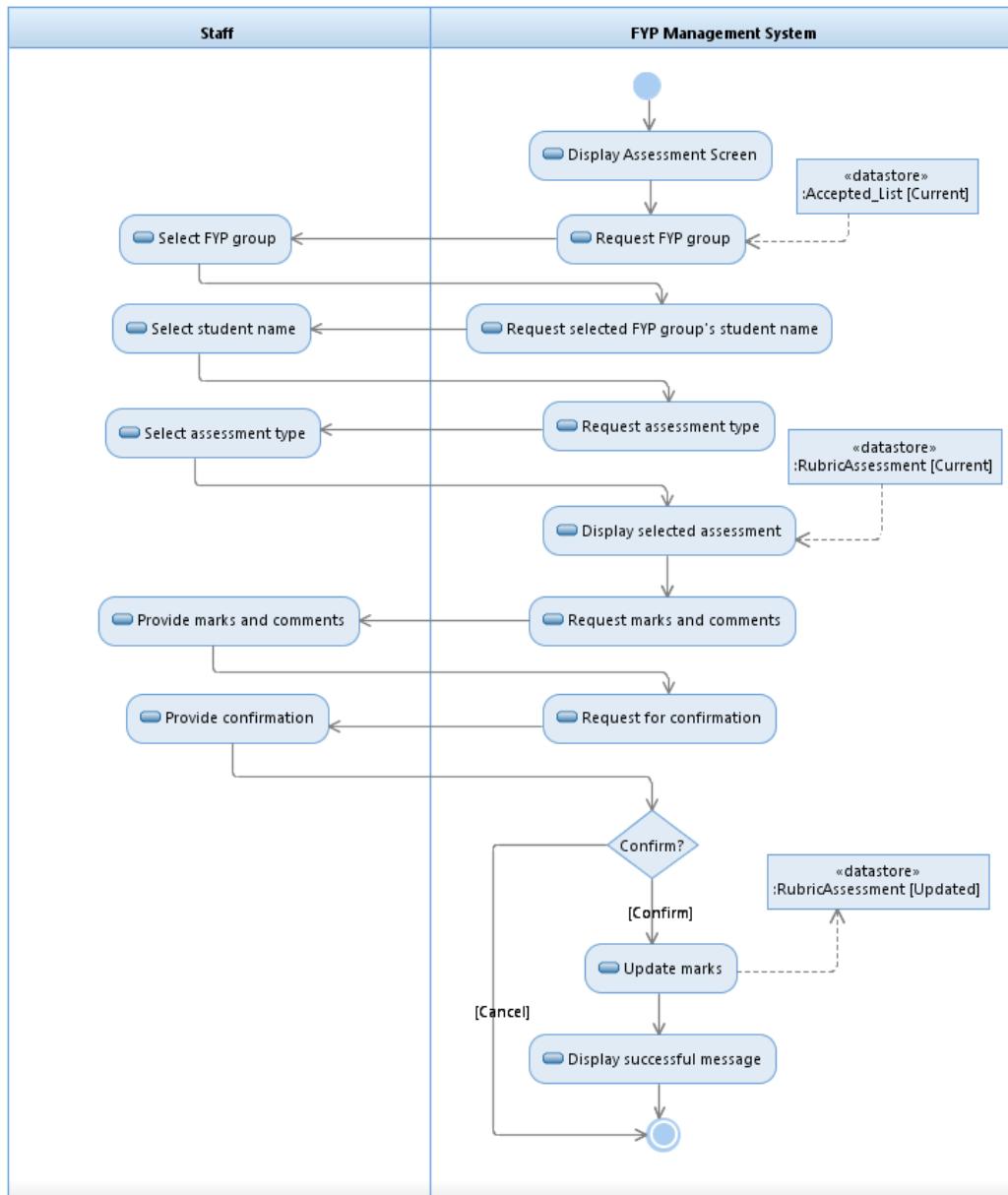


Figure 4.8: Activity Diagram for the function of entering marks in assessment rubric

g. Report generation – Mark summary

This process enables the staff, which is supervisors to generate the mark summary report. The activity diagram of this function is shown in the Figure 4.9 below. Firstly, staff is required to select the cohort of the mark summary report. After that, the report for the selected cohort will be generated. If staff would like to export it, they are required to choose the export type, either Microsoft Excel or PDF format. Lastly, the report will be exported based on the selected export format.

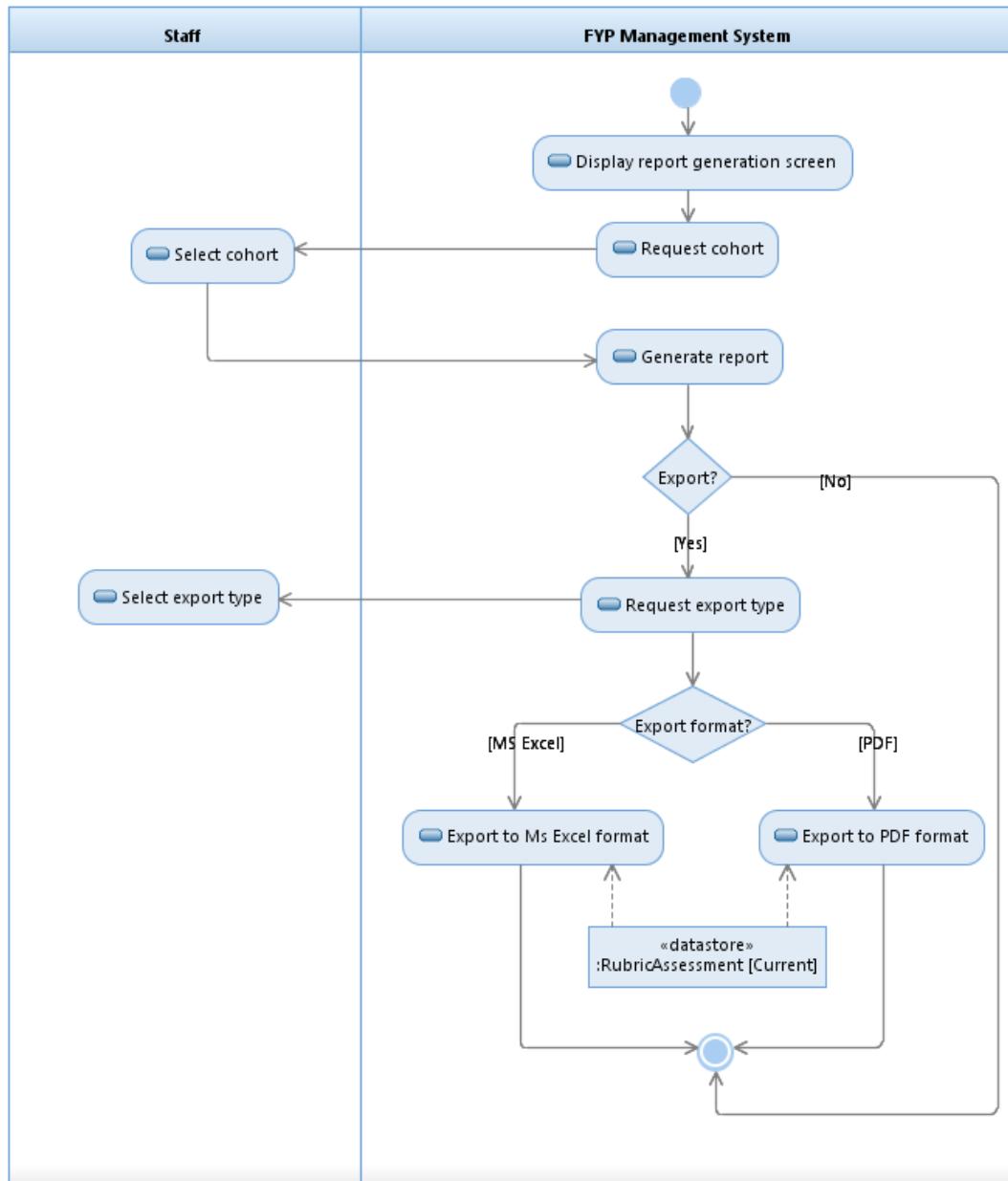


Figure 4.9: Activity Diagram for the function of report generation

4.3 Algorithm Design

Figure 4.10 below is the algorithms for Uploading Excel File in pseudocode.

```
UploadFile()
IF uploadFile == excel THEN
    Get file name from uploadFile
    Get extension from uploadFile

    Set filePath = server folderPath + file name + extension

    IF server folderPath directory not exist THEN
        Create server folderPath directory
    ENDIF

    Save uploadFile into filePath
ENDIF
```

Figure 4.10: Pseudocode for Uploading Excel File

4.4 Report Design

The report design for the mark summary report is shown in Figure 4.11. The title of the report will be displayed at the top left of the report. The name of supervisor and moderator will be displayed at the bottom of the report title. The date of report generated will be displayed on the right side of supervisor name. Some details such as programme code, student name, student registration ID, marks in each CLO, total marks, project title, project category and competition name will be displayed in a table form. The sequence order will be arranged based on programme code and followed by student name. A signature and date field are provided at the bottom left corner to be filled by supervisor.

Mark Summary for BACS3403 Project I													
Supervisor: Ms Kathleen Tan			Moderator: Ms Tey Siew Kee										
						Marks by CLO							
No.	Prog	Student Name	Reg. ID:	FYP Supervisor	CLO1	CLO2	CLO3	CLO4	Total Mark	Project Title	Moderator	Project Category	Competition Name
1	RIS	RIS STUDENT 1	16WMR00005	Donald Duck	11	23	24	8	66	Project B - Title B1	Mickey Mouse	Incubator	Innovate Malaysia Design
2	RIS	RIS STUDENT 3	16WMR00007	Donald Duck	15.5	25	33	8	82	Project B - Title B2	Mickey Mouse	Smart Campus	0
3	RIS	RIS STUDENT 5	16WMR00009	Donald Duck	7	6	14	1	28	Project C - Title C1	Mickey Mouse	Smart Campus	0
4	RIS	RIS STUDENT 6	16WMR00010	Donald Duck	20	16	14	1	51	Project C - Title C2	Mickey Mouse	0	0
5	RIS	RIS STUDENT 7	16WMR00011	Donald Duck	9.5	21	28	1	60	Project D	Mickey Mouse	0	0
6	RIS	RIS STUDENT 9	16WMR00013	Donald Duck	8.5	24	27	8	68	Project E	Mickey Mouse	Competition	Imagine Cup
7	0	0	0	0					0				
8	0	0	0	0									
9	0	0	0	0									

4.5 User Interface Design

The user interface design of this system will be following some of the Shneiderman's Eight Golden Rules.

i. Strive for consistency

This system is having the same header, footer and menu on every pages in order to standardizing the design for the system.

ii. Enable frequent users to use shortcuts

Some shortcut keys, abbreviations, function keys and hidden commands are provided in this system to reduce the number of interactions and increase the pace of interactions between the user and system. For example, after user filling in some fields in a form, he may press the “Enter” key on the keyboard to submit the form.

iii. Offer simple error handling

This system is designed in a way that the user cannot make a serious error. For example, there is a wide space between the “Save” and “Generate as PDF” button in order to prevent user misclicks the button. The example is shown in Figure 4.23. Besides, some simple error handling mechanism will also be included in this system.

iv. Permit easy reversal of actions

This system is designed in a way that is easy for user to return to the previous page or the previous actions. For example, when user clicks the “Unsubmit” button on the Figure 4.18, a confirmation box will be popped up. The confirmation box is to make sure that user is not misclicking the unsubmit button, in another words, it acts as a reverse action for user who is misclicking the unsubmit button.

v. Reduce short-term memory load

Some of the fields in this system is designed by using dropdown list and checkbox selection so that user does not need to type the full name for the field. The example of UI design which obey this rule is shown in Figure 4.20, Figure 21, Figure 34 and Figure 35.

Some UI design and funtions for Form and Assessment Module will be described as follow.

The dashboard design view for staff is shown in the Figure 4.12 while the dashboard design view for student is shown in Figure 4.13 below.

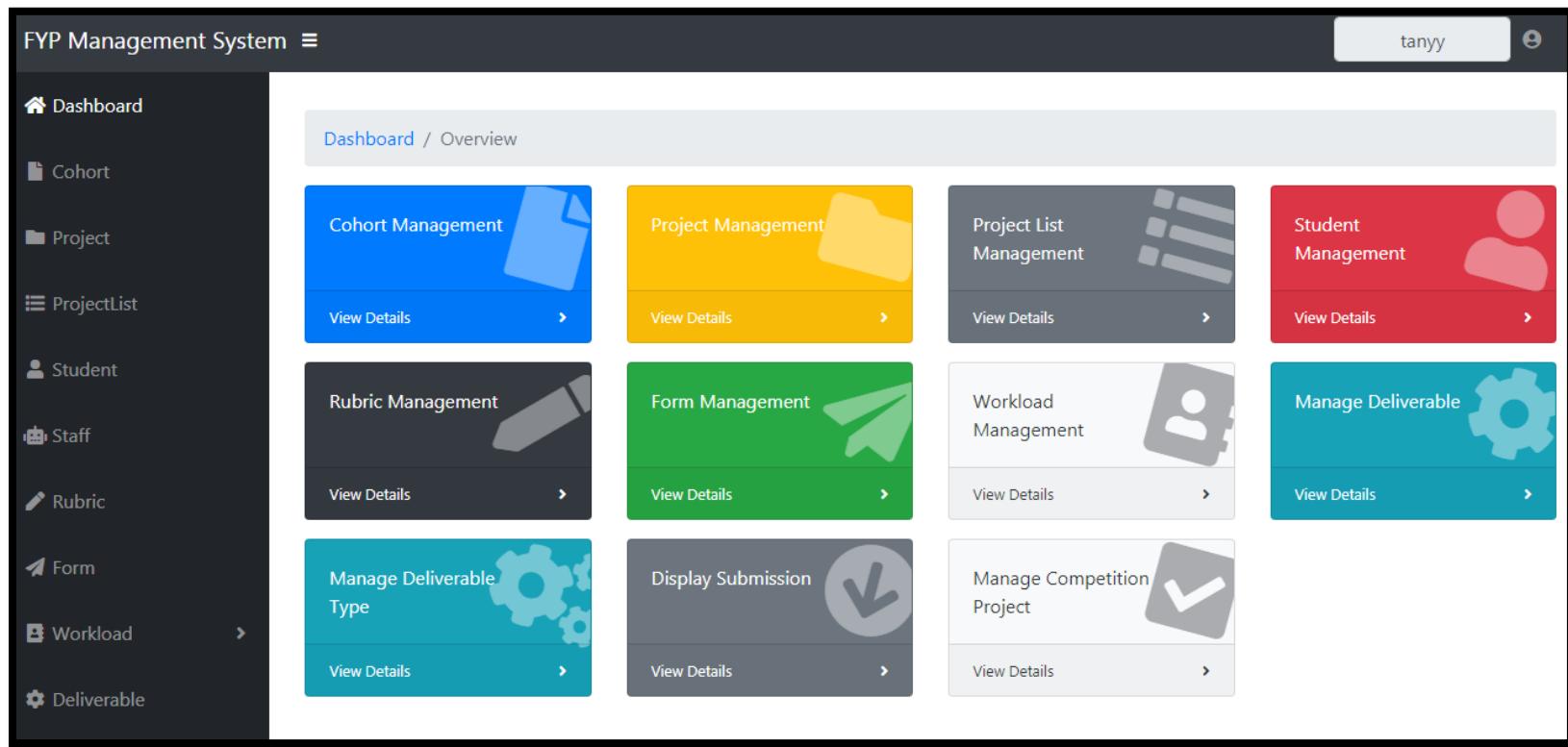


Figure 4.12: Dashboard design view for staff

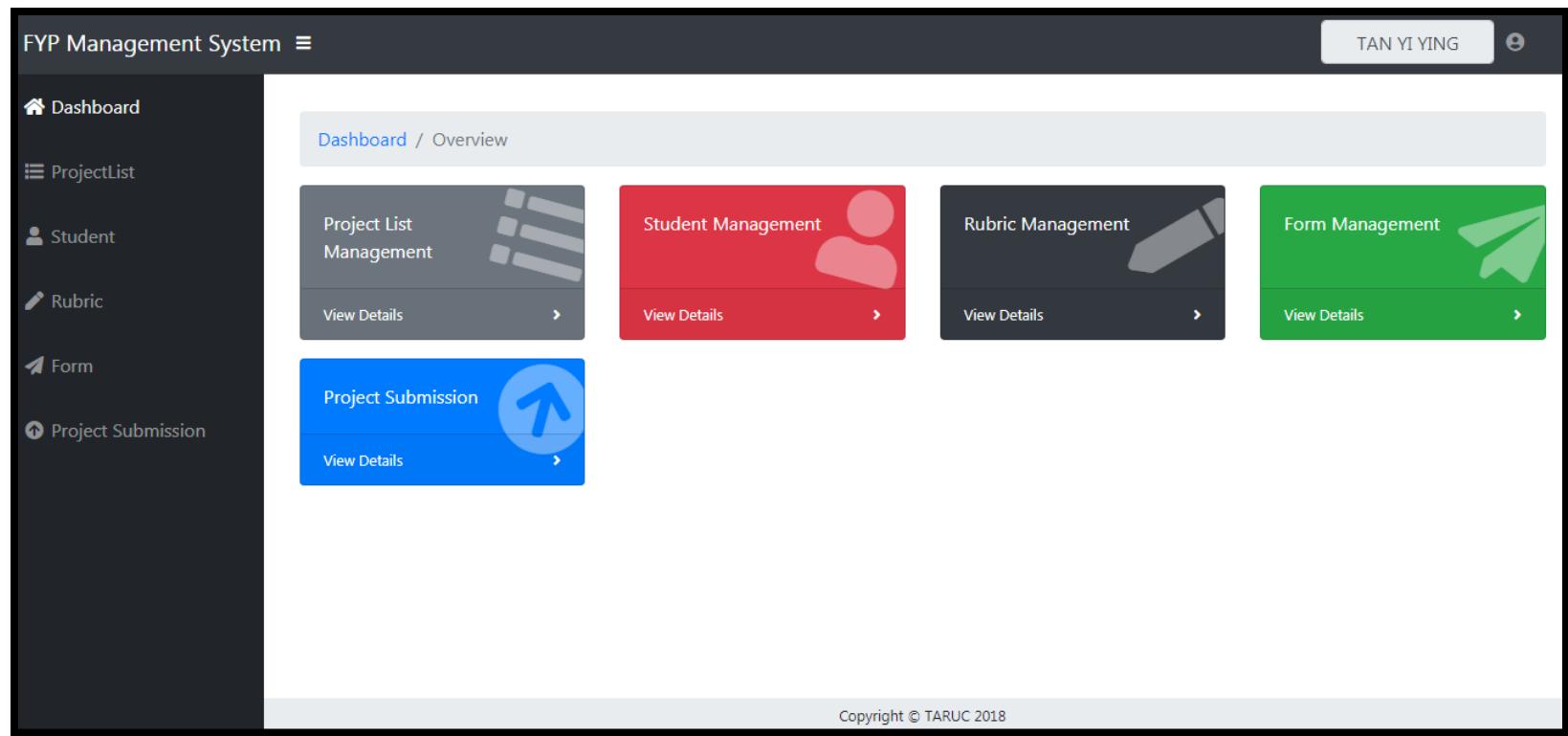


Figure 4.13: Dashboard design view for student

Figure 4.14 shows the main page of form screen of the FYP management system for student. There are three types of forms, Form 1 Student Details, Form 2 Project Proposal and Form 4 Project Appointment Record are to be filled in by students. After user clicks the form button, it will navigate user to the form page that user selected.

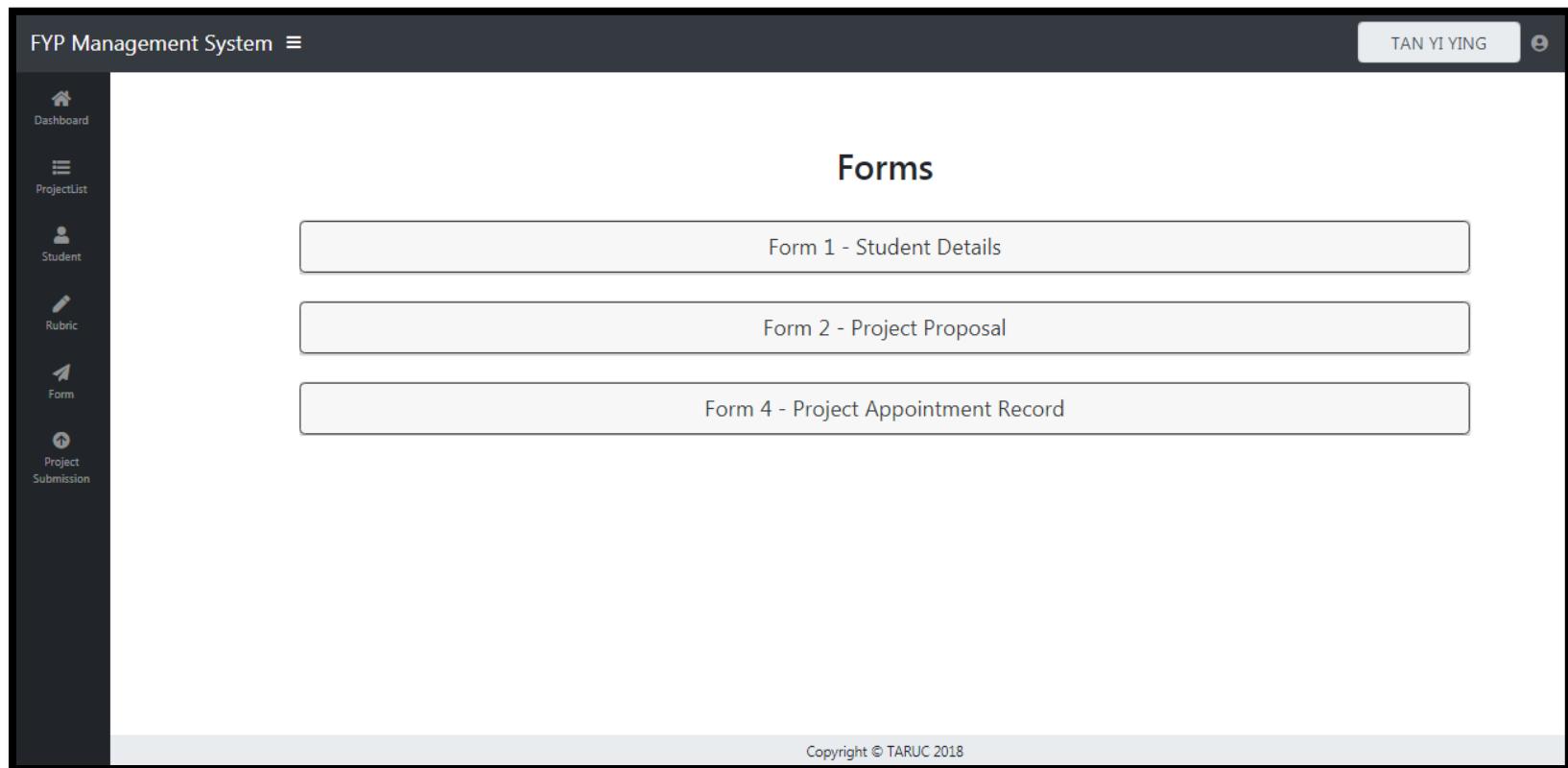


Figure 4.14: Main page of form module screen for student

Figure 4.15 shows the main page of form screen for staff. There are two types of forms, Form 2 Project Proposal and Form 3 Project Proposal Moderation that can be accessed by staff. After user clicks the form button, it will navigate user to the form page that user selected.

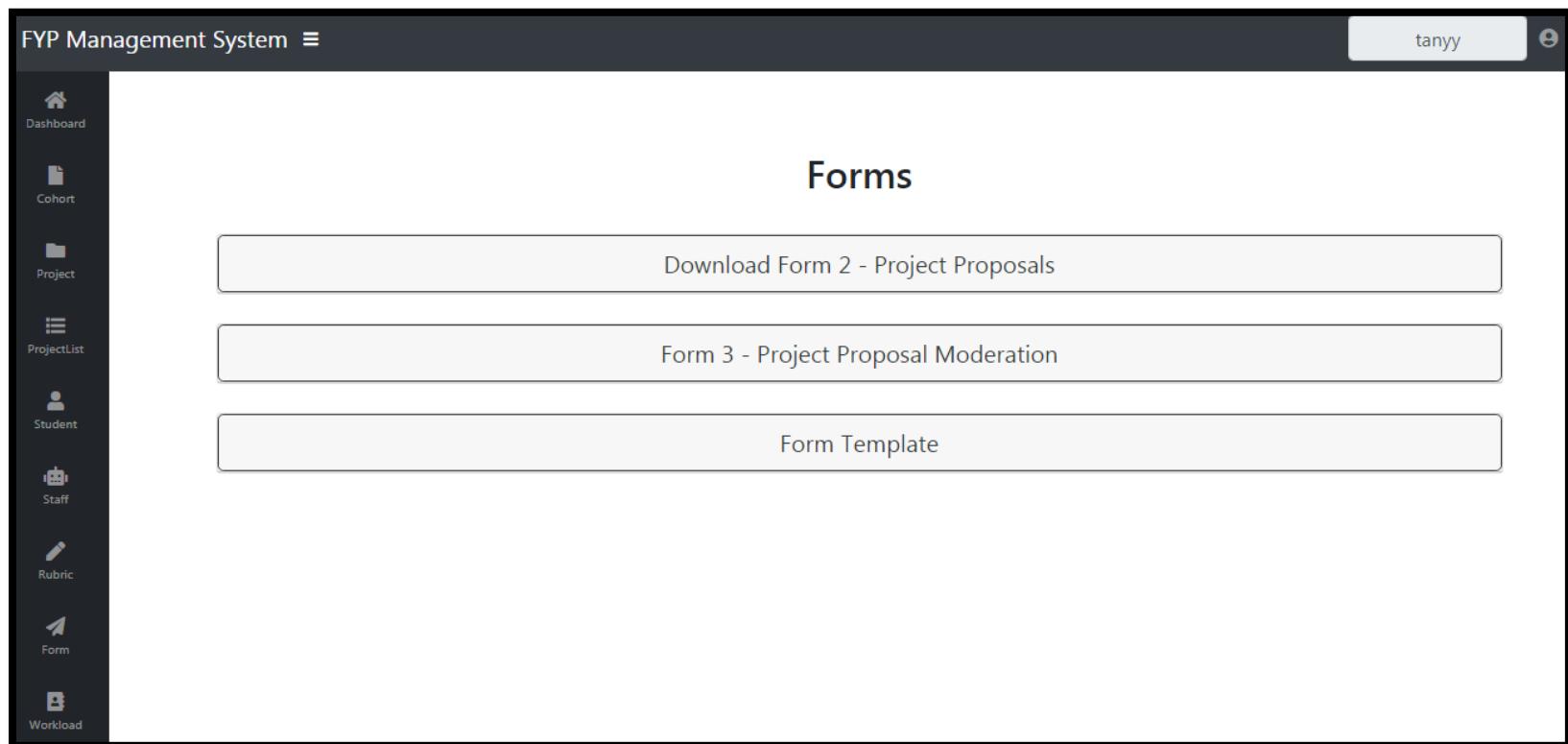


Figure 4.15: Main page of form module screen for staff

Figure 4.16 shows the Form 1 – Student Details screen. After students fill in the details and click “Save” button, the student details will be stored into database.

The screenshot shows the 'FYP Management System' application interface. On the left is a vertical sidebar with icons for Dashboard, ProjectList, Student, Rubric, Form, and Project Submission. The main area is titled 'Form 1 - Student Details'. It contains a table with the following data:

Student Name	TAN YI YING		
Registration No.	17WMR09519		
Academic Year	2018/2019	Cohort	201805Y2
Programme	RSD		
House Phone Contact (Term)	<input type="text"/>	House Phone Contact (Permanent)	<input type="text"/>
Handphone No.	<input type="text"/>		
Email (TAR UC)	tanyy-wa15@student.tarc.edu.my		
Email (Personal)	<input type="text"/>		

A blue 'Save' button is located at the bottom of the form. The top right corner of the main window shows the student's name, TAN YI YING, and a profile icon. The footer of the window displays the copyright notice 'Copyright © TARUC 2018'.

Figure 4.16: Form 1 - Student Details screen

Figure 4.17 shows the Form 2 Project Proposal screen. At first, student can download the template of proposal by clicking the “Download Proposal Template” button. Student can also upload their proposal by clicking “Choose File” button. By clicking the “Submit” button, the proposal will be stored into database. After that, the proposal will be uploaded as shown in the Figure 4.18. Student can also unsubmit the proposal and submit the new version of proposal by clicking the “Unsubmit” button as shown in Figure 4.18.

Form 2 - Project Proposal

Download Proposal Template

Download Proposal Template:

Download Proposal Template

Proposal Submission

Submitted work	Action
No work is submitted	Unsubmit

Upload Proposal

* Individual Title	Form & Management
Client Name	
Competition	

* Choose the file you want to upload as proposal:

Choose File No file chosen

*File type must be .doc , .docx , .pdf format

Submit

Figure 4.17: Form 2 - Project Proposal screen

Form 2 - Project Proposal

[Download Proposal Template](#)

Download Proposal Template:

[Download Proposal Template](#)

Proposal Submission

Submitted work	Action
TAN YI YING_TEST CASE FORM.docx	Unsubmit

Upload Proposal

* Individual Title	Form & Management
Client Name	
Competition	

* Choose the file you want to upload as proposal:

No file chosen

*File type must be .doc , .docx , .pdf format

Figure 4.18: After submitting Form 2 - Project Proposal screen

Figure 4.19 shows the list of proposal that are submitted by students. Supervisors can download students' proposal by clicking the "Select All" button to select all proposals or ticking the checkbox to download certain proposal.

Proposals

Supervise Student Proposal List

Select All

FYP Management System			
Select	StudentName	Student ID	Proposal
<input checked="" type="checkbox"/>	TAN YI YING	17WMR09519	TAN YI YING_TEST CASE FORM.docx

Bloody Defense			
Select	StudentName	Student ID	Proposal
			Download

Moderate Student Proposal List

Select All

Lie Detection using Eyes Movement / Micro Expression / Body Language			
Select	StudentName	Student ID	Proposal

QR Code Attendance System			
Select	StudentName	Student ID	Proposal
			Download

Figure 4.19: Form 2 - Project Proposal list

Figure 4.20 shows the Form 3 - Project Proposal Moderation main screen. This form can only be accessed by staff. Supervisor can only view and leave some comment in this form as shown in Figure 4.24 and Figure 4.25 while moderator has full accessibility for this form. Users can select their role as a supervisor or moderator. By default, the role will be set as “Supervisor”, when user select the role as “Moderator” the supervise project’s part will be disabled as shown in Figure 4.21 below and vice versa. Users can select the project and student they want to moderate and click “Confirm” button to proceed.

Form 3 - Project Proposal Moderation

Name	Ms. tanny		
Role	<input checked="" type="radio"/> Supervisor <input type="radio"/> Moderator		
Supervise Project	FYPMS2 ~ FYP Management System *20180!	Moderate Project	R-LieDetect ~ Lie Detection using Eyes Move
Student name	201805Y2_T1017 - TAN YI YING	Student name	CTV1 - CHAN WENG SIANG

Confirm

Figure 4.20: Form 3 - Project Proposal Moderation main screen when “Supervisor” role is selected

Form 3 - Project Proposal Moderation

Name	Ms. tanny		
Role	<input type="radio"/> Supervisor <input checked="" type="radio"/> Moderator		
Supervise Project	FYPMS2 ~ FYP Management System *20180!	Moderate Project	R-LieDetect ~ Lie Detection using Eyes Move
Student name	201805Y2_T1017 - TAN YI YING	Student name	CTV1 - CHAN WENG SIANG

Confirm

Figure 4.21: Form 3 - Project Proposal Moderation main screen when “Moderator” role is selected

Figure 4.22 and Figure 4.23 shows the Form 3 - Project Proposal Moderation screen. Moderators are able to tick the checkbox if the students had fulfil the project requirements and leave some feedbacks such as comments and action taken if necessary. Besides that, moderators can also enter the marks for the proposal. After clicking the “Confirm” button, the details entered will be stored into database. By clicking the “Generate as PDF” button, user can generate this form in the PDF format.

Form 3 - Project Proposal Moderation			
1. Project Details			
Student Name	CHAN WENG SIANG	Programme	Bachelor of Information Technology (Honours) in Information Security
Supervisor Name	Ms. tarry	Cohort	201805Y2
Moderator Name	Mr. yapkj		
Project Title/Scope	Lie Detection using Eyes Movement / Micro Expression / Body Language		
Project Type	Research	Project Category	Researcher's Topics
2. Project Scope Moderation (to be filled by Moderator) (Please tick if comply)			
Project Requirements			Comply
Relevance and contribution The project is within the area of specialization related to the student's programme of study. The outcome of the project is able to contribute to the IT practices, target market, or knowledge.			<input checked="" type="checkbox"/>
IT content The project is IT-related and has substantial amount of IT content.			<input checked="" type="checkbox"/>
Technical Skill The project requires the students to write substantial amounts of programming codes, or use of IT technical skills with the aid of tools.			<input checked="" type="checkbox"/>
Methodology The project allows the students to apply some kind of system development or research methodology.			<input checked="" type="checkbox"/>
Practicality or Innovativeness The project should have qualities of practicality and/or innovativeness. For research projects, the project should be meaningful. For application projects, it should either be an industrial project, an internal project or be aligned to an external competition. For entrepreneurial projects, the project should have a unique value proposition.			<input type="checkbox"/>
Knowledge Expansion The project allows the students the opportunity to expand their existing knowledge, either in depth or in breadth.			<input checked="" type="checkbox"/>
Scope & Complexity The project should be of scope acceptable within the limits of resources and capability of students. If the scope is small, then the project should be well justified.			<input type="checkbox"/>

Figure 4.22: Form 3 - Project Proposal Moderation screen (Role as Moderator)

3. Feedback	
Comments and Changes Recommended (by Moderator)	Actions Taken (by Supervisor)
Good work	

4. Assessment			
Item	Criteria	Mark Allocation	Mark
Content	- All the necessary information is included. - Discussion is clear and concise.	10	<input type="text"/>
Innovativeness	- The proposed project is useful/meaningful - Includes innovativeness in user experience, technical implementation, etc.	10	<input type="text"/>
Total Marks			0

Moderated By: _____ **Received By:** _____

Moderator's Signature: _____ Supervisor's Signature: _____

Moderation Date: 16-01-2019 Received Date: _____

Save **Generate as PDF**

Figure 4.23: Form 3 - Project Proposal Moderation screen (Role as Moderator) (continue)

Form 3 - Project Proposal Moderation

1. Project Details			
Student Name	TAN YI YING	Programme	Bachelor of Information Technology (Honours) in Software Systems Development
Supervisor Name	Ms. tarry	Cohort	201805Y2
Moderator Name	Mr. yapkj		
Project Title/Scope	FYP Management System		
Project Type	Academic Service	Project Category	E-learning System

2. Project Scope Moderation (to be filled by Moderator) (Please tick if comply)	
Project Requirements	Comply
Relevance and contribution The project is within the area of specialization related to the student's programme of study. The outcome of the project is able to contribute to the IT practices, target market, or knowledge.	<input checked="" type="checkbox"/>
IT content The project is IT-related and has substantial amount of IT content.	<input checked="" type="checkbox"/>
Technical Skill The project requires the students to write substantial amounts of programming codes, or use of IT technical skills with the aid of tools.	<input type="checkbox"/>
Methodology The project allows the students to apply some kind of system development or research methodology.	<input checked="" type="checkbox"/>
Practicality or Innovativeness The project should have qualities of practicality and/or innovativeness. For research projects, the project should be meaningful. For application projects, it should either be an industrial project, an internal project or be aligned to an external competition. For entrepreneurial projects, the project should have a unique value proposition.	<input checked="" type="checkbox"/>
Knowledge Expansion The project allows the students the opportunity to expand their existing knowledge, either in depth or in breadth.	<input type="checkbox"/>
Scope & Complexity The project should be of scope acceptable within the limits of resources and capability of students. If the scope is small, then	<input type="checkbox"/>

Figure 4.24: Form 3 - Project Proposal Moderation screen (Role as Supervisor)

3. Feedback	
Comments and Changes Recommended (by Moderator)	Actions Taken (by Supervisor)
haha	

4. Assessment			
Item	Criteria	Mark Allocation	Mark
Content	- All the necessary information is included. - Discussion is clear and concise.	10	<input type="text"/>
Innovativeness	- The proposed project is useful/meaningful - Includes innovativeness in user experience, technical implementation, etc.	10	<input type="text"/>
		Total Marks	0

Moderated By: _____ **Received By:** _____

Moderator's Signature: _____ Supervisor's Signature: _____

Moderation Date: 10-01-2019 Received Date: _____

Save **Generate as PDF**

Figure 4.25: Form 3 - Project Proposal Moderation screen (Role as Supervisor) (continue)

After user clicking the “Generate as PDF” button, the form will be generated into PDF format and opened in a new tab as shown in the Figure 4.26 and Figure 4.27 below. User can click the download icon to download the current view or click the print icon to print it directly.

The screenshot shows a PDF document titled "Form 3 - Project Proposal Moderation". At the top left is "Form 3" and at the top center is "1 / 2". On the right side are icons for refresh, download, and print. The main content is divided into two sections:

1. Project Details

Student Name	TAN YI YING	Programme	Bachelor of Information Technology (Honours) in Software Systems Development
Supervisor Name	Ms. tanyy	Cohort	201805Y2
Moderator Name	Mr. yapkj		
Project Title/Scope	FYP Management System		
Project Type	Academic Service	Project Category	

2. Project Scope Moderation

Project Requirements	Comply
Relevance and contribution The project is within the area of specialization related to the student's programme of study. The outcome of the project is able to contribute to the IT practices, target market, or knowledge.	Yes
IT content The project is IT-related and has substantial amount of IT content.	Yes
Technical Skill The project requires the students to write substantial amounts of programming codes, or use of IT technical skills with the aid of tools.	No
Methodology The project allows the students to apply some kind of system development or research methodology.	Yes
Practicality or Innovativeness The project should have qualities of practicality and/or innovativeness. For research projects, the project should be meaningful. For application projects, it should either be an industrial project, an internal project or be aligned to an external competition. For entrepreneurial projects, the project should have a unique value proposition.	Yes
Knowledge Expansion The project allows the students the opportunity to expand their existing knowledge, either in depth or in breadth.	No
Scope & Complexity The project should be of scope acceptable within the limits of resources and capability of students. If the scope is small, then the project should have reasonable level of complexity. The project should focus on quality, but not quantity.	No

Figure 4.26: Generate Form 3 - Project Proposal Moderation screen in PDF format

Form 3

2 / 2

C: D: P:

3. Feedback			
Comments and Changes Recommended (by Moderator)		Actions Taken (by Supervisor)	
haha			

Item	Criteria	Mark Allocation	Mark
Content	- All the necessary information is included. - Discussion is clear and concise.	10	
Innovativeness	- The proposed project is useful/meaningful - Includes innovativeness in user experience, technical implementation, etc.	10	
	Total Marks	0	

Moderated By:

Received By:

Moderator's Signature:

Supervisor's Signature:

Moderation Date: 10-01-2019

Received Date:

+ -

Figure 4.27: Generate Form 3 - Project Proposal Moderation screen in PDF format (continue)

Figure 4.28 below shows the Form 4 – Project Appointment Record screen. This form can be accessed by students. They are allowed to download the Project I & II Appointment Record template, fill in and submit to their respective supervisors.

The screenshot shows the FYP Management System interface. The top navigation bar includes the system name and a user profile for 'TAN YI YING'. The left sidebar has a dark theme with white icons and text, listing 'Dashboard', 'ProjectList', 'Student', 'Rubric', and 'Form'. The main content area is titled 'Form 4 - Project Appointment Record'. It features two sections: 'Project I Appointment Record Template' and 'Project II Appointment Record Template'. Each section contains a green button labeled 'Download Project I Appointment Record Template' or 'Download Project II Appointment Record Template' respectively. At the bottom of the page, there is a copyright notice: 'Copyright © TARUC 2018'.

Figure 4.28: Form 4 – Project Appointment Record screen

Figure 4.29 shows the upload form template screen. User can select the type of form to be uploaded and choose the file. By clicking the “Submit” button, the form template will be uploaded to the database. There is some file extension to be followed, for instance, user can only upload the Form 2, Form 4(i) and Form 4(ii) file in .doc, .docx or .pdf format while for Form 3, only .xsl or .xlsx is accepted. If wrong file extension is submitted, error message will be displayed. Besides that, user can remove the latest file that they have uploaded by clicking the “Remove” button, provided that the file’s content in database has not been accessed, else error message will be displayed. The sample of all of the templates is attached in Appendix D.

The screenshot displays two stacked web pages. The top page is titled 'Upload Form Template' and contains a form for selecting a file to upload. The bottom page is titled 'Remove Latest Form Template' and lists a single file entry with a 'Remove' button.

Upload Form Template

Form Type

- Form 2 - Project Proposal
(File type must be in .doc, .docx, .pdf format)
- Form 3 - Project Requirement
(File type must be in .xsl, .xlsx format)
- Form 4 (i) - Project I Appointment Record
(File type must be in .doc, .docx, .pdf format)
- Form 4 (ii) - Project II Appointment Record
(File type must be in .doc, .docx, .pdf format)

Choose the file you want to upload as rubric:

No file chosen

Remove Latest Form Template

Form Type	Form Name	Action
Form 4 (ii)	1_FORM 4(ii) BACS3413 Project II Project Appointment Record.docx	<input type="button" value="Remove"/>

Figure 4.29: Upload form template screen

Figure 4.30 shows the main page of assessment module screen for staff. After user clicks any of the button, it will navigate user to the rubric page that user selected.

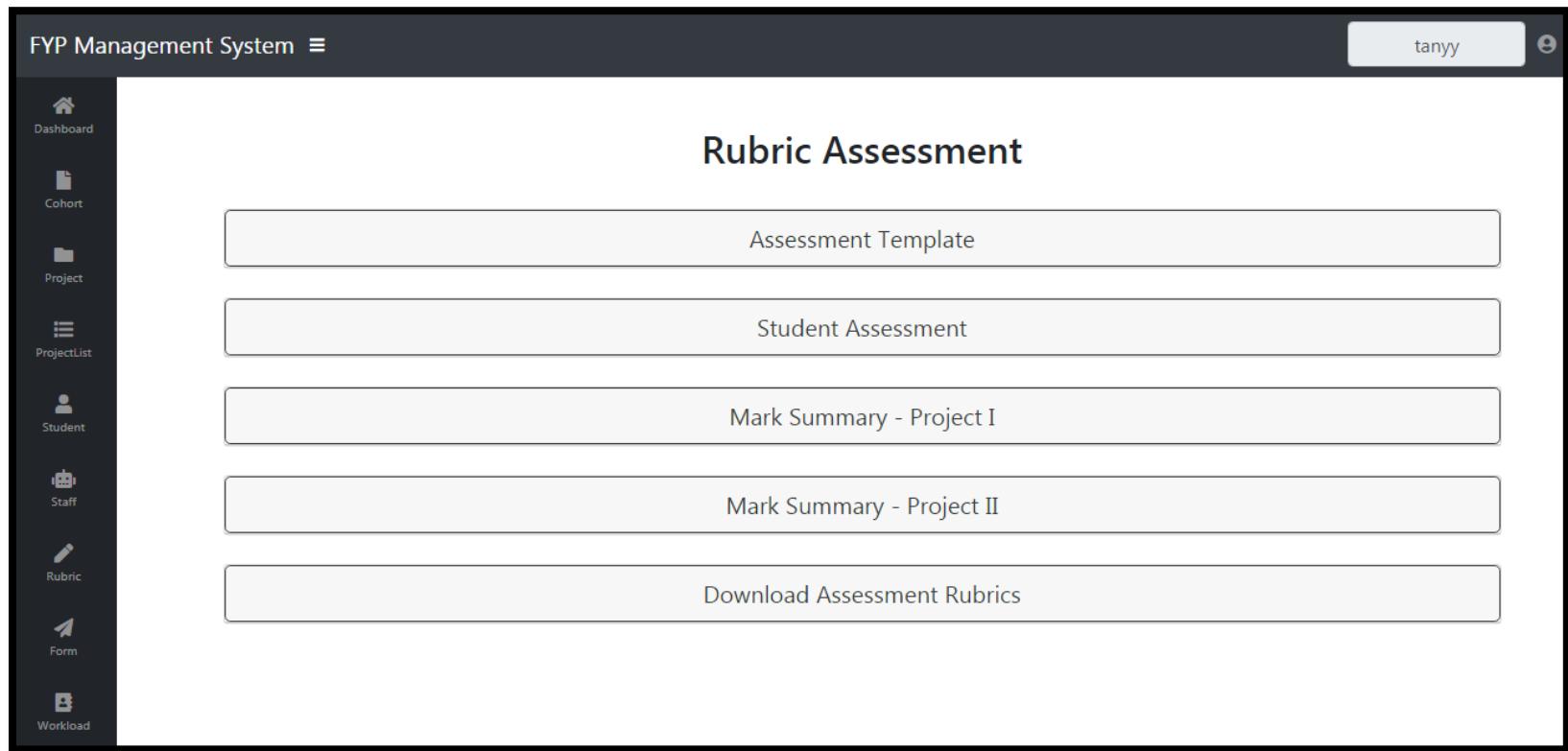


Figure 4.30: Main page of assessment module screen for staff

Figure 4.31 shows the main page of assessment module screen for student. Student can only download the assessment rubric from the assessment module which is shown in the following figure.

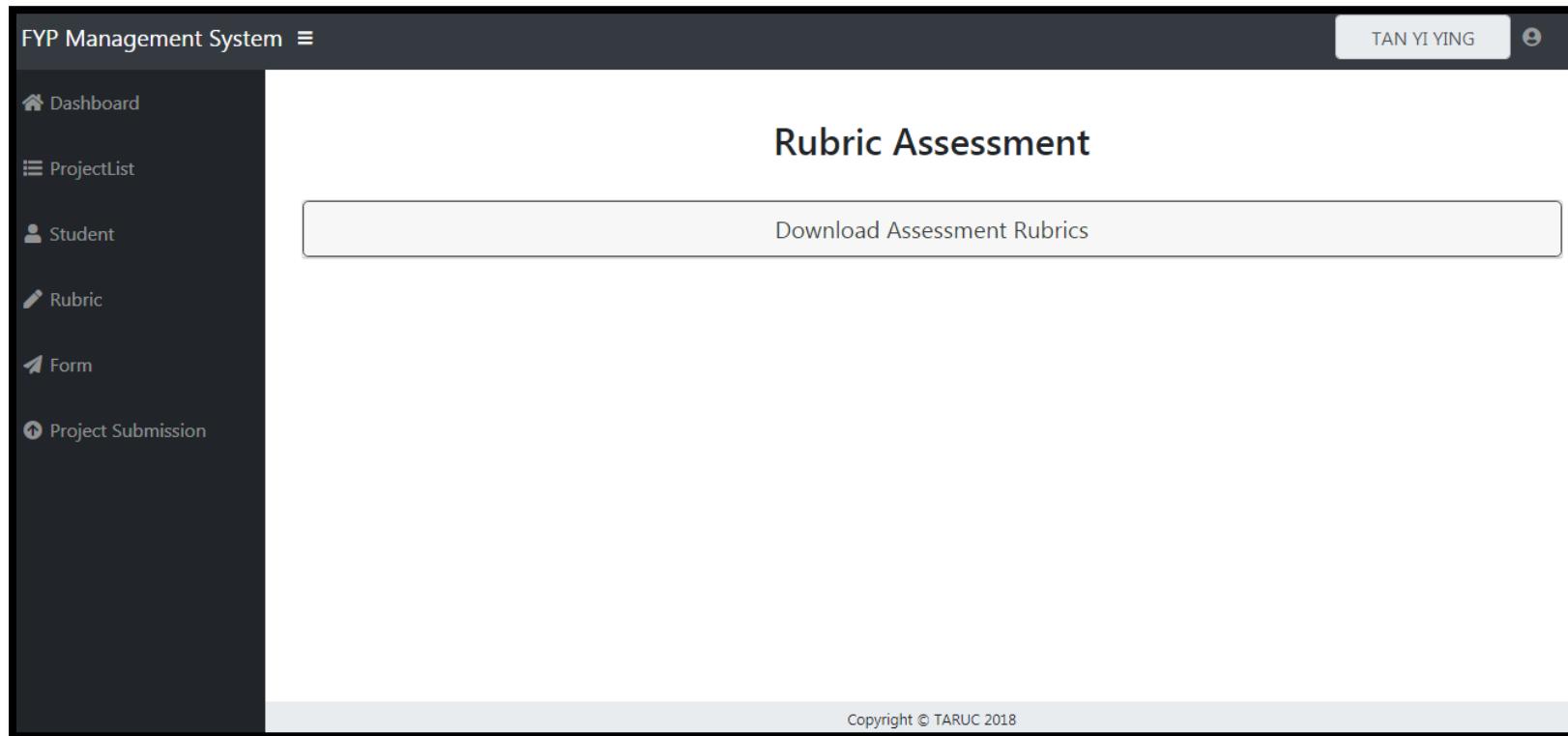


Figure 4.31: Main page of assessment module screen for student

The idea of this screen is same with Figure 4.28 above. Users, which are students and staffs can download the Project I & II assessment rubric by clicking the “Download” button.

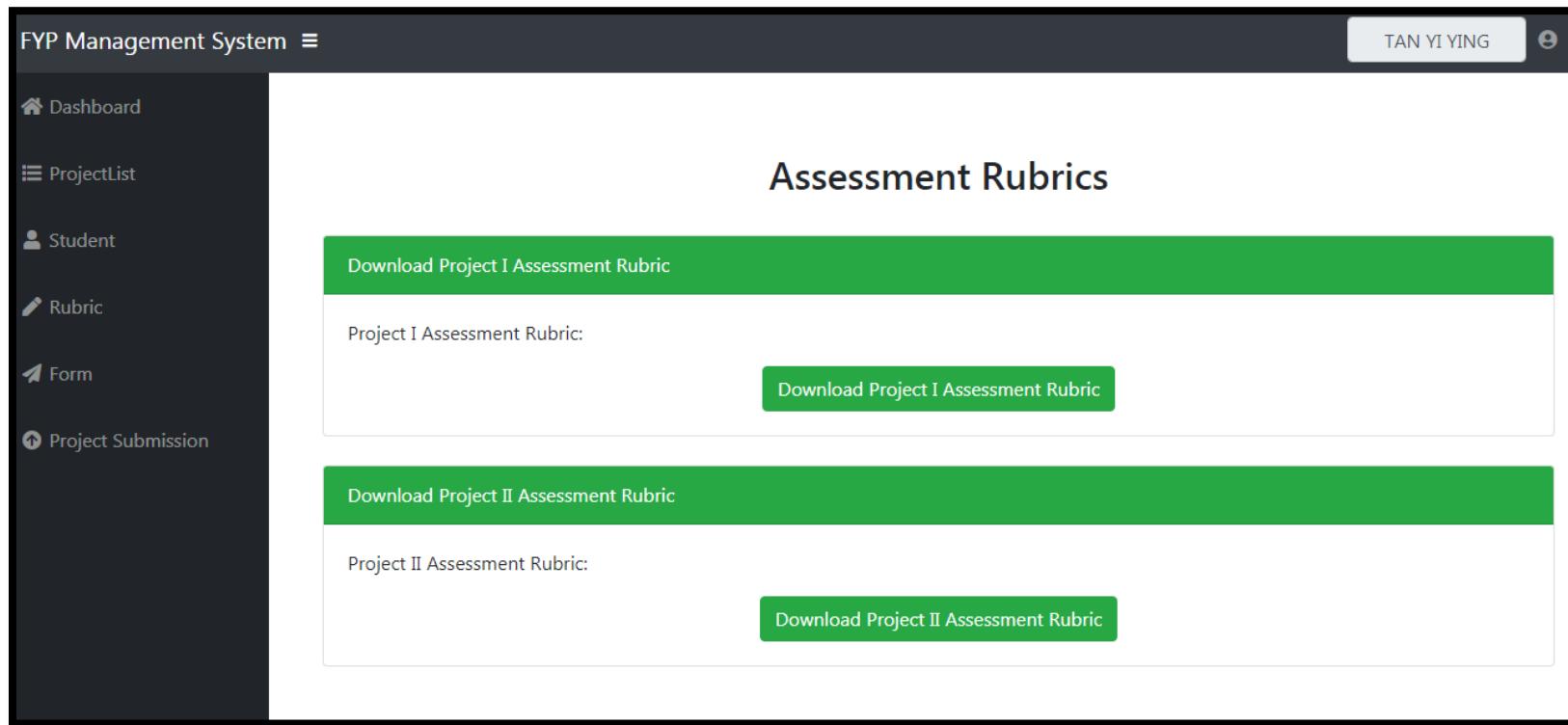


Figure 4.32: Download assessment rubric screen

Figure 4.33 shows the upload or import assessment rubric screen by uploading assessment rubric document. The concept of uploading assessment rubric is slight different with uploading form template as discussed earlier. The contents of the uploaded file will be extract out and store into database. After that, staff is required to choose the version of assessment rubric or form template to be used in the specific cohort as shown in Figure 4.34. The sample of assessment rubric is attached in Appendix D.

The screenshot displays two stacked web pages. The top page is titled 'Upload Rubric' and contains fields for 'Project Type' (radio buttons for 'Project I' and 'Project II'), a file upload input ('Choose File') showing 'No file chosen', and a note ('*File type must be .xsl or .xlsx format'). A 'Submit' button is at the bottom. The bottom page is titled 'Remove Latest Rubric Template' and shows a table with one row. The table has columns for 'Rubric Type', 'Rubric Name', and 'Action'. The data is: 'Project II' in 'Rubric Type', '2_rubricProjectII.xlsx' in 'Rubric Name', and a red 'Remove' button in 'Action'.

Rubric Type	Rubric Name	Action
Project II	2_rubricProjectII.xlsx	Remove

Figure 4.33: Upload assessment rubric screen

Figure 4.34 shows the template version to be used in a particular cohort. The version of template will be arranged from the lastest version to the oldest in the drop down list. The default version displayed in the drop down lists are the latest version of the template. After user click the “Confirm” button, all the template version to be used in that particular cohort will be fixed.

Template Version

Select template version for the following details

Project 1 Rubric	1_rubricProjectI.xlsx - Version 1
Project 2 Rubric	1_rubricProjectII.xlsx - Version 1
Form 2 - Proposal	1_FORM 2 Project Proposal (Tan Yi Ying RSD2G7).docx - Version 1
Form 3 - Project Requirements	1_form3.xlsx - Version 1
Form 4 (i) - Project I Appointment Record	1_FORM 4(i) BACS3403 Project I Project Appointment Record.docx - Version 1
Form 4 (ii) - Project II Appointment Record	1_FORM 4(ii) BACS3413 Project II Project Appointment Record.docx - Version 1

Confirm

Figure 4.34: Template version screen

Figure 4.35 shows the screen of student assessment rubric. Before supervisor or moderator entering marks in assessment rubric, they are required to choose their role, project type, project title, followed by student name as shown in Figure 4.35. The concept of design in same with the Form 3 – Project Proposal Moderation main screen. Figure 4.36 shows the design of assessment rubric to be filled in by supervisor.

Student Assessment

Name	Ms. tanny		
Role	<input checked="" type="radio"/> Supervisor <input type="radio"/> Moderator		
Project	<input checked="" type="radio"/> Project I <input type="radio"/> Project II		
Supervise Project		Moderate Project	
Student name		CTV1 - CHAN WENG SIANG	
Confirm			

Figure 4.35: Student assessment rubric screen

After user clicking the “Confirm” button in Figure 4.35, figure below will be shown. Figure 4.36 is the view for the role of Supervisor. All the assessment contents is retrieved from the assessment rubric that have been uploaded previously. Supervisor is required to enter the marks for each criteria. At the same time, supervisor can view the marks in the moderator column as well. After supervisor clicking the “Save” button, all the marks will be stored into the database, then the final mark and grade will be calculated accordingly.

BACS3403 PROJECT I ASSESSMENT											
Supervisor's Name		Ms. tanyy		Moderator's Name			Mr. yapkj				
Student's Name		TAN YI YING		Project Title			FYP Management System				
Registration ID		17WMR09519		Individual Title			Form & Management				
Programme		Bachelor of Information Technology (Honours) in Software Systems Development									
CLO	Artifact	Marks	Criteria	Descriptors	Assessment Criteria			Mark by Supervisor	Mark by Moderator	Final Mark	Mark Subtotal by CLO
					Poor	Accomplished	Good				
1	Project Proposal	20	Content	- All the necessary information is included. - Discussion is clear and concise.	1-4	5-7	8-10	<input type="text"/>	<input type="text"/>	0	0
			Innovativeness	- The proposed project is useful/meaningful - Includes innovativeness in user experience, technical implementation, etc.	1-4	5-7	8-10	<input type="text"/>	<input type="text"/>	0	
2	Literature Review & Requirements Analysis	30	Literature Review	- Content is well-structured - Discussion is clear and concise	1-4	5-7	8-10	<input type="text"/>		0	0
			Referencing	- Good range and appropriate use of references - Correct use of Harvard Referencing for in-text citation and reference list	1-4	5-7	8-10	<input type="text"/>		0	
			Requirements Analysis	- Methods and techniques used are well-justified. - Requirements are complete and clear.	1-4	5-7	8-10	<input type="text"/>		0	

Figure 4.36: Student assessment rubric screen (Supervisor view)

				- Discussion is clear and concise								
			Design considerations	- Designs are based on stated criteria, analysis and constraints.	1-4	5-7	8-10	<input type="text"/>		0		
			Critical Evaluation	- Design recommendations are well supported by information.	1-4	5-7	8-10	<input type="text"/>		0		
4	Meetings with supervisor	10	Leadership skills	- Demonstrates perfect attendance, always on time or early, and contributes meaningfully to discussions. - Demonstrates integrity and ability to respectfully interact with peers, lecturers and other people. Accepts feedback and follows directions.	1-4	5-7	8-10	<input type="text"/>		0	0	
		100							Total Marks	0		
											Grade	F
<p>Comments</p> <div style="border: 1px solid #ccc; height: 100px; width: 100%;"></div>												
Supervisor's Signature:							<hr/>					
Date:							<hr/>					
Moderator's Signature:							<hr/>					
Date:							<hr/>					

Figure 4.36: Student assessment rubric screen (Supervisor view) (continue)

Figure 4.37 below is the view of student assessment rubric screen for the role of Moderator. Moderator can only access and enter the marks for CLO 1's criteria for Project I. Besides, the mark given by the supervisor in each criteria, final mark and grade will be hidden from the view of moderator as moderator has limited access to the assessment form.

BACS3403 PROJECT I ASSESSMENT											
Supervisor's Name		Ms. tanny		Moderator's Name		Mr. yapkj					
Student's Name		CHAN WENG SIANG		Project Title		Lie Detection using Eyes Movement / Micro Expression / Body Language					
Registration ID		17WMU09215		Individual Title							
Programme		Bachelor of Information Technology (Honours) in Information Security									
CLO	Artifact	Marks	Criteria	Descriptors		Assessment Criteria		Mark by Supervisor	Mark by Moderator	Final Mark	Mark Subtotal by CLO
1	Project Proposal	20	Content	- All the necessary information is included. - Discussion is clear and concise.		1-4	5-7	8-10			
			Innovativeness	- The proposed project is useful/meaningful - Includes innovativeness in user experience, technical implementation, etc.		1-4	5-7	8-10			
2	Literature Review & Requirements Analysis	30	Literature Review	- Content is well-structured - Discussion is clear and concise		1-4	5-7	8-10			
			Referencing	- Good range and appropriate use of references - Correct use of Harvard Referencing for in-text citation and reference list		1-4	5-7	8-10			
			Requirements Analysis	- Methods and techniques used are well-justified. - Requirements are complete and clear.		1-4	5-7	8-10			

Figure 4.37: Student assessment rubric screen (Moderator view)

Supervisor can generate the mark summary report for both Project I and Project II. Figure 4.38 shows the mark summary screen for Project I. It is arranged based on programme, followed by student name in the alphabetically manner. Supervisor can generate the report into PDF format as shown in Figure 4.39. The concept of generating report into PDF format is same with the Form 3 – Project Proposal Moderation.

Mark Summary for BACS3403 Project I 201805Y2									
No	Programme	Student Name	Registration ID	Marks by CLO				Total Mark	Project Title
				CLO 1	CLO 2	CLO 3	CLO 4		
				20%	30%	40%	10%	100	
1	RSD	TAN YI YING	17WMR09519	75	73.33	85	90	80	FYP Management System
2	RSD	TEE REN MIAN	17WMR09524	70	70	70	70	70	FYP Management System
3	RSD	YAP KAI JEAN	17WMR19542	90	76.67	70	70	76	FYP Management System
4	RST	CHA KHOON LIN	17WMU09656	90	90	90	90	90	Bloody Defense

Signature: _____

Date: 18-01-2019

[Generate as PDF](#)

Figure 4.38: Mark summary report screen

Mark Summary Report - BACS3403 Project I

1 / 1

Mark Summary for BACS3403 Project I
201805Y2

Supervisor : Ms. tany
Moderator : Mr. yapkj

No.	Programme	Student Name	Registration ID	Marks by CLO				Total Mark	Project Title
				CLO 1	CLO 2	CLO 3	CLO 4		
				20%	30%	40%	10%	100	
1	RSD	TAN YI YING	17WMR09519	75	73.33	85	90	80	FYP Management System
2	RSD	TEE REN MIAN	17WMR09524	70	70	70	70	70	FYP Management System
3	RSD	YAP KAI JEAN	17WMR19542	90	76.67	70	70	76	FYP Management System
4	RST	CHA KHOON LIN	17WMU09656	90	90	90	90	90	Bloody Defense

Signature :

Date : 18-01-2019

+ -

Figure 4.39: Generate mark summary report in PDF format

4.6 Chapter Summary and Evaluation

In this chapter, as a summary, a class diagram is designed to clearly define the relationship between the classes and objects. Besides, the design of database is presented using Entity Relationship Diagram, with data dictionary attached in appendix while the design of processes in forms and assessments modules are presented using Activity Diagram. In addition, the design of report are presented using the sample reports provided by FYP committee and the algorithm for uploading excel file is designed by using pseudocode. Lastly, the user interface design of the system is illustrated with explanation.

Several problems were faced during the design phase. One of them was the design of database. There are ambiguities in which attributes are unclear whether they are necessary for other processes. Next, some of the tables such as Cohort tables were confusing as the attributes of cohort name is replaced by cohort ID. Problems were solved and minimized after having discussion with project supervisor Ms. Kathleen, as well as project teammates.

Chapter 5

Implementation and Testing

5 Implementation and Testing

In this chapter, system implementation tasks will be described in detail as there is a need to implement the system for use by TARUC's FYP committee, supervisors and students. Topics that would be described include the implementation of system, testing strategies, test plan, test data and test cases.

5.1 Implementation / Coding

5.1.1 Libraries Installation

This part will include the libraries needed to be installed for the Assessment Module and Form Module.

a) Laravel Excel

Laravel Excel to be a Laravel-flavoured PhpSpreadsheet: a simple, but elegant wrapper around PhpSpreadsheet with the goal of simplifying exports and imports. For FYP Management System, it is used for importing the assessment rubric and project requirements contents in the Form Module and Assessment Module. The requirements and steps for Laravel Excel's installation is shown in Figure 5.1 and Figure 5.2 below. Further details are available at <https://laravel-excel.maatwebsite.nl/3.1/getting-started/installation.html>

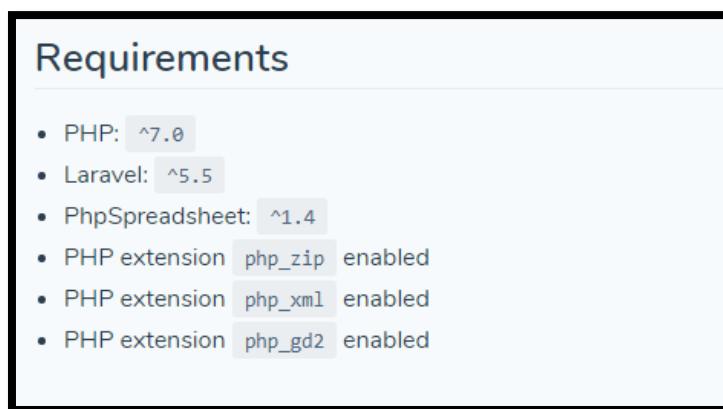


Figure 5.1: Requirements of installing Laravel Excel library

1. Add this package to the list of required packages, inside `console`
 - `composer require maatwebsite/excel`
2. Go to `app/config/app.php`
 - add to providers `Maatwebsite\Excel\ExcelServiceProvider::class`
 - add to aliases `'Excel' => Maatwebsite\Excel\Facades\Excel::class`

Figure 5.2: Requirements of installing Laravel Excel library

b) Zipper

Zipper is a simple Wrapper around the Zip Archive methods with some handy functions. For the FYP Management System, Zipper will be used in the Form Module, which allows the supervisor to download the Form 2 - project proposals that were uploaded by their students in a zip format. Every file selected by the supervisor will be downloaded as a zip file. The steps for Zipper's installation is shown in Figure 5.3 below. Refer to <https://github.com/Chumper/Zipper> for further information.

1. Add this package to the list of required packages, inside `composer.json`
 - for Laravel 5: `"chumper/zipper": "1.0.x"`
2. Run `composer update`
3. Go to `app/config/app.php`
 - add to providers `Chumper\Zipper\ZipperServiceProvider::class`
 - add to aliases `'Zipper' => Chumper\Zipper\Zipper::class`

Figure 5.3: Steps of installing Zipper library

c) TCPDF

TCPDF is one of the most active Open Source projects in the world. It is used for converting Form 3 - Project Proposal Moderation and Mark Summary for Project I & II into PDF format, to be saved, downloaded or printed by supervisor. The steps of TCPDF's installation is shown in Figure 5.4 below. Further information about TCPDF may be found at <https://ourcodeworld.com/articles/read/233/how-to-generate-a-pdf-from-html-with-tcpdf-in-laravel>

1. Add this package to the list of required packages, inside `console`

```
composer require elibyy/tcpdf-laravel
```

2. Go to `app/config/app.php`

- add to providers

```
'providers' => [
    //...
    Elibyy\TCPDF\ServiceProvider::class,
]
```

- add to aliases

```
'aliases' => [
    //...
    'PDF' => Elibyy\TCPDF\Facades\TCPDF::class
]
```

Figure 5.4: Steps of installing TCPDF library

d) Laravel Collective – FORMS & HTML

The purpose of installing this library is to deal with the multiple “<form>” usage in the single html file. The steps of Laravel Collective - FORMS & HTML’s installation is shown in Figure 5.5 below. Refer to <https://laravelcollective.com/docs/5.0/html> for more details on Laravel Collective.

1. Add this package to the list of required packages, inside `composer.json`
 - for Laravel 5: `"laravelcollective/html": "~5.0"`
2. Run `composer update`
3. Go to `app/config/app.php`
 - add to providers `Collective\Html\HtmlServiceProvider::class`
 - add to aliases `'Form' => Collective\Html\Form Facade::class,`
`'Html' => Collective\Html\HtmlFacade::class`

Figure 5.5: Steps of installing Laravel Collective – FORMS & HTML library

5.1.2 Implementation of Algorithms

- i. Upload function

Figure 5.6 below shows a part of the algorithm regarding the upload function for Form 2 – Project Proposal Moderation. This function is to allow students to upload their Form 2 – Project Proposal as the submission.

```
$folderName = "Project Proposals/" . $studentId;
$path = $request->file('proposal')->storeAs($folderName,
$studentDetail['studentName'] . "_" .
$request->proposal->getClientOriginalName());

$form2 = new Form2();
$form2->studentId = $studentId;
$form2->fileName = $path;
$form2->save();
```

Figure 5.6: Algorithm for upload function

ii. Download function

Figure 5.7 below shows a part of the algorithm regarding the download function for Form 4 – Project Appointment Record. This function is to allow student to download the template for Form 4 – Project Appointment Record.

```
$form4Template = Form_Template::where('formTemplateId',
$cohortDetail['form4iTemplateId'])->first();

if (!empty($form4Template)) {
    $isFormTemplateExist = Storage::disk('local')
        ->exists($form4Template->fileName);

    if ($isFormTemplateExist) {
        return Storage::download($form4Template->fileName);
    }
} else {
    return redirect('errorForm4i')->with('errorDlForm4i',
    'Form 4 (i) is not ready to be downloaded.');
}
```

Figure 5.7: Algorithm for download function

iii. Download file in a zip file format

Figure 5.8 below shows a part of the algorithm regarding the download file in a zip file format function for Form 2 – Project Proposal. This function is to allow the supervisor to download more than one student's proposal in a zip file format.

```
$currentTime = date("d-m-Y H.i.s", strtotime('+8 hours'));

$zipName = $currentTime . '.zip';
$zipFilePath = 'C:\proposal\\' . $zipName;

$zipper = new \Chumper\Zipper\Zipper;
$zipper->make($zipFilePath);

foreach ($fileArray as $file) {
    $zipper->add(storage_path() . '\app\\' .
        str_replace('\\', '/', $file));
}

$zipper->close();

// Set Header
$headers = array(
    'Content-Type' => 'application/octet-stream',
);

return response()->download($zipFilePath, $zipName, $headers);
```

Figure 5.8: Algorithm for download file in a zip file format

iv. Import file function

Figure 5.9 below shows a part of the algorithm regarding the import file function for assessment rubric. This function is to allow the FYP committee to import the assessment rubric contents to the database.

```
$rows = Excel::toArray(new UsersImport, $rubricFileName);

foreach ($rows as $row) {
    foreach ($row as $ro) {
        if ($ro[0] != 'CLO' && isset($ro[0])) {
            $artifact = new Artifact();
            $artifact->CLO = $ro[0];
            $artifact->description = $ro[1];
            $artifact->totalMarks = $ro[2];
            $artifact->rubicId = $rubricId;
            $artifact->save();
        }

        $artifactDetail = Artifact::orderBy('artifactId', 'desc')->first();

        if ($ro[0] != 'CLO' && $ro[3] != 'Criteria' && isset($ro[3])) {
            $criteria = new Criteria();
            $criteria->criteriaName = $ro[3];
            $criteria->description = $ro[4];
            $criteria->poor = $ro[5];
            $criteria->accomplished = $ro[6];
            $criteria->good = $ro[7];
            $criteria->artifactId = $artifactDetail['artifactId'];
            $criteria->save();
        }
    }
}
```

Figure 5.9: Algorithm for import file function

v. Validate file type

Figure 5.10 below shows a part of the algorithm regarding the validate file type function when uploading Form 2 – Project Proposal. This function is to make sure that student is uploading the correct type of file.

```
if (count($request->all()) == 5) {
    $validator = Validator::make($request->all(), [
        'proposal' => 'mimes:doc,docx,pdf'
    ]);

    if ($validator->fails()) {
        return redirect('invalidProposalUpload')
            ->withErrors($validator)
            ->withInput();
    }
}
```

Figure 5.10: Algorithm for validate file type function

vi. Generate contents in PDF format

Figure 5.11 below shows a part of the algorithm regarding the generation of contents in PDF format function for Form 3 – Project Proposal Moderation. This function is to generate the specific details in PDF format so that supervisor can download or print it out.

```
require_once('../tcpdf/tcpdf.php');

$view = View::make('form.form3PDF');
$html = $view->render();

$title = "Form 3";
$pdfName = "Form 3";

PDF::SetCreator(PDF_CREATOR);
PDF::SetTitle($title);
PDF::SetHeaderData(' ', ' ', PDF_HEADER_TITLE,
PDF_HEADER_STRING);
PDF::setHeaderFont(Array(PDF_FONT_NAME_MAIN, '',
PDF_FONT_SIZE_MAIN));
PDF::setFooterFont(Array(PDF_FONT_NAME_DATA, '',
PDF_FONT_SIZE_DATA));
PDF::SetDefaultMonospacedFont('helvetica');
PDF::SetFooterMargin(PDF_MARGIN_FOOTER);
PDF::SetMargins(PDF_MARGIN_LEFT, '10',
PDF_MARGIN_RIGHT);
PDF::setPrintHeader(false);
PDF::setPrintFooter(false);
PDF::SetAutoPageBreak(TRUE, 10);
PDF::SetFont('helvetica', '', 11);
PDF::AddPage('L', 'A4');

PDF::writeHTML($html, true, false, false, false, '');
PDF::Output($pdfName . '.pdf', 'I');
```

Figure 5.11: Algorithm for generating contents in PDF format

5.1.3 Follow-up

The project system will be passed to the next batch of Final Year Project students to continue the development for further enhancement and maintenance tasks.

5.2 Testing Strategies

5.2.1 Test Approach

The following test approaches were adopted in this project.

i. Unit Test

Unit testing refers to the practice of testing certain functions of our code and this helps us to determine whether the functions work as intended. Each of the individual function such as Fill in Form 1, Upload Form 2 - Project Proposal and download Form 4 – Project Appointment Record will be tested individually and separately.

ii. Integration Test

Integration testing tests integration or interfaces between components and interactions to different part of the system and, it is carried out right after integrating two different components or modules to find defects. For instance, an integration test is carried out after assessment module and form module are integrated.

iii. System Test

System testing is the level of the software testing process where a complete, integrated system is tested. The purpose of this test is to evaluate the system's compliance with the specified requirements. The entire FYP Management System is tested after all the modules are integrated successfully. Below are the testing that will be included in the system testing.

a. Usability Testing

To ensure that the interface of the FYP Management System is easy to use and understand such as user is able to see the content or key in the input.

b. Functional Testing

To ensure that the system meets the functional requirements.

c. Stress Testing

To ensure that the system is able to maintain its stability when it meets an overload or a heavy load conditions.

d. Performance Testing

To ensure that the sample program execute properly when the input values are more than the amount that set.

iv. Acceptance Test

Acceptance Test is the last phase of software testing process and within this phase, end users test the software to make sure it can handle required tasks in real-world scenarios, according to defined specifications. The complete FYP Management System after final integration will be having final testing with the FYP committee to evaluate the system's compliance with the business requirements and assess whether it is acceptable for delivery.

Below are the procedures which are carried out during the training:

- Presentation of the FYP Management System was carried out for the FYP committee lead and I²Hub lead to demonstrate the correct steps to operate the system.
- Right after presentation, Q&A session is held to accept questions from FYP committee lead and I2Hub lead. Questions that have been asked are answered to resolve confusion and misunderstanding. New requirements or suggested improvements will be recorded on future improvements.
- FYP Management System had been deployed to the I2Hub server.

5.3 Test Plan

The purpose of test plan is to provide the information and the framework required to plan and perform all test processes needed for the testing of FYP Management System. In order to make sure this program can run properly without errors such as logic error, syntax error and run time error, a number of test processes will be carried out. Besides, testing will be performed to find out the defects of the system before delivering it for students and staff.

5.3.1 Test Design Techniques

i. Boundary Value Analysis

It is the best design technique for the FYP Management System to test the input values at the boundaries. The input values are tested at the initial stages to reduce the chances of causing errors. The boundary values include: minimum, maximum, error values and inside/ outside boundaries. It is applied to see if there is any bugs occur at the boundary of the input domain. Hence, by using this method, there is no need to look for the errors at the centre of the input. This technique is an easy, fast and good way to catch any input errors that might occur to interrupt the functionality of the system.

ii. Equivalence Class Partitioning

This test design technique is designed to reduce the number of tests by dividing the different types of tests. After division, the FYP Management System will behave in a similar way for the different tests with equivalence partition. The test inputs are selected on the basis of each equivalence partition. One test value will be picked from each class during testing as it is assumed that all the conditions in one partition will be treated in the same way by the software. If one condition in the partition pass, it is assumed that all of the other conditions in that partition will pass; if one condition fails, it is assumed that all the other conditions in the partition will fail.

5.3.2 Test Completion Criteria

The testing could be completed when the following criteria are met:

- The scheduled time for testing expires
- The test cases execute without detecting errors
- 100% statement coverage
- 100% decision coverage
- 100% equivalence class coverage for specific requirements
- No faults of impact 3 and 4

5.3.3 Metrics to be collected

Table 5.1 below shows the metrics to be collected during testing process.

Metric List	Metric Description	Goals
Actual duration versus project planning duration	Metric to monitor the project progress compared to the plan	Allow 10% delay
Percentage of test cases run during test execution	Metric to monitor total number of test cases executed	100%
Percentage of test cases passed against total of test cases executed	Metric to monitor total number of test cases executed with Passed criteria	All high-risk test cases or 90% test cases passed

Percentage of baseline requirement covered against total test cases	Metric to monitor total number of baseline requirement coverage	100%
---	---	------

Table 5.1: Metrics to be collected during the testing plan

5.3.4 Test Data Requirements

Test data is used to confirm the expected result. For instance, when test data is entered, the expected result should be displayed. Table 5.2 to Table 5.6 shows the test data together with the requirements that have been collected during the testing planning process.

i. Form Module

Form 1 – Student Details			
Type of Test Data	Range of Test Data	Validity of Test Data	Description
String	Phone number's regular expression	Valid	Used for the following input fields: <ul style="list-style-type: none"> • House Phone Contact (Term) • House Phone Contact (Permanent) • Handphone No.
	Alphabet	Invalid	
String	Email's regular expression	Valid	Used for the following input fields: <ul style="list-style-type: none"> • Email (Personal)

Table 5.2: Test data and requirements for Form 1 – Student Details

Form 2 – Project Proposal			
Type of Test Data	Range of Test Data	Validity of Test Data	Description
String	Alphabet	Valid	Used for the following input fields: <ul style="list-style-type: none">• Individual Title• Client Name• Competition
File	.doc, .docx, .pdf	Valid	Used for the following input fields: <ul style="list-style-type: none">• Choose the file you want to upload as proposal
	.xls, .xlsx, .txt	Invalid	

Table 5.3: Test data and requirements for Form 2 – Project Proposal

Form 3 – Project Proposal Moderation			
Type of Test Data	Range of Test Data	Validity of Test Data	Description
String	Alphabet	Valid	Used for the following input fields: <ul style="list-style-type: none">• Comments and Changes Recommended (by Moderator)• Actions Taken (by Supervisor)
Integer	0 to 10	Valid	Used for the following input field: <ul style="list-style-type: none">• Mark
	Alphabet	Invalid	
	-1, 11	Invalid	

Table 5.4: Test data and requirements for Form 3 – Project Proposal Moderation

ii. Assessment Module

Assessment Form			
Type of Test Data	Range of Test Data	Validity of Test Data	Description
String	Alphabet	Valid	Used for the following input fields: <ul style="list-style-type: none">• Comments
Integer	0 to 10	Valid	Used for the following input field: <ul style="list-style-type: none">• Mark by Supervisor
	Alphabet	Invalid	
	-1, 11	Invalid	<ul style="list-style-type: none">• Mark by Moderator

Table 5.5: Test data and requirements for Assessment Form

5.3.5 Test Environment Requirements

i. Software

Since FYP Management System is written in PHP and HTML, therefore web browsers such as Google Chrome, Internet Explorer are needed to execute it. The operating system of computer can be MacOS or must be at least Windows 7 as the version before the Windows 7 may affect the efficiency and the performance of web browser. The user will need an internet access to access the system.

ii. Hardware

A working computer with a keyboard and a mouse are needed to begin the testing. It would be recommended that the components of computer had met the following requirements as shown in Table 5.6 to avoid some unnecessary problems such as time latency when testing is carried out.

Components	Requirements
RAM	At least 4GB DDR3 or higher
Hard Drive	At least 500Gb or higher
Processor	At least Core i3 or higher

Table 5.6: Computer's requirements

5.4 Test Cases

A test case describes the purpose of a particular test, determines the required inputs and expected results, provides a step-by-step procedure for performing the test, and outlines the pass/fail criteria for determining acceptance. Some of the test cases for this system are presented here.

Project Name: FYP Management System											
Test Case ID: TC01		Test Designed by: Tan Yi Ying									
Test Priority (Low/Medium/High): Medium		Test Designed date: 9/1/2019									
Module Name: Form Module (Form 1 – Student Details)		Test Executed by: Tan Yi Ying									
Test Title: Testing all input fields with valid data		Test Execution date: 10/1/2019									
Description: Enter valid data for all the input fields											
Pre-conditions: The screen is ready for input, all the data is valid											
Dependencies: -											
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes					
1	Enter valid House Phone Contact (Term)	03-87654321	Tick symbol is displayed	Tick symbol is displayed	Pass						
2	Enter valid House Phone Contact (Permanent)	03-12345678	Tick symbol is displayed	Tick symbol is displayed	Pass						
3	Enter valid Handphone No.	012-1234567	Tick symbol is displayed	Tick symbol is displayed	Pass						
4	Enter valid Email (Personal)	yvonnetyy_0323@hotmai.com	Tick symbol is displayed	Tick symbol is displayed	Pass						
5	Click “Save” button	-	Form 1 details successfully saved message is displayed	Form 1 details successfully saved message is displayed	Pass						
Post-conditions: Same as expected result, Form 1's details are stored into database											

Project Name: FYP Management System									
Test Case ID: TC02				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 1 – Student Details)				Test Executed by: Tan Yi Ying					
Test Title: Testing all input fields with wrong format of data				Test Execution date: 10/1/2019					
Description: Enter wrong format of data for all the input fields									
Pre-conditions: The screen is ready for input, all the data is in wrong format									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Enter alphabet in House Phone Contact (Term)	abc	Cross symbol is displayed	Cross symbol is displayed	Pass				
2	Enter alphabet in House Phone Contact (Permanent)	abc	Cross symbol is displayed	Cross symbol is displayed	Pass				
3	Enter alphabet in Handphone No.	abc	Cross symbol is displayed	Cross symbol is displayed	Pass				
4	Enter wrong format of Email (Personal)	yvonnetyy _0323	Cross symbol is displayed	Cross symbol is displayed	Pass				
5	Click “Save” button	-	-	-	-	“Save” button is disabled			
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC03				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 2 – Project Proposal)				Test Executed by: Tan Yi Ying					
Test Title: Testing all input fields with valid data				Test Execution date: 10/1/2019					
Description: Enter valid data for all the input fields									
Pre-conditions: The screen is ready for input, all the data is valid									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Enter valid Individual Title	Assessment & Form Management							
2	Enter valid Client Name	Tan Yi Ying							
3	Enter valid Competition	FYP Competition							
4	Choose correct file type	Proposal.doc							
5	Click “Submit” button	-	Form 2 details successfully saved message is displayed	Form 2 details successfully saved message is displayed	Pass				
Post-conditions: Same as expected result, Form 2's details are stored into database									

Project Name: FYP Management System									
Test Case ID: TC04				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 2 – Project Proposal)				Test Executed by: Tan Yi Ying					
Test Title: Testing “Individual Title” field with blank input				Test Execution date: 10/1/2019					
Description: Leave blank for “Individual Title” field									
Pre-conditions: The screen is ready for input, all the other data is valid									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Leave blank for Individual Title								
2	Enter valid Client Name	Tan Yi Ying							
3	Enter valid Competition	FYP Competition							
4	Choose correct file type	Proposal.doc							
5	Click “Submit” button	-	Field filled required message is displayed	Field filled required message is displayed	Pass	*Individual Title is a must filled field			
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC05				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 2 – Project Proposal)				Test Executed by: Tan Yi Ying					
Test Title: Testing file attached field with blank input				Test Execution date: 10/1/2019					
Description: Leave blank for file attached field									
Pre-conditions: The screen is ready for input, all the other data is valid, no proposal is submitted earlier.									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Enter valid Individual Title	Assessment & Form Management							
2	Enter valid Client Name	Tan Yi Ying							
3	Enter valid Competition	FYP Competition							
4	Leave blank for file attached field								
5	Click “Submit” button	-	Field filled required message is displayed	Field filled required message is displayed	Pass	*File must be attached if there is no proposal submitted earlier			
Post-conditions: Same as expected result									

Project Name: FYP Management System										
Test Case ID: TC06			Test Designed by: Tan Yi Ying							
Test Priority (Low/Medium/High): Medium			Test Designed date: 9/1/2019							
Module Name: Form Module (Form 2 – Project Proposal)			Test Executed by: Tan Yi Ying							
Test Title: Testing file attached field with wrong file type			Test Execution date: 10/1/2019							
Description: Attached wrong file type for file attached field										
Pre-conditions: The screen is ready for input, all the other data is valid, no proposal is submitted earlier.										
Dependencies: -										
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes				
1	Enter valid Individual Title	Assessment & Form Management								
2	Enter valid Client Name	Tan Yi Ying								
3	Enter valid Competition	FYP Competition								
4	Leave blank for file attached field	Proposal.xls								
5	Click "Submit" button	-	Wrong file type error message is displayed	Wrong file type error message is displayed	Pass	*File type for project proposal must be in .doc, .docx or .pdf format				
Post-conditions: Same as expected result										

Project Name: FYP Management System									
Test Case ID: TC07				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 2 – Project Proposal)				Test Executed by: Tan Yi Ying					
Test Title: Testing for downloading Proposal Template				Test Execution date: 10/1/2019					
Description: Testing for downloading Proposal Template									
Pre-conditions: The template version for Form 2 had been chosen and saved									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Download Proposal Template” button	-	Proposal template is downloaded successfully	Proposal template is downloaded successfully	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC08				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 2 – Project Proposal)				Test Executed by: Tan Yi Ying					
Test Title: Testing for downloading Proposal Template				Test Execution date: 10/1/2019					
Description: Testing for downloading Proposal Template									
Pre-conditions: The template version for Form 2 has not been chosen									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Download Proposal Template” button	-	Proposal template not ready error message is displayed	Proposal template not ready error message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC09				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 2 – Project Proposal)				Test Executed by: Tan Yi Ying					
Test Title: Testing for downloading student's Project Proposal				Test Execution date: 10/1/2019					
Description: Testing for downloading student's Project Proposal									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Select student's proposal by ticking the check box								
2	Click "Download" button	-	Student's proposal is downloaded successfully	Student's proposal is downloaded successfully	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC10				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 3 – Project Proposal Moderation)				Test Executed by: Tan Yi Ying					
Test Title: Testing negative value in “Mark” input field				Test Execution date: 10/1/2019					
Description: Enter -5 in the “Mark” input field									
Pre-conditions: The screen is ready for input, all other data is valid, access as moderator									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Select project requirements by ticking the checkbox								
2	Enter Comments and Changes Recommended (by Moderator)	Title is not interesting							
3	Enter mark	-5							
4	Click “Save” button	-	Value must be less than or equal to 10 error message is displayed	Value must be less than or equal to 10 error message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC11				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 3 – Project Proposal Moderation)				Test Executed by: Tan Yi Ying					
Test Title: Boundary value analysis testing by entering value > 10 in “Mark” input field				Test Execution date: 10/1/2019					
Description: Enter 11 in the “Mark” input field									
Pre-conditions: The screen is ready for input, all other data is valid, access as moderator									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Select project requirements by ticking the checkbox								
2	Enter Comments and Changes Recommended (by Moderator)	Title is not interesting							
3	Enter mark	11							
4	Click “Save” button	-	Value must be less than or equal to 10 error message is displayed	Value must be less than or equal to 10 error message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC12				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 3 – Project Proposal Moderation)				Test Executed by: Tan Yi Ying					
Test Title: Boundary value analysis testing by entering value <=10 in “Mark” input field				Test Execution date: 10/1/2019					
Description: Enter 8 in the “Mark” input field									
Pre-conditions: The screen is ready for input, all other data is valid, access as moderator									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Select project requirements by ticking the checkbox								
2	Enter Comments and Changes Recommended (by Moderator)	Title is not interesting							
3	Enter mark	8							
4	Click “Save” button	-	Form 3 details successfully saved message is displayed	Form 3 details successfully saved message is displayed	Pass				
Post-conditions: Same as expected result, Form 3's details are stored into database									

Project Name: FYP Management System									
Test Case ID: TC13				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 3 – Project Proposal Moderation)				Test Executed by: Tan Yi Ying					
Test Title: Testing for generating Form 3 in PDF format and download it				Test Execution date: 10/1/2019					
Description: Testing for generating Form 3 in PDF format and download it									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Generate as PDF” button	-	Form 3 is generated as PDF in new tab	Form 3 is generated as PDF in new tab	Pass				
2	Click “Download” icon	-	“Save as” box is displayed	“Save as” box is displayed					
3	Click “Save” button	-	Form 3 is downloaded successfully	Form 3 is downloaded successfully	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC14				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 3 – Project Proposal Moderation)				Test Executed by: Tan Yi Ying					
Test Title: Testing for generating Form 3 in PDF format and print it				Test Execution date: 10/1/2019					
Description: Testing for generating Form 3 in PDF format and print it									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Generate as PDF” button	-	Form 3 is generated as PDF in new tab	Form 3 is generated as PDF in new tab	Pass				
2	Click “Print” icon	-	Print settings is displayed	Print settings is displayed					
3	Click “Save” button	-	Form 3 is printed successfully	Form 3 is printed successfully	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC15				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 4 – Project Appointment Record)				Test Executed by: Tan Yi Ying					
Test Title: Testing for downloading Project I Appointment Record with cohort's template version chosen				Test Execution date: 10/1/2019					
Description: Testing for downloading Project I Appointment Record with cohort's template version chosen									
Pre-conditions: The template version for Form 4 – Project I Appointment Record had been chosen and saved									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Download Project I Appointment Record Template” button	-	Form 4 Project I's template is downloaded successfully	Form 4 Project I's template is downloaded successfully	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC16				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 4 – Project Appointment Record)				Test Executed by: Tan Yi Ying					
Test Title: Testing for downloading Project I Appointment Record without cohort's template version chosen				Test Execution date: 10/1/2019					
Description: Testing for downloading Project I Appointment Record without cohort's template version chosen									
Pre-conditions: The template version for Form 4 – Project I Appointment Record has not been chosen									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Download Project I Appointment Record Template” button	-	Form 4 Project I's template not ready error message is displayed	Form 4 Project I's template not ready error message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC17				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Form 4 – Project Appointment Record)				Test Executed by: Tan Yi Ying					
Test Title: Testing for downloading Project II Appointment Record with cohort's template version chosen				Test Execution date: 10/1/2019					
Description: Testing for downloading Project II Appointment Record with cohort's template version chosen									
Pre-conditions: The template version for Form 4 – Project II Appointment Record had been chosen and saved									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Download Project II Appointment Record Template” button	-	Form 4 Project II's template is downloaded successfully	Form 4 Project II's template is downloaded successfully	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System										
Test Case ID: TC18			Test Designed by: Tan Yi Ying							
Test Priority (Low/Medium/High): Medium			Test Designed date: 9/1/2019							
Module Name: Form Module (Form 4 – Project Appointment Record)			Test Executed by: Tan Yi Ying							
Test Title: Testing for downloading Project II Appointment Record without cohort's template version chosen			Test Execution date: 10/1/2019							
Description: Testing for downloading Project II Appointment Record without cohort's template version chosen										
Pre-conditions: The template version for Form 4 – Project II Appointment Record has not been chosen										
Dependencies: -										
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes				
1	Click “Download Project II Appointment Record Template” button	-	Form 4 Project II's template not ready error message is displayed	Form 4 Project II's template not ready error message is displayed	Pass					
Post-conditions: Same as expected result										

Project Name: FYP Management System									
Test Case ID: TC19				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Upload Form Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for uploading Form 2 – Project Proposal template with correct file type				Test Execution date: 10/1/2019					
Description: Testing for uploading Form 2 – Project Proposal template with correct file type									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Choose project type	Form 2 – Project Proposal							
2	Choose correct file type	Form2.doc							
3	Click “Submit” button	-	Form template uploaded successfully message is displayed	Form template uploaded successfully message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC20				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Upload Form Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for uploading Form 2 – Project Proposal template with wrong file type				Test Execution date: 10/1/2019					
Description: Testing for uploading Form 2 – Project Proposal template with wrong file type									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Choose project type	Form 2 – Project Proposal							
2	Choose wrong file type	Form2.xls							
3	Click “Submit” button	-	Wrong file type error message is displayed	Wrong file type error message is displayed	Pass	*Form 2 template must be in .doc, .docx or .pdf format			
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC21				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Upload Form Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for uploading Form 3 – Project Requirement template with correct file type				Test Execution date: 10/1/2019					
Description: Testing for uploading Form 3 – Project Requirement template with correct file type									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Choose project type	Form 3 – Project Requirement							
2	Choose correct file type	Form3.xls							
3	Click “Submit” button	-	Form template uploaded successfully message is displayed	Form template uploaded successfully message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System										
Test Case ID: TC22			Test Designed by: Tan Yi Ying							
Test Priority (Low/Medium/High): Medium			Test Designed date: 9/1/2019							
Module Name: Form Module (Upload Form Template)			Test Executed by: Tan Yi Ying							
Test Title: Testing for uploading Form 3 – Project Requirement template with wrong file type			Test Execution date: 10/1/2019							
Description: Testing for uploading Form 3 – Project Requirement template with wrong file type										
Pre-conditions: -										
Dependencies: -										
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes				
1	Choose project type	Form 3 – Project Requirement								
2	Choose wrong file type	Form3.pdf								
3	Click “Submit” button	-	Wrong file type error message is displayed	Wrong file type error message is displayed	Pass	*Form 3 template must be in .xls or .xlsx format				
Post-conditions: Same as expected result										

Project Name: FYP Management System									
Test Case ID: TC23				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Upload Form Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for uploading Form 4 – Project I Appointment Record template with correct file type				Test Execution date: 10/1/2019					
Description: Testing for uploading Form 4 – Project I Appointment Record template with correct file type									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Choose project type	Form 4 – Project I Appointment Record							
2	Choose correct file type	Form4i.doc							
3	Click “Submit” button	-	Form template uploaded successfully message is displayed	Form template uploaded successfully message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC24				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Upload Form Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for uploading Form 4 – Project I Appointment Record template with wrong file type				Test Execution date: 10/1/2019					
Description: Testing for uploading Form 4 – Project I Appointment Record template with wrong file type									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Choose project type	Form 4 – Project I Appointment Record							
2	Choose wrong file type	Form4i.txt							
3	Click “Submit” button	-	Wrong file type error message is displayed	Wrong file type error message is displayed	Pass	*Form 4 – Project I template must be in .doc, .docx or .pdf format			
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC25				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Upload Form Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for uploading Form 4 – Project II Appointment Record template with correct file type				Test Execution date: 10/1/2019					
Description: Testing for uploading Form 4 – Project II Appointment Record template with correct file type									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Choose project type	Form 4 – Project II Appointment Record							
2	Choose correct file type	Form4i.doc							
3	Click “Submit” button	-	Form template uploaded successfully message is displayed	Form template uploaded successfully message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC24				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Upload Form Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for uploading Form 4 – Project II Appointment Record template with wrong file type				Test Execution date: 10/1/2019					
Description: Testing for uploading Form 4 – Project II Appointment Record template with wrong file type									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Choose project type	Form 4 – Project II Appointment Record							
2	Choose wrong file type	Form4ii.txt							
3	Click “Submit” button	-	Wrong file type error message is displayed	Wrong file type error message is displayed	Pass	*Form 4 – Project II template must be in .doc, .docx or .pdf format			
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC25				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Upload Form Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for removing the latest form template that has not been used				Test Execution date: 10/1/2019					
Description: Testing for removing the latest form template that has not been used									
Pre-conditions: There is uploaded form template, it has not been used									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Remove” button	-	Template is removed successfully message is displayed	Template is removed successfully message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC26				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Form Module (Upload Form Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for removing the latest form template that has been used				Test Execution date: 10/1/2019					
Description: Testing for removing the latest form template that has been used									
Pre-conditions: There is uploaded form template, it has been used									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Remove” button	-	Template cannot be removed error message is displayed	Template cannot be removed error message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC27				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Download Assessment Rubrics)				Test Executed by: Tan Yi Ying					
Test Title: Testing for downloading Project I Assessment Rubric with cohort's template version chosen				Test Execution date: 10/1/2019					
Description: Testing for downloading Project I Assessment Rubric with cohort's template version chosen									
Pre-conditions: The template version for Project I Assessment Rubric had been chosen and saved									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Download Project I Assessment Rubric” button	-	Project I Assessment Rubric’s template is downloaded successfully	Project I Assessment Rubric’s template is downloaded successfully	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC28				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Download Assessment Rubrics)				Test Executed by: Tan Yi Ying					
Test Title: Testing for downloading Project I Assessment Rubric without cohort's template version chosen				Test Execution date: 10/1/2019					
Description: Testing for downloading Project I Assessment Rubric without cohort's template version chosen									
Pre-conditions: The template version for Project I Assessment Rubric has not been chosen									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Download Project I Assessment Rubric” button	-	Project I Assessment Rubric’s template not ready error message is displayed	Project I Assessment Rubric’s template not ready error message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC29				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Download Assessment Rubrics)				Test Executed by: Tan Yi Ying					
Test Title: Testing for downloading Project II Assessment Rubric with cohort's template version chosen				Test Execution date: 10/1/2019					
Description: Testing for downloading Project II Assessment Rubric with cohort's template version chosen									
Pre-conditions: The template version for Project II Assessment Rubric had been chosen and saved									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Download Project II Assessment Rubric” button	-	Project II Assessment Rubric’s template is downloaded successfully	Project II Assessment Rubric’s template is downloaded successfully	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC30				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Download Assessment Rubrics)				Test Executed by: Tan Yi Ying					
Test Title: Testing for downloading Project II Assessment Rubric without cohort's template version chosen				Test Execution date: 10/1/2019					
Description: Testing for downloading Project II Assessment Rubric without cohort's template version chosen									
Pre-conditions: The template version for Project II Assessment Rubric has not been chosen									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Download Project II Assessment Rubric” button	-	Project II Assessment Rubric’s template not ready error message is displayed	Project II Assessment Rubric’s template not ready error message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC31				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Upload Assessment Rubric Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for uploading Project I Assessment Rubric Template with correct file type				Test Execution date: 10/1/2019					
Description: Testing for uploading Project I Assessment Rubric Template with correct file type									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Choose project type	Project I							
2	Choose correct file type	rubricI.xls							
3	Click “Submit” button	-	Rubric uploaded successfully message is displayed	Rubric uploaded successfully message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC32				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Upload Assessment Rubric Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for uploading Project II Assessment Rubric Template with correct file type				Test Execution date: 10/1/2019					
Description: Testing for uploading Project II Assessment Rubric Template with correct file type									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Choose project type	Project II							
2	Choose correct file type	rubricII.xls							
3	Click “Submit” button	-	Rubric uploaded successfully message is displayed	Rubric uploaded successfully message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC33				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Upload Assessment Rubric Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for uploading Project I Assessment Rubric Template with wrong file type				Test Execution date: 10/1/2019					
Description: Testing for uploading Project I Assessment Rubric Template with wrong file type									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Choose project type	Project I							
2	Choose wrong file type	rubricI.doc							
3	Click “Submit” button	-	Wrong file type error message is displayed	Wrong file type error message is displayed	Pass	*File type for assessment rubric must be in .xls or .xlsx format			
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC34				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Upload Assessment Rubric Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for uploading Project II Assessment Rubric Template with wrong file type				Test Execution date: 10/1/2019					
Description: Testing for uploading Project II Assessment Rubric Template with wrong file type									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Choose project type	Project II							
2	Choose wrong file type	rubricII.doc							
3	Click “Submit” button	-	Wrong file type error message is displayed	Wrong file type error message is displayed	Pass	*File type for assessment rubric must be in .xls or .xlsx format			
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC35				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Upload Assessment Rubric Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for removing the latest assessment rubric template that has not been used				Test Execution date: 10/1/2019					
Description: Testing for removing the latest assessment rubric template that has not been used									
Pre-conditions: There is uploaded assessment rubric template, it has not been used									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Remove” button	-	Template is removed successfully message is displayed	Template is removed successfully message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC36				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Upload Assessment Rubric Template)				Test Executed by: Tan Yi Ying					
Test Title: Testing for removing the latest assessment rubric template that has been used				Test Execution date: 10/1/2019					
Description: Testing for removing the latest assessment rubric template that has been used									
Pre-conditions: There is uploaded assessment rubric template, it has been used									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Remove” button	-	Template cannot be removed error message is displayed	Template cannot be removed error message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC37				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Student Assessment)				Test Executed by: Tan Yi Ying					
Test Title: Boundary value analysis testing by entering value <=10 in “Mark by Supervisor” input field				Test Execution date: 10/1/2019					
Description: Enter 8 in the “Mark by Supervisor” input field									
Pre-conditions: The screen is ready for input, all other data is valid									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Enter Mark by Supervisor	8							
2	Enter Mark by Moderator	8							
3	Enter Comments	Well done							
4	Click “Save” button	-	Student assessment details successfully saved message is displayed	Student assessment details successfully saved message is displayed	Pass				
Post-conditions: Same as expected result, student assessment details are stored into database									

Project Name: FYP Management System									
Test Case ID: TC38				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Student Assessment)				Test Executed by: Tan Yi Ying					
Test Title: Boundary value analysis testing by entering value >10 in “Mark by Supervisor” input field				Test Execution date: 10/1/2019					
Description: Enter 11 in the “Mark by Supervisor” input field									
Pre-conditions: The screen is ready for input, all other data is valid									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Enter Mark by Supervisor	11							
2	Enter Mark by Moderator	8							
3	Enter Comments	Well done							
4	Click “Save” button	-	Value must be less than or equal to 10 error message is displayed	Value must be less than or equal to 10 error message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC39				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Student Assessment)				Test Executed by: Tan Yi Ying					
Test Title: Enter negative value in “Mark by Supervisor” input field				Test Execution date: 10/1/2019					
Description: Enter -5 in the “Mark by Supervisor” input field									
Pre-conditions: The screen is ready for input, all other data is valid									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Enter Mark by Supervisor	-5							
2	Enter Mark by Moderator	8							
3	Enter Comments	Well done							
4	Click “Save” button	-	Value must be less than or equal to 10 error message is displayed	Value must be less than or equal to 10 error message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC40				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Student Assessment)				Test Executed by: Tan Yi Ying					
Test Title: Boundary value analysis testing by entering value <=10 in “Mark by Moderator” input field				Test Execution date: 10/1/2019					
Description: Enter 8 in the “Mark by Moderator” input field									
Pre-conditions: The screen is ready for input, all other data is valid									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Enter Mark by Supervisor	8							
2	Enter Mark by Moderator	8							
3	Enter Comments	Well done							
4	Click “Save” button	-	Student assessment details successfully saved message is displayed	Student assessment details successfully saved message is displayed	Pass				
Post-conditions: Same as expected result, student assessment details are stored into database									

Project Name: FYP Management System									
Test Case ID: TC41				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Student Assessment)				Test Executed by: Tan Yi Ying					
Test Title: Boundary value analysis testing by entering value >10 in “Mark by Moderator” input field				Test Execution date: 10/1/2019					
Description: Enter 11 in the “Mark by Moderator” input field									
Pre-conditions: The screen is ready for input, all other data is valid									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Enter Mark by Supervisor	8							
2	Enter Mark by Moderator	11							
3	Enter Comments	Well done							
4	Click “Save” button	-	Value must be less than or equal to 10 error message is displayed	Value must be less than or equal to 10 error message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC42				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Student Assessment)				Test Executed by: Tan Yi Ying					
Test Title: Enter negative value in “Mark by Moderator” input field				Test Execution date: 10/1/2019					
Description: Enter -5 in the “Mark by Moderator” input field									
Pre-conditions: The screen is ready for input, all other data is valid									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Enter Mark by Supervisor	8							
2	Enter Mark by Moderator	-5							
3	Enter Comments	Well done							
4	Click “Save” button	-	Value must be less than or equal to 10 error message is displayed	Value must be less than or equal to 10 error message is displayed	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC43				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Mark Summary - Project I)				Test Executed by: Tan Yi Ying					
Test Title: Testing for generating Mark Summary for Project I in PDF format and download it				Test Execution date: 10/1/2019					
Description: Testing for generating Mark Summary for Project I in PDF format and download it									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Generate as PDF” button	-	Mark Summary for Project I is generated as PDF	Mark Summary for Project I is generated as PDF	Pass				
2	Click “Download” icon	-	“Save as” box is displayed	“Save as” box is displayed					
3	Click “Save” button	-	Mark Summary for Project I is downloaded successfully	Mark Summary for Project I is downloaded successfully	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC44				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Mark Summary - Project I)				Test Executed by: Tan Yi Ying					
Test Title: Testing for generating Mark Summary for Project I in PDF format and print it				Test Execution date: 10/1/2019					
Description: Testing for generating Mark Summary for Project I in PDF format and print it									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Generate as PDF” button	-	Mark Summary for Project I is generated as PDF in new tab	Mark Summary for Project I is generated as PDF in new tab	Pass				
2	Click “Print” icon	-	Print settings is displayed	Print settings is displayed					
3	Click “Save” button	-	Mark Summary for Project I is printed successfully	Mark Summary for Project I is printed successfully	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC45				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Mark Summary - Project II)				Test Executed by: Tan Yi Ying					
Test Title: Testing for generating Mark Summary for Project II in PDF format and download it				Test Execution date: 10/1/2019					
Description: Testing for generating Mark Summary for Project II in PDF format and download it									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Generate as PDF” button	-	Mark Summary for Project II is generated as PDF	Mark Summary for Project II is generated as PDF	Pass				
2	Click “Download” icon	-	“Save as” box is displayed	“Save as” box is displayed					
3	Click “Save” button	-	Mark Summary for Project II is downloaded successfully	Mark Summary for Project II is downloaded successfully	Pass				
Post-conditions: Same as expected result									

Project Name: FYP Management System									
Test Case ID: TC46				Test Designed by: Tan Yi Ying					
Test Priority (Low/Medium/High): Medium				Test Designed date: 9/1/2019					
Module Name: Assessment Module (Mark Summary - Project II)				Test Executed by: Tan Yi Ying					
Test Title: Testing for generating Mark Summary for Project II in PDF format and print it				Test Execution date: 10/1/2019					
Description: Testing for generating Mark Summary for Project II in PDF format and print it									
Pre-conditions: -									
Dependencies: -									
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/ Fail)	Notes			
1	Click “Generate as PDF” button	-	Mark Summary for Project II is generated as PDF in new tab	Mark Summary for Project II is generated as PDF in new tab	Pass				
2	Click “Print” icon	-	Print settings is displayed	Print settings is displayed					
3	Click “Save” button	-	Mark Summary for Project II is printed successfully	Mark Summary for Project II is printed successfully	Pass				
Post-conditions: Same as expected result									

5.5 Chapter Summary and Evaluation

In this chapter, two main items which are system implementation and testing are recorded.

In the implementation section, four sub-sections which are on-site setup, libraries installation, training procedure and follow-up are discussed. On-site setup is discussed briefly as it will be further discussed in the Chapter 6. The purpose and steps of libraries installation for Assessment Module and Form Module are documented in details.

In testing section, the testing strategies such as the test approaches applied in this system is discussed. Besides, the sub-sections in test plan including test design techniques, test completion criteria, metrics to be collected, test data requirements and test environment requirements are documented. Test cases with details such as objective, data, pre-condition, post-condition and step are recorded in details. Expected and actual results are recorded to compare with each other.

Chapter 6

System Deployment

6 System Deployment

This chapter would be applicable for students who have embarked on a real-life industrial project. Students in this case would need to describe how the deployment has been carried out. Some of implementation tasks which need to be described include: training, file conversion or creation, and changeovers.

6.1 Deployment Environment

The FYP Management System was deployed at the TAR UC's Integrated Innovation Hub (I²Hub) server. The I²hub serves as a centre of intelligence harnessed from all the faculties within TAR UC and turns it into a catalyst for the creation of innovative applications and technologies. The specifications of I2Hub server are described in the Table 6.1 below.

Criteria	Specification
Operating System	Windows Server 2016 Standard
Processor	Intel(R) Xeon(R) Silver 4108 CPU @ 1.80GHz 1.80 GHz
System Type	64-bit Operating System, x64-based processor
Computer Name	WIN-MQASBA8QSUG

Table 6.1: Specifications of the I²Hub server

6.2 Deployment Process / Steps

6.2.1 On-site Setup

A summary of the procedures of the FYP Management System's deployment is shown in Table 6.2 below.

No	Procedures	Descriptions
1	Install Apache Web Server 2.4	Install Apache Web Server version 2.4 on virtual machine.
2	Install PHP 7.2	Install PHP version 7.2 on virtual machine.
3	Install MySQL Workbench 6.3 CE	Install and configure MySQL Workbench which includes creating and setting up database, executing scripts to insert data into database, configuring TCP/IP port to allow remote access and etc., on the computer.
4	Place Laravel Project	Upload the Laravel Project to the cloud storage

		such as Google Drive then download it from the virtual machine and place it in the “htdocs”.
5	Run Laravel Project	Run FYP Management System Laravel project in the command prompt of the virtual machine.
6	Test Published Web Site	Test the published FYP Management web site to ensure if it functions normally.
7	Clean-up	Remove any temporary files created during the installation and configuration process (if any), on the virtual machine.

Table 6.2 Procedure for deployment to I2Hub server

Below is the details of deploying FYP Management System to the I²Hub. It includes the steps of configurations for Apache, PHP and MySQL Workbench in the virtual machine – I²Hub.

i. Configuration of Apache

Step 1: Download Apache Server

- Download Apache Server (Apache 2.4.37 Win64) from the link:
<https://www.apachelounge.com/download>

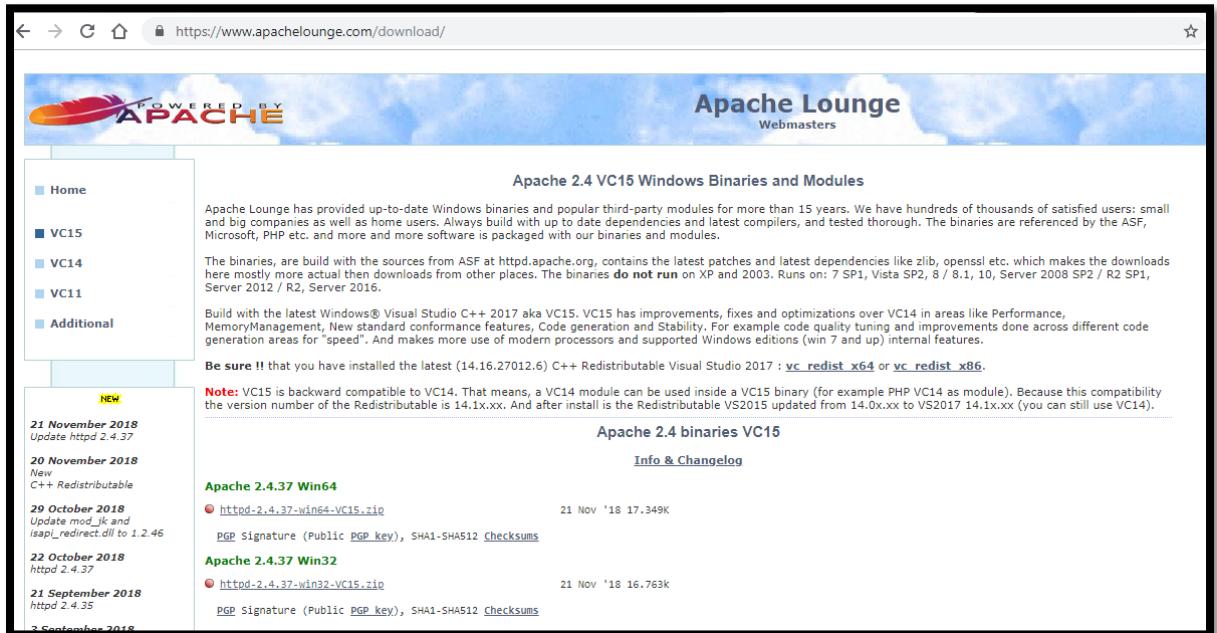
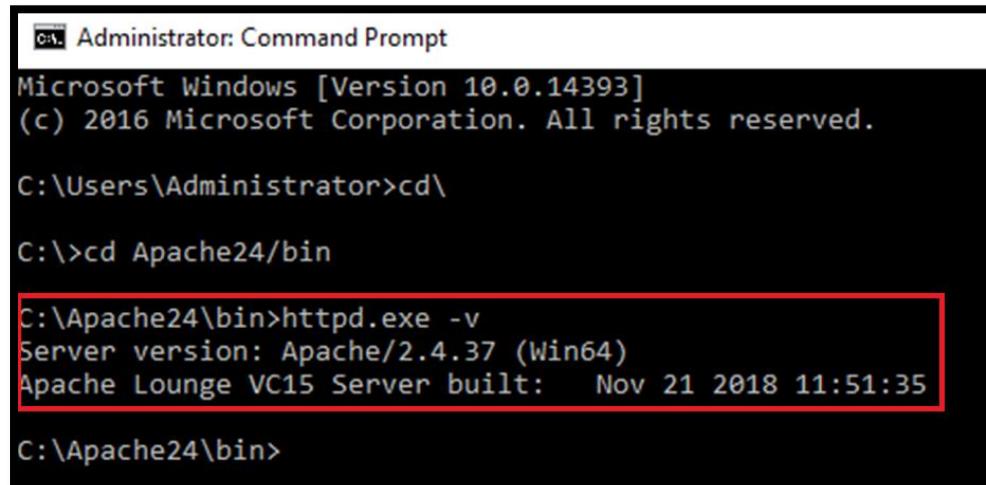


Figure 6.1:

Step 2: Place in C drive

- Read the ReadMe.txt text file in the downloaded “httpd-2.4.37-win64-VC15.zip” file, follow all the instructions given.

- Install Visual C++ Redistributable. Install from the link:
<https://support.microsoft.com/en-my/help/2977003/the-latest-supported-visual-c-downloads>
- Type “localhost” on any browser or open command prompt go to the Apache/bin folder then type the comment “httpd.exe –v”.



```

Administrator: Command Prompt
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd\

C:\>cd Apache24/bin

C:\Apache24\bin>httpd.exe -v
Server version: Apache/2.4.37 (Win64)
Apache Lounge VC15 Server built: Nov 21 2018 11:51:35

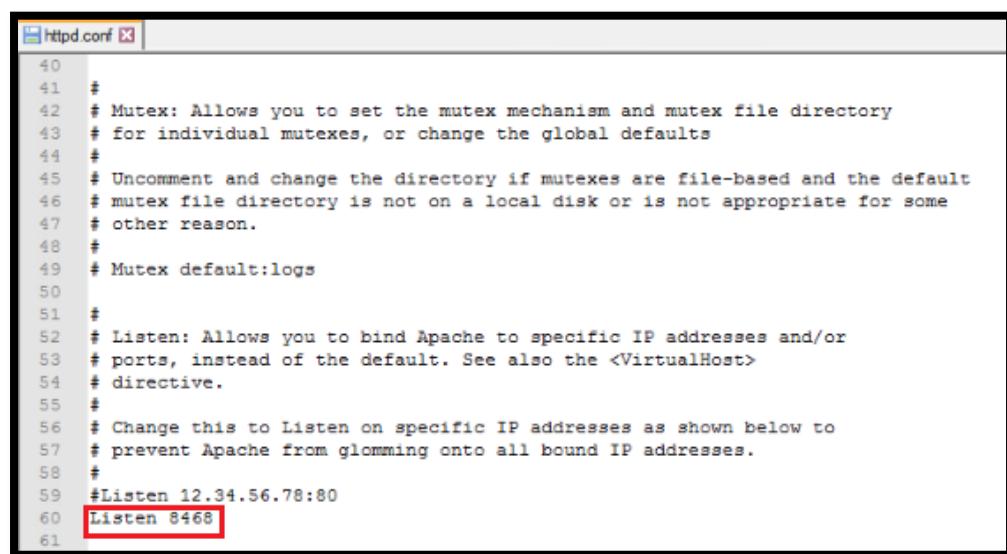
C:\Apache24\bin>

```

Figure 6.2:

Step 3: Change Port Number

- Default port number is 80.
- Open the “httpd.conf” file.
- Change the port number to 8468.



```

40
41 #
42 # Mutex: Allows you to set the mutex mechanism and mutex file directory
43 # for individual mutexes, or change the global defaults
44 #
45 # Uncomment and change the directory if mutexes are file-based and the default
46 # mutex file directory is not on a local disk or is not appropriate for some
47 # other reason.
48 #
49 # Mutex default:logs
50 #
51 #
52 # Listen: Allows you to bind Apache to specific IP addresses and/or
53 # ports, instead of the default. See also the <VirtualHost>
54 # directive.
55 #
56 # Change this to Listen on specific IP addresses as shown below to
57 # prevent Apache from glomming onto all bound IP addresses.
58 #
59 #Listen 12.34.56.78:80
60 Listen 8468
61

```

Figure 6.3:

ii. Configuration of PHP

Step 1: Download PHP

- Download PHP (PHP 7.2) from the link: <https://windows.php.net/download/>

Step 2: Extract on C drive

- Copy C:\php\php.ini-development to C:\php\php.ini
- In the “php.ini” file, modify the *extension_dir = “ext”* extension

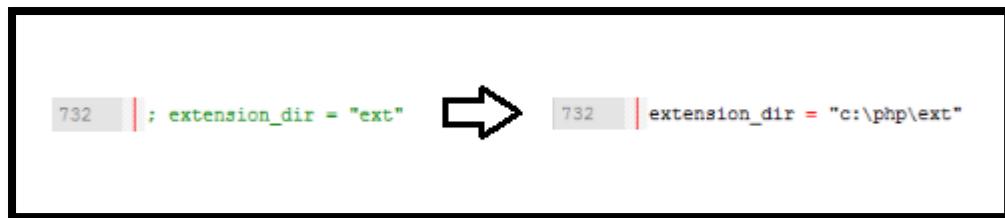


Figure 6.4:

- Uncomment the extensions accordingly as shown below

```
885 ;extension=bz2
886 ;extension=curl
887 extension=fileinfo
888 extension=gd2
889 ;extension=gettext
890 ;extension=gmp
891 ;extension=intl
892 ;extension=imap
893 ;extension=interbase
894 ;extension=ldap
895 ;extension=mbstring
896 ;extension=exif      ; Must be after mbstring as it depends on it
897 ;extension=mysql
898 ;extension=oci8_12c ; Use with Oracle Database 12c Instant Client
899 ;extension=odbc
900 extension=openssl
901 ;extension=pdo_firebird
902 extension=pdo_mysql
903 ;extension=pdo_oci
904 ;extension=pdo_odbc
905 ;extension=pdo_pgsql
906 ;extension=pdo_sqlite
907 ;extension=pgsql
908 ;extension=shmop
```

Figure 6.5:

Step 3: Configure Control Panel's settings

- Open Control Panel → System and Security → System
- Press “Change settings”

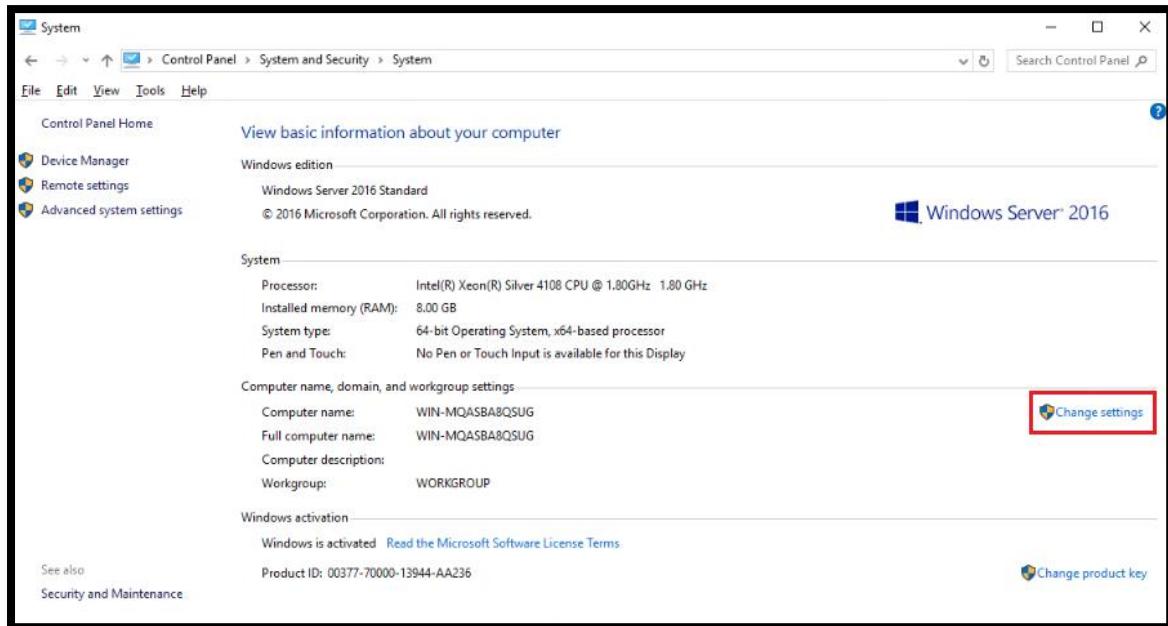


Figure 6.6:

- Select “Advanced” tab
- Press “Environment Variables”

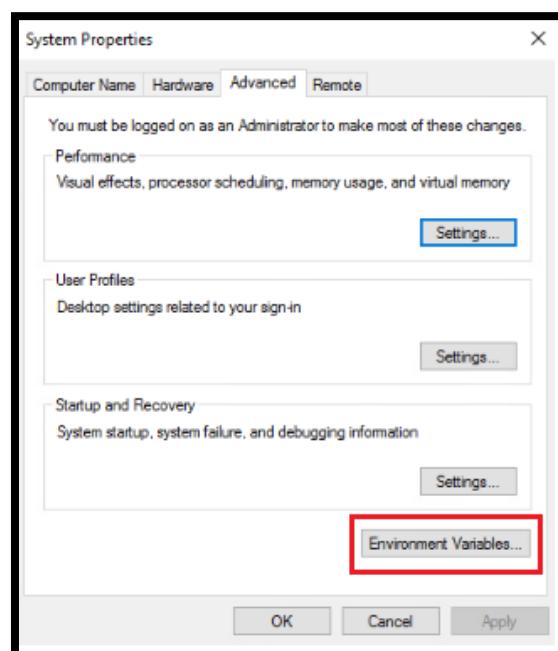


Figure 6.7:

- Select “Path” as shown below
- Press “Edit”

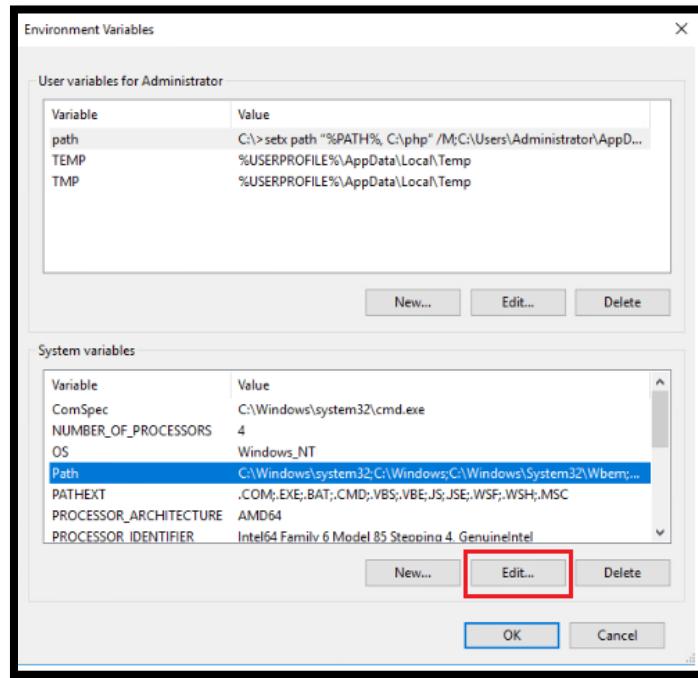


Figure 6.8:

- Press “New”
- Enter PHP folder directory as shown below

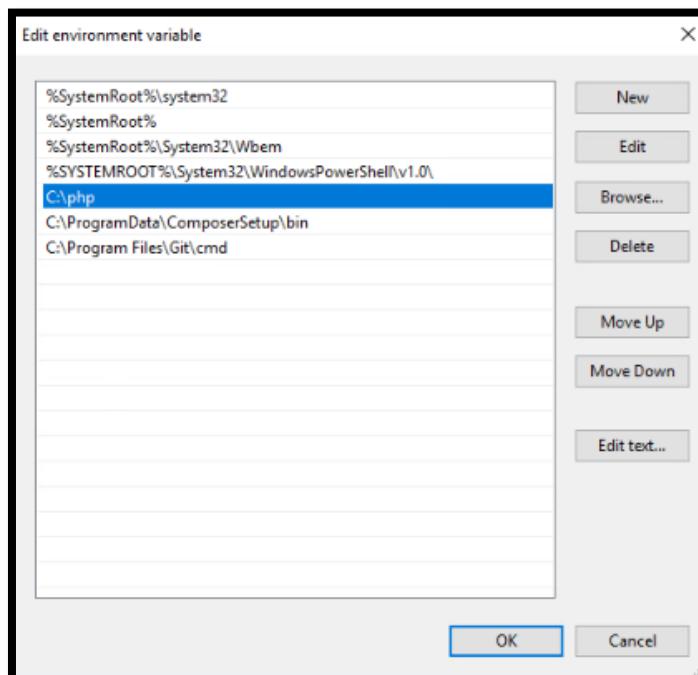


Figure 6.9:

Step 4: Add PHP to let Apache server to run it

- Open Apache\conf → httpd
- Add the following words in order to let Apache runs the PHP websites

```
188 LoadModule php7_module "C:/php/php7apache2_4.dll"
189 AddHandler application/x-httpd-php .php
190 PHPIniDir "c:/php"
```

Figure 6.10:

- Restart I²Hub server, then PHP and Apache will run successfully

iii. Configuration of MySQL Workbench

Step 1: Download MySQL Workbench

- Download MySQL Workbench (MySQL Workbench 8.0) from the link:
<https://dev.mysql.com/downloads/workbench/?os=src>

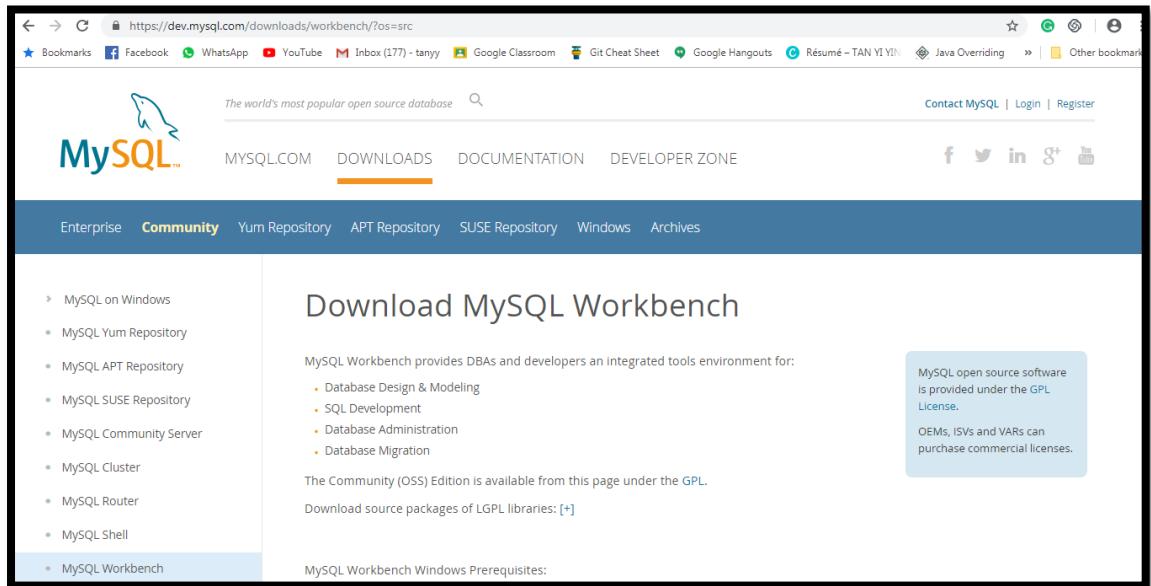


Figure 6.11:

- It has pre-requirement, user might be asked to download other software such as python 3.7.1 before he or she can download MySQL workbench

6.3 Issues and Solutions

There are some issues that have been faced during the deployment process. The first issue is MySQL Workbench is unable to be downloaded as it required user to download python 3.7.1 first. So the solution is follow the requirement stated, download python 3.7.1 first then only proceed to download MySQL Workbench. The second issue that have been faced is that user cannot copy the project from the local computer and paste it to the virtual machine directly. The solution is user can upload the project to the cloud storage such as Google Drive at the local side and download from the cloud storage in the I²Hub server.

6.4 Chapter Summary and Evaluation

In this chapter, system implementation details are recorded into three sections which are deployment environment, deployment process or steps, issues and solutions.

In the deployment environment, the specifications of I²Hub server are stated clearly. While in the deployment steps section, the procedures with detailed descriptions to deploy the system at the I²Hub are described. Some technical issues and solutions faced during the deployment process were also discussed in the third section.

Chapter 7

Discussions and Conclusion

7 Discussions and Conclusion

In this chapter, evaluation of the project will be described in a few sections. Firstly, summary section will summarize all the works done. Secondly, achievement of the project will be described. Thirdly, contribution of the new system will be described. Next, limitations and future improvements of the project will be provided and at last, issues and solutions will be discussed.

7.1 Summary

Initially, before the development of the project system, the problem was many of the processes for FYP management in TARUC is still planned and assigned manually, which is extremely inefficient. This would require a great amount of resources in terms of time and manpower for carrying out the work. Since the process is carried out manually, records have to be entered manually by FYP committee or supervisors into the computer system.

The proposed solution to overcome the problem is to design a computerized system to automate the existing manual planning process. The computerized system will be named FYP Management System and it will automate the management and coordination processes related to FYP. With the proposed solution, efficiency will be greatly increased and at the same time, reducing manpower needed and time spent in existing processes.

Hybrid of Agile and model is used as the software development model for this project. The software development model is used because team members will be actively involving themselves into the development task to deliver usable parts of a system quickly and to cope with the rapid and sudden changes of requirements.

For fact gathering stage, literature review and document inspection are carried out to know more about the system background. For fact recording stage, IBM Rational Software Architect for WebSphere Software is used as it provides functions to draw various diagrams such as deployment diagram, use case diagram, activity diagram and class diagram etc. Other than IBM Rational Software Architect, Lucidchart is also used to draw structure chart and flowchart.

Visual Studio Code is used to develop the new system in the development stage. The reason of Visual Studio is chosen because it is multi-tabbed and it enables the developers to organize files by folder or project for installed languages. Besides, there is a comprehensive list of extensions available for installing in the online marketplace, the steps of installing is as easy as clicking one button. Laravel framework is used to develop the new system because system will be a web-based system based on requirements and thus PHP is the programming

language used. PHP is used to develop the system because it is one of the object-oriented languages, which is well known by developers, and the language itself by its nature, is simple yet powerful.

Unit Test, Integration Test, System Test and Acceptance Test are the testing approaches used to test the system in testing stage right after development stage. The suggested improvements or new requirements are recorded on future improvement.

7.2 Achievements

Generally, the new system is able to automate the coordination tasks in the FYP management process, which has met the main objective of the system. Specifically, the new system consists of the following modules: Cohort, Supervisor and Student Maintenance, Project Management and Registration, Auto-assignment of Supervisors to Students, Supervisor Workload Tracking, Student Assessments, Forms and Template Management, as well as Security.

From the system's perspective, one of the strengths is the ability to import the student details and assessment rubric provided by FYP committee in Microsoft Excel format. This is because by providing facility to import data, the need of entering data manually into the system, which is supposed to be time-consuming, will be eliminated. Another strength of the system is, it provides upload and download function. This function allows FYP committee to upload various templates and allows student to download them. Besides, students can also upload their project proposals and the proposals can be downloaded by supervisor for assessment review. Other than that, the assessment form for Project I and Project II can be generated in a table form, which is well-performed and all the formula is set to prevent marks calculation errors due to wrong formula applied. Mark summary for project can also be generated by the supervisors and downloaded or printed in the PDF format.

Not only strengths, the system also has its weaknesses. For import data function, the header column name must be fixed and not dynamic. For instance, it must be in sequential order of CLO, Artifact, Marks, Criteria, Descriptors and Assessment Criteria for assessment rubric. Anything other than this order will cause the data to be unreadable.

7.3 Contributions

The system is designed to ease the process of planning and managing the FYP tasks. The system will improve the FYP committee performance, efficiencies, reduce errors and redundancies in handling FYP task. In addition, it also helps to reduce stress of the users, as well as to generate reports with higher accuracy. Amount of resources needed are reduced

too. Moreover, with good database design and management, this will probably future-proof the system, making the FYP committee hassle-free in a long run.

The system is necessary and important to the campus as the FYP tasks are needed to be carried out every semester. Additionally, with the tremendous population growth including both academician and student, the FYP process will become even tedious if manual processes are still involved. The system will reduce the stress and workload greatly on the FYP committee. Besides, redundant and inconsistency of data due to the duplicate data will be eliminated with computerized system and database management. With future improvements or enhancements that will be done by the next batch of students in-charge, the system will be even better and more efficient. Hence, the marketability of the system is high with all these contributions.

7.4 Limitations and Future Improvements

After evaluating the new system, some limitations and restrictions are discovered. The limitations and suggestions for future improvement are as follows:

1. Fixed Column Name of Header (Import from Excel)

The column name of header in excel files must be in a fixed sequence before data can be imported into database. A rubricProjectI.xls file for instance, the header must be in order of CLO, Artifact, Marks, Criteria, Descriptors and Assessment Criteria. This is because the algorithm behind this search for the different header names to identify the columns of data. In future, this limitation may be overcome by a new set of algorithms.

2. Repeat Student

For the current system, it will have problem when dealing with the case that there is repeat student in the certain cohort. Therefore, the suggestion improvement is to add some remark on the studentId for example, “17WMR09519 (R)” to indicate that the student is a repeat student and to avoid duplicate primary key in the database.

3. Form 4 – Project Appointment Record

The current function for Form 4 – Project Appointment Record is to allow students to download the Form 4’s template. However, there is some suggestions from semi-final’s judges that Form 4 can be improved by allowing students to enter the appointment details each time after they have an appointment with their supervisor. By doing this, students can trace back the appointment’s records or details easily.

4. Generate students’ assessment rubric in PDF format

There is no generation of students' assessment rubric in PDF format function in the system now. Due to some errors from the TCPDF library, the "Generate as PDF" function in student assessment rubric is not working. Therefore, this limitation can be overcome by finding other available library in the Internet.

7.5 Issues and Solutions

Several issues or difficulties have been encountered throughout the development of the project system. However, these issues have been resolved thanks to the involvement of teamwork spirit. Valuable experiences have been gained along the journey of development.

During the initial stage of the development for this project system, it is quite difficult to start developing the system, as requirements regarding the system are unclear with many ambiguities. To resolve this issue, meeting with the users is carried out to clarify the ambiguities of requirements and problems raised. Many background researches about the system are done as well, to know about similar systems done by other institutions, through literature review.

After that, database design and data dictionary have changed several times due to the continuous changes in requirements. Therefore, it is somehow difficult for some of the students as if their parts are dependent on the database. In addition, the datasets provided are incomplete as some of the required data are absent. Assumptions are made by generating and inserting dummy data to replace the data, which are absent to resolve this issue.

Difficulties have been encountered during development phase for import function. Datasets supplied by FYP committee are in Microsoft Excel format. Searching the web for libraries to read excel file such as the one employed in the import function, Laravel Excel is the solution to this issue. Moreover, the data in the excel files are found to be not consistent. For instance, firstly, some data are stored in one cell of their own while some are found scattered across multiple cells. The solution is to require FYP committee and the teammate in-charge to make some changes to the excel files.

Extensive testing needs to be done on the functions after changes done to the code, as the database design and the data dictionary are changed frequently. Changing on attributes of affected tables in the data dictionary requires modifying the codes in the affected functions. The database changes are unavoidable as the database is considered big and new issues are discovered by other students from other processes, which may affect their parts.

7.6 Conclusion

The FYP Management System is developed and deployed successfully to the I²Hub server. A brief summary to summarize up the whole project's process is highlighted. The achievements in this project are also listed, all the objectives listed are achieved. The marketability of the system is evaluated in the contributions section, it is considered high because of the contributions that it had brought to the users. Besides, some limitations are listed out and some future improvements are suggested in order to make the system to be a better one. Lastly, some issues faced during the whole development process and the solutions are discussed.

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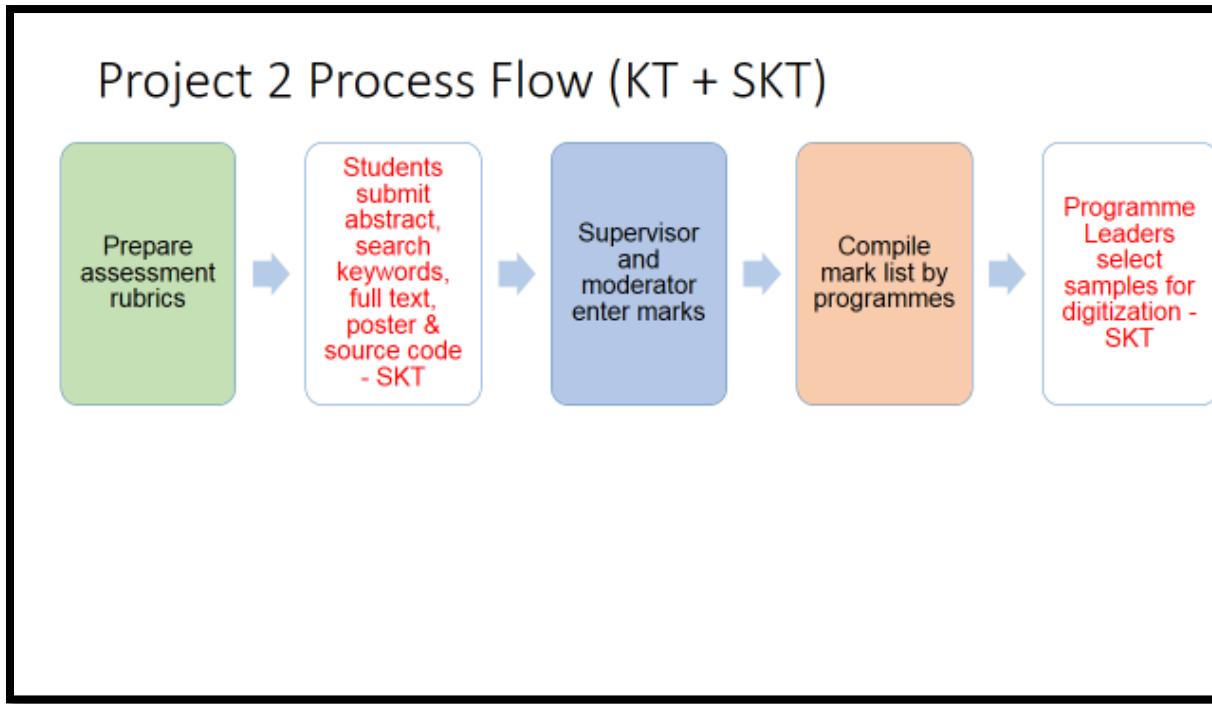
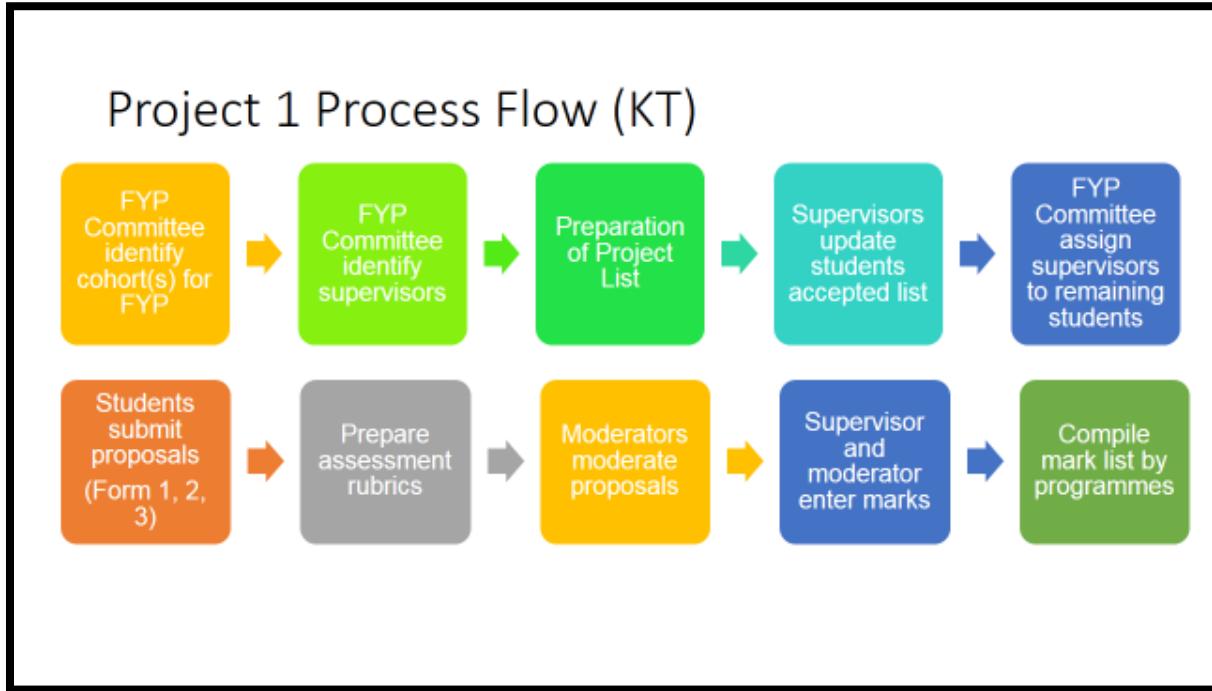
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Appendices

Appendix A

Process Flow of FYP



Other FYP Management Tasks (KT)

Maintain assessment rubrics

Calculate supervisor workload

Calculate Part-Time supervisor claims

Search for projects by criteria/keywords

FYP Showcase & Competition Process Flow (YKP)

FYP Showcase Committee Specify Competition Tracks

Supervisors recommend projects for FYP Showcase (may need to merge teams)

Prepare judging forms

Identify judges for semi-finals and finals

Students submit competition abstract and poster

Semi-Finals Judging

Booklet committee extract abstracts for booklet

Finals Judging

Competition committee submit soft skills record form

Other FYP Showcase & Competition Tasks (YKP)

Maintain external
competitions and
student participation

Generate soft skills
form details for
students' participation
and wins

Appendix B

Supervisor List

Supervisor List					May2016 Y1
REI – 4	RIT – 1	RSD – 5	RSF – 6	RIS – 9	RST – 6
Steve Jabs	Superman	Thor	Bruce Banner	Mickey Mouse	Winnie the Pooh
William Gates	Wonder Woman	Loki	Steve Jabs	Donald Duck	Eeyore
Mark McDonalds		Ironman Captain America	Donald Duck		Donkey Tigger Kanga

Student Accepted List

Supervisor-Student List

Supervisor-Student List											
No.	FYP Supervisor	Prog	Team ID	Student Name	Reg. ID	Tutorial Group	Project Title	Project Type	Project Category	Competition Name	Individual Project Title
1	Captain America	RSD	MN4	RSD STUDENT 4	16WMR00018	GROUP 1	Project A	Application	Competition	Innovate Malaysia Design	
2	Donald Duck	RIS	WTL1	RIS STUDENT 1	16WMR00005	GROUP 1	Project B	Research	Incubator	Innovate Malaysia Design	Title B1
3	Donald Duck	RIS	WTL3	RIS STUDENT 3	16WMR00007	GROUP 1	Project B	Research	Smart Campus		Title B2
4	Donald Duck	RIS	WTL5	RIS STUDENT 5	16WMR00009	GROUP 1	Project C	Industrial	Smart Campus		Title C1
5	Donald Duck	RIS	WTL6	RIS STUDENT 6	16WMR00010	GROUP 1	Project C	Application			Title C2
6	Donald Duck	RIS	WTL7	RIS STUDENT 7	16WMR00011	GROUP 1	Project D	Application			
7	Donald Duck	RIS	WTL9	RIS STUDENT 9	16WMR00013	GROUP 1	Project E	Application	Competition	Imagine Cup	
8	Donkey	RST	TBS3	RST STUDENT 3	16WMR00028	GROUP 1					
9	Eeyore	RST	TBS2	RST STUDENT 2	16WMR00027	GROUP 1					
10	Ironman	RSD	MN1	RSD STUDENT 5	16WMR00019	GROUP 1					
11	Ironman	RSD	MN3	RSD STUDENT 3	16WMR00017	GROUP 1					
12	Kanga	RST	TBS5	RST STUDENT 5	16WMR00030	GROUP 1					
13	Kanga	RST	TBS6	RST STUDENT 6	16WMR00031	GROUP 1					
14	Loki	RSD	MN2	RSD STUDENT 2	16WMR00016	GROUP 1					
15	Mark McDonalds	REI	MN6	REI STUDENT 4	16WMR00004	GROUP 1					
16	Mickey Mouse	RIS	WTL2	RIS STUDENT 2	16WMR00006	GROUP 1					
17	Mickey Mouse	RIS	WTL4	RIS STUDENT 4	16WMR00008	GROUP 1					
18	Mickey Mouse	RIS	WTL8	RIS STUDENT 8	16WMR00012	GROUP 1					
19	Steve Jabs	RSF	CJK2	RSF STUDENT 1	16WMR00020	GROUP 1					
20	Steve Jabs	RSF	CJK2	RSF STUDENT 3	16WMR00022	GROUP 1					
21	Steve Jabs	RSF	CJK3	RSF STUDENT 5	16WMR00024	GROUP 1					
22	Steve Jabs	RSF	CJK3	RSF STUDENT 6	16WMR00025	GROUP 1					
23	Steve Jabs	RSF	CJK4	RSF STUDENT 2	16WMR00021	GROUP 1					
24	Steve Jabs	RSF	CJK5	RSF STUDENT 4	16WMR00023	GROUP 1					
25	Steve Jabs	REI	MN5	REI STUDENT 1	16WMR00001	GROUP 1					
26	Steve Jabs	REI	MN6	REI STUDENT 3	16WMR00003	GROUP 1					
27	Superman	RIT	CJK1	RIT STUDENT 1	16WMR00014	GROUP 1					
28	Thor	RSD	MN1	RSD STUDENT 1	16WMR00015	GROUP 1					
29	Tigger	RST	TBS4	RST STUDENT 4	16WMR00029	GROUP 1					

FYP Student Details

Student FYP Details											
INSTRUCTION: Copy and paste your FYP students' information from the Supervisor-Student List											
No.	FYP Supervisor	Prog	Team ID	Student Name	Reg. ID	Tutorial Group	Project Title	Project Type	Project Category	Competition Name	Individual Project Title
1	Donald Duck	RIS	WTL1	RIS STUDENT 1	16WMR00005	GROUP 1	Project B	Research	Incubator	Innovate Malaysia Design	Title B1
2	Donald Duck	RIS	WTL3	RIS STUDENT 3	16WMR00007	GROUP 1	Project B	Research	Smart Campus		Title B2
3	Donald Duck	RIS	WTL5	RIS STUDENT 5	16WMR00009	GROUP 1	Project C	Industrial	Smart Campus		Title C1
4	Donald Duck	RIS	WTL6	RIS STUDENT 6	16WMR00010	GROUP 1	Project C	Application			Title C2
5	Donald Duck	RIS	WTL7	RIS STUDENT 7	16WMR00011	GROUP 1	Project D	Application			
6	Donald Duck	RIS	WTL9	RIS STUDENT 9	16WMR00013	GROUP 1	Project E	Application	Competition	Imagine Cup	

Rubric Form

BACS3403 PROJECT 1 RUBRIC										FORM 5
Supervisor's name: Donald Duck				Project Title: Project B						1
Student's name: RIS STUDENT 1				Individual Title: Title B1						
Programme: RIS										
Reg. ID: 16WMR00005				Moderator's name: Mickey Mouse		Grade: B				
CLO	Artifact	Marks	Criteria	Descriptors	Assessment Criteria		Mark by Supervis	Mark by Moderat	Final Mark	Mark Subtotal by
					Poor	Acomplishe				
1	Project Proposal	20	Innovativeness	- The proposed project is useful/meaningful - Includes innovativeness in user	1-4	5-7	8-10	6	8	7
			Content	- All the necessary information is included.	1-4	5-7	8-10	4	4	4
2	Literature Review & Requirements Analysis	30	Literature Review	- Content is well-structured - Discussion is clear and concise	1-4	5-7	8-10	10		10
			Referencing	- Good range and appropriate use of references - Correct use of Harvard Referencing for in-text citation and reference list	1-4	5-7	8-10	7		7
			Requirements Analysis	- Methods and techniques used are well-justified. - Requirements are complete and clear.	1-4	5-7	8-10	6		6
3	System Design	40	Modeling	- Models are appropriate - Models are correct	1-4	5-7	8-10	8		8
			Content	- Content is well-structured - Discussion is clear and concise	1-4	5-7	8-10	2		2
			Design considerations	- Designs are based on stated criteria, analysis and constraints.	1-4	5-7	8-10	7		7
			Critical Evaluation	- Design recommendations are well-supported by information.	1-4	5-7	8-10	7		7
4	Project Evaluation	10	Leadership skills	- Objective reflection on project management skills and leadership qualities - Attainment of leadership skills is well-supported by information.	1-4	5-7	8-10	8	8	8
		100							Total Marks	66
Comments:					Supervisor's Signature & Date:					
					Moderator's Signature & Date:					

Mark Summary

Mark Summary for BACS3403 Project I													
No.	Prog	Student Name	Reg. ID:	FYP Supervisor	Marks by CLO				Total Mark	Project Title	Moderator	Project Category	Competition Name
					CLO1	CLO2	CLO3	CLO4					
1	RIS	RIS STUDENT 1	16WMR00005	Donald Duck	11	23	24	8	66	Project B - Title B1	Mickey Mouse	Incubator	Innovate Malaysia Design
2	RIS	RIS STUDENT 3	16WMR00007	Donald Duck	15.5	25	33	8	82	Project B - Title B2	Mickey Mouse	Smart Campus	0
3	RIS	RIS STUDENT 5	16WMR00009	Donald Duck	7	6	14	1	28	Project C - Title C1	Mickey Mouse	Smart Campus	0
4	RIS	RIS STUDENT 6	16WMR00010	Donald Duck	20	16	14	1	51	Project C - Title C2	Mickey Mouse	0	0
5	RIS	RIS STUDENT 7	16WMR00011	Donald Duck	9.5	21	28	1	60	Project D	Mickey Mouse	0	0
6	RIS	RIS STUDENT 9	16WMR00013	Donald Duck	8.5	24	27	8	68	Project E	Mickey Mouse	Competition	Imagine Cup
7	0	0	0	0					0				
8	0	0	0	0									
9	0	0	0	0									
10	0	0	0	0									
11	0	0	0	0									
12	0	0	0	0									
Signature: _____													
Date: _____													

Appendix C

Entity Name	Attributes	Data Type	Description
Cohort	cohortId (PK)	Varchar(50)	Unique ID of cohort. Eg. Cohort May Entry to Y1
	project1Session	Varchar(20)	Status of Project I. Eg. InProgress, Completed
	project1Session	Varchar(20)	Status of Project II. Eg. InProgress, Completed
	project1startDate	Date	Starting date of Project I. Eg. 28/05/2018
	project1endDate	Date	End date of Project I. Eg. 03/09/2018
	project2startDate	Date	Starting date of Project II. Eg. 29/10/2018
	project2endDate	Date	End date of Project II. Eg. 04/02/2019
	project1Rubric	Integer	Rubric ID for Project I.
	project2Rubric	Integer	Rubric ID for Project I.
	form2TemplateId	Integer	Form template ID for Form 2.
	form3TemplateId	Integer	Form template ID for Form 3.
	form4iTemplateId	Integer	Form template ID for Form 4's Project I.
	form4iiTemplateId	Integer	Form template ID for Form 4's Project II.

Entity Name	Attributes	Data Type	Description
Supervisor_Cohort	cohortId (PK, FK)	Varchar(20)	Unique code of a project. Eg. FYP
	staffId (PK, FK)	Varchar(50)	Unique ID of staff.
	moderatorId	Varchar(150)	Unique ID of staff.

Entity Name	Attributes	Data Type	Description
Project	projectCode (PK)	Varchar(20)	Unique code of a project. Eg. FYP
	title	Varchar(50)	Title of a project. Eg. FYP Management System
	description	Varchar(150)	Description of a project. Eg. A system to manage FYP processes
	projectGroup	Varchar(30)	Group of a project. Eg. Accumulating knowledge
	generation	Integer	Generation of a project. Eg. 1
	scope	Varchar(999)	Scope of a project.
	enhancement	Varchar(999)	Enhancement of a project.
	cluster	Varchar(30)	Cluster of a project. Eg. Academic Services
	status	Varchar(20)	Status of a project. Eg, New, On-going, Completed, Continue
	level	Varchar(20)	Level of a project. Eg. Bachelor, Master, PhD
	clientName	Varchar(100)	Name of the project's client.
	advisor	Varchar(50)	Name of an advisor. Eg. Dr Lim Yee Mei
	teamSize	Integer	The team size of a project. Eg. 2

Entity Name	Attributes	Data Type	Description
Project_Supervisor	projectCode (PK, FK)	Varchar(20)	Unique code of a project. Eg. FYP
	supervisorId (PK, FK)	Varchar(50)	Unique ID of a staff.
	status	Varchar(15)	Status of a project. Eg. Assigned, Unassigned
	justification	Varchar(999)	Justification if the supervisor

			rejected the student.
	timeLine	Date	The deadline for the supervisor to reject the student. Eg. 23/03/2019

Entity Name	Attributes	Data Type	Description
Team	teamId (PK)	Varchar(50)	Unique ID of a team.
	supervisor	Varchar(50)	Unique ID of a staff.
	moderator	Varchar(50)	Unique ID of a staff.
	teamScope	Varchar(200)	Scope of project by an accepted list. Eg. Develop an application with good UX to automate the FYP management system
	competitionName	Varchar(50)	The name of competition.
	status	Varchar(50)	The status of the team. Eg. Pending, Assigned
	projectCode (FK)	Varchar(20)	Unique ID of a project code. Eg. FYP
	isCompetition	Integer	To indicate whether the team is participated in the FYP competition. Eg. 0 - No, 1 - Yes

Entity Name	Attributes	Data Type	Description
Programme	programmeId (PK)	Varchar(10)	Unique ID of a programme. Eg. RSD
	programmeName	Varchar(100)	Name of a programme. Eg. Bachelor of Information Technology (Honours) in Software Systems Development
	departmentId (FK)	Varchar(10)	Unique ID of a department. Eg. DECA

Entity Name	Attributes	Data Type	Description
Faculty	facultyId (PK)	Varchar(10)	Unique ID of a faculty. Eg. FOCS
	facultyName	Varchar(100)	Name of a faculty. Eg. Faculty of Computing and Information Technology

Entity Name	Attributes	Data Type	Description
Workload	workloadID (PK)	Integer	Unique ID of a workload, it is auto-increment.
	totalStudent	Integer	Total student handled by a supervisor. Eg. 4
	formulaId	Integer	Unique ID of a WLFormula.
	staffID (FK)	Integer	Unique ID of a staff.

Entity Name	Attributes	Data Type	Description
WL_Formula	formulaId (PK)	Integer	Unique ID of a WLFormula, it is auto-increment.
	totalMinutes	Integer	Total minutes of workload by staff. Eg. 30
	totalWeeks	Integer	Total weeks of workload by staff. Eg. 14
	PTClaims	Double	Claims of a part-timer staff. Eg. 200.00

Entity Name	Attributes	Data Type	Description
Department	departmentId (PK)	Varchar(10)	Unique ID of a department. Eg. DECA
	departmentName	Varchar(50)	Name of department. Eg. Department of Examinations and Credit Accumulation
	facultyId (FK)	Varchar(10)	Unique ID of a faculty. Eg. FOCS

Appendix D

Sample template for Form 2 – Project Proposal

2018/19	FORM 2: Project Proposal
 [NAME] Select Programme [Phone] [Corresponding E-Mail Address] [Supervisor]	
PROJECT TITLE: [INSERT YOUR PROJECT TITLE HERE. IF YOU ARE WORKING IN A TEAM, EACH STUDENT'S TITLE SHOULD CLEARLY REFLECT THEIR AREA OF FOCUS]	
ABSTRACT [In not more than 150 words, summarize the problem of your focus and the solution proposed for the target market/users. State how does your project stand out from the rest]	
INSTRUCTION: COMPLETE THE PROPOSAL WITHIN 3-7 PAGES. NOTE: FOR RST STUDENTS, ATTACH YOUR HIGH CONCEPT DOCUMENT INSTEAD OF COMPLETING THE FOLLOWING SECTIONS.	
PROBLEM [Identify the existing problem - the ONE problem you solve doesn't need to be earth-shattering. The most important thing is to identify a problem that is worth solving. If your product or service doesn't solve a problem that potential customers have, you don't have a viable business]	
SOLUTION [A clear problem statement will help you focus your solution on solving that ONE problem, and not stretch the solution to solve multiple potential problems. Try to describe your product or service and how it functions as a solution in just a few sentences or bullet points. Briefly list out the essential functions or features of your system, and what technologies you will utilize]	
TARGET MARKET [State the focus of your target customers or users (it is not credible to include everyone in the world as the users). Conduct a market research or feasibility study to prove the product is designed for the right group of customers/users. Do a little research to estimate how many people are in each target market segment you're after, and produce a "realistic" market size]	
COMPETITION/CONTRIBUTION [Explain what advantages your solution offers over the competition. Are you faster, cheaper, better? Why would a potential customer choose your solution over someone else's? If the project is intended to solve community or social problem, state how does your project brings societal impact to the country. If it is a pure research, state the contribution of your project]	

Sample template for Form 3 – Project Requirements

	A Project Requirement	B Description	C
1	Relevance and contribution	The project is within the area of specialization related to the student's programme of study. The outcome of the project is able to contribute to the IT practices, target market, or knowledge.	
2	IT content	The project is IT-related and has substantial amount of IT content.	
3	Technical Skill	The project requires the students to write substantial amounts of programming codes, or use of IT technical skills with the aid of tools.	
4	Methodology	The project allows the students to apply some kind of system development or research methodology.	
5	Practicality or Innovativeness	The project should have qualities of practicality and/or innovativeness. For research projects, the project should be meaningful. For application projects, it should either be an industrial project, an internal project or be aligned to an external competition. For entrepreneurial projects, the project should have a unique value proposition.	
6	Knowledge Expansion	The project allows the students the opportunity to expand their existing knowledge, either in depth or in breadth.	
7	Scope & Complexity	The project should be of scope acceptable within the limits of resources and capability of students. If the scope is small, then the project should have reasonable level of complexity. The project should focus on quality, but not quantity.	
8			
9			
10			

Sample template for Form 4 – Project I Appointment Record

 TUNKU ABDUL RAHMAN UNIVERSITY COLLEGE	BACS3403 PROJECT I	Form 4 (i)					
Project Appointment Record							
Student's Details							
Name							
Programme							
No	Date	Time		Duration (Minutes)	Venue	Project Progress & Remarks	Students' Signature
		From	To				
1.							
2.							
3.							
4.							
5.							
6.							
7.							

Sample template for Form 2 – Project II Appointment Record

 TARC TUNKU ABDUL RAHMAN UNIVERSITY COLLEGE		BACS3413 PROJECT II				Form 4 (ii) Project Appointment Record	
Student's Details							
Name							
<u>Programme</u>							
No	Date	Time		Duration (Minutes)	Venue	Project Progress & Remarks	Students' Signature
		From	To				
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							

Sample template for Assessment Rubric for Project I

1	CLO	Artifact	Marks	Criteria	Descriptors	Assessment Criteria		
						Poor	Acomplished	Good
						1-4	5-7	8-10
3	1	Project Proposal	20	Content	- All the necessary information is included. - Discussion is clear and concise.	1-4	5-7	8-10
				Innovativeness	- The proposed project is useful/meaningful - Includes innovativeness in user experience, technical implementation, etc.	1-4	5-7	8-10
5	2	Literature Review & Requirements Analysis	30	Literature Review	- Content is well-structured - Discussion is clear and concise	1-4	5-7	8-10
				Referencing	- Good range and appropriate use of references - Correct use of Harvard Referencing for in-text citation and reference list	1-4	5-7	8-10
				Requirements Analysis	- Methods and techniques used are well-justified. - Requirements are complete and clear.	1-4	5-7	8-10
10	3	System Design	40	Modeling	- Models are appropriate - Models are correct	1-4	5-7	8-10
				Content	- Content is well-structured - Discussion is clear and concise	1-4	5-7	8-10
				Design considerations	- Designs are based on stated criteria, analysis and constraints.	1-4	5-7	8-10
				Critical Evaluation	- Design recommendations are well supported by information.	1-4	5-7	8-10
12	4	Meetings with supervisor	10	Leadership skills	- Demonstrates perfect attendance, always on time or early, and contributes meaningfully to discussions. - Demonstrates integrity and ability to respectfully interact with peers, lecturers and other people. Accepts feedback and follows directions.	1-4	5-7	8-10
13								
14								

Sample template for Assessment Rubric for Project II

1	A	B	C	D	E	Assessment Criteria		
						Poor	Acomplished	Good
2	1	Working system / prototype / proof of concept	50	Completeness & Appropriateness	- A working system/prototype/proof of concept that fulfils all the requirements is delivered. - The entire system is perfectly appropriate for the target users.	1-4	5-7	8-10
				Accuracy & Comprehensiveness	- All or most of the main information/output generated are accurate. - The system is comprehensive and thoughtfully constructed.	1-4	5-7	8-10
				UX Design	- User interface is intuitive; Styling is consistent and call-to-action elements are obvious. - The application provides the user with appropriate feedback based on interactions.	1-4	5-7	8-10
				Programming Logic & Validation	- Correct system logic. - Exceptions/user errors are handled well.	1-4	5-7	8-10
				Programming Complexity / Use of New Knowledge	- Demonstrates appropriate or high level of complex algorithms and programming skills. - Demonstrates appropriate application of new knowledge and skills.	1-4	5-7	8-10
3	2	FYP Report	30	Organization	- The entire FYP report is well-organized and well-written. - The points are clearly articulated and presented in a coherent manner.	1-4	5-7	8-10
				Content	- Includes all the required content of the FYP report. - Includes critical evaluation; decisions are well supported by the appropriate information and examples.	1-4	5-7	8-10
				Language & Report Format	- Sentences use correct grammar, appropriate choice of words and are free from spelling errors. - All the contents of the report is properly formatted.	1-4	5-7	8-10

11	3	Presentation	10	Formal Presentation/Pitching & Poster	- Speaks clearly, convincingly and concisely without unnecessary words. - The poster is able to convey information effectively (with the use of appropriate colours, font, visuals, etc.) and free of spelling/grammatical mistakes.	1-4	5-7	8-10
12	4	Meetings with supervisor	10	Leadership skills	- Demonstrates perfect attendance, always on time or early, and contributes meaningfully to discussions. - Demonstrates integrity and ability to respectfully interact with peers, lecturers and other people. Accepts feedback and follows directions.	1-4	5-7	8-10