FYP Online Marking System (FOMS)

By

Nor Atika Binti Abdul

Dissertation submitted in partial fulfillment of

the requirement for the

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(Business Information System)

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CERTIFICATION OF APPROVAL

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A project dissertation submitted to the
Business Information System Programme
Universiti Teknologi PETRONAS
in partial fulfilment of the requirement for the
BACHELOR OF TECHNOLOGY (Hons)
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Approved by,

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(Faizal bin Ahmad Fadzil)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
September 2012

CERTIFICATION ON ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgement, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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NOR ATIKA BINTI ABDUL

ABSTRACT

Final Year Project (FYP) is one of the compulsory courses that need to be taken by all of the final year students. In UTP, FYP course is available in two semesters, namely FYP1 and FYP2 respectively. For each of the courses, the FYP students need to submit several deliverables in order to complete their coursework. These deliverables will be evaluated by the students' supervisor and the panel of examiners. The FYP marking process in UTP is still manually implemented. This means that the supervisor and the panel of examiner manually write down the students information and the awarded mark for the students in a paper-based score sheet. The manual FYP marking process causes a lot of problem to the supervisor and the panel of examiners as well as the FYP coordinators, who administrator the FYP course. Among of the problems identified are **inefficiency and error-likely of FYP manual marking process, unorganized and time-consuming of FYP oral presentation and paper wastage and confidential issue.** Therefore, the implementation of FYP Online Marking System is vital with the objectives to convert the manual FYP marking process into an automated FYP online marking system, to increase the process efficiency and reduce the possible error chances, to have a more organized and time-saving FYP marking process flow, to go green and help to preserve the environment. The scopes that the FOMS project covers include FYP marking process out of the overall FYP course process and the CIS department's lecturer and panel of examiners as the main user. The FOMS system implementation covers for both of the FYP1 and FYP2 courses. In order to complete the FOMS system, prototyping will be the methodology used as it allows the project analysis, design and implementation to be done concurrently and repeatedly until complete. A set of survey has been done to gather the feedback on the current manual FYP marking process and their opinion on FOMS. An acceptance test has also been carry out to gather feedback related to the FOMS system.

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Firstly, I would like to thank the Almighty God for giving me the strength and wisdom to complete this Final Year Project (FYP). I would like to express my deep gratitude to my supervisor, Mr Faizal Bin Ahmad Fadzil, for the enthusiastic encouragement, for his advice and great assistance and guidance given during the completion of this project.

Also, I would like to thanks all the lecturer of Computer Information Sciences (CIS) department of Universiti Teknologi Petronas (UTP) for their cooperation and kindness to provide me with the needed data and information in order to gather the system requirements. I would also like to acknowledge the help provided by the lecturer who has helped me to test the system. Their willingness to give their time so generously is highly appreciated.

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Last but not least, I wish to thanks my parent for their support and encouragement during the development of this project. Without their support, advice and encouragement, this project would have not been successful.

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ABBREVIATIONS

1. CIS	Computer Information Sciences
2. FOMS	FYP Online Marking System
2. FYP	Final Year Project
3. UTP	Universiti Teknologi PETRONAS
4. SUS	System Usability Scale

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Final Year Project (FYP) is one of the compulsory courses that should be taken by all final year students in order to receive an honors degree. In UTP, FYP course is divided into two which need to be taken in two semesters, namely FYP1 and FYP2 respectively.

For FYP1, the objective of the course is for the students to propose their project title to the selected supervisor, in which if the title is approved, then the students are require to make more research related to the project proposed. The research is essential to prove and defense the project so that the examiners would be convinced with the relevancy and feasibility of the project chosen. Then, the students need to come out with presentation and interim report based on the founding they made, which these deliverables will be graded by the examiners. The examiners for FYP1 would be the internal examiners which are the lecturer from the students' respective programme and the supervisor of the students itself.

On the other hand, for FYP2, the students have arrived to the most complicated stage where it involves mainly on the development and implementation phase of the project. FYP2 students need to focus on designing and developing the project's prototype based on the requirement gathered during the planning and analysis stage in FYP1. In the end of the course, the students need to present a demonstration of the prototype developed and the final submission will be the complete FYP dissertation. For FYP2, the examiners that would assess students' deliverables are the students' supervisor, internal examiners and external examiners which are the people from industries. As mentioned previously, for FYP1 and FYP2, the students' assessment will be evaluated by different examiners. For example, the FYP1 VIVA presentation

will be evaluated by the students' supervisor and one internal examiner while for FYP2 VIVA presentation the students will be evaluated by their supervisor, one internal examiner and external examiners. The list of panel of examiners that is responsible to evaluate the students' deliverables and their amount of contribution in grading the assessment are shown at the tables below:

FYP1	**Assessment Contribution (%)**	
	Supervisor (%)	**Panel of Examiners (%) (internal examiners)**
Extended Proposal	10	-
Proposal defense and progress evaluation	15	25
Interim report	25	25
Total	**50**	**50**

FYP2	**Assessment Contribution (%)**	
	Supervisor (%)	**Panel of Examiners (%) (internal and external examiners)**
Progress Report	10	-
Pre-EDX	-	10
Technical Report	10	-
Dissertation	20	20
VIVA	10	20
Total	**50**	**50**

Table 1: Grading Structure for FYP 1 and FYP 2

For evaluation, the supervisor and panel of examiners will be given a copy of score sheet for them to fill in the preferred mark for the students' deliverables. The score sheet used for grading is divided into several part of category and each category has specified criteria for judging quality. This enables the supervisor and the examiners to evaluate the students' assessment based on these criterions to indicate whether the students meet the criteria required. This will also help them to choose the most suitable grade to be given to the students. Each of the graded assessment is a part of the students' FYP coursework marks. The supervisor and the panel of examiners are responsible to submit the graded score marks to the FYP coordinator for compilation

of these scores toward the end of the semester. FYP Coordinator is the FYP administrator for that current semester. The coordinator is responsible in managing the FYP students on that semester, assigning the students with their supervisor and the panel of examiners, planning on the FYP timeline and collecting the students score sheet from their respective supervisor and panel of examiner for compilation. The grand total from the compiled score sheet will be the final result of either FYP1 or FYP2 course taken by the students in that current semester.

The whole FYP marking process is manually implemented. This means that the supervisor and panel of examiners fill in the awarded marks to the students manually in the score sheet. They also submit the score sheet in a hardcopy form directly to the FYP coordinator. Furthermore, the FYP coordinator manually allocates the students with the panel of examiners and also total up the compiled score sheet from each of the students by hands using the same formula.

1.2 PROBLEM STATEMENT

Based on the studies made on the FYP courses system flow in UTP, I have found several problems related to the current FYP marking process. Among of the major problem identified are as follow:

1.2.1 Inefficiency and error-likely of FYP manual marking process.

For both FYP1 and FYP2, the grading assessment is done manually where papers and human effort are involved. The supervisor and the panel of examiners will be provided with the score sheet for them to enter the students' information and awarded mark for each of these students' deliverables. Thus, if there are for instances, 5 students under the supervision of each supervisor and that have to be evaluated by each of the panel of examiners, these examiners therefore need to write down each of these students information manually for every deliverables that need scoring. The students' information includes their full name, ID, programme and FYP project title.

Besides that, these examiners need to manually enter the suitable marks to be given to these students based on the criterion in the score sheet and manually calculate the total mark before submitting to the FYP coordinator. As each step in FYP marking process is done manually, this could create hassle or trouble to the supervisor and the panel of examiners. The same information of one student need to be writes down many times for different deliverable that this student submitted.

Therefore, the manual marking process has increase the workload of these examiners and this could be a burden for them. The FYP coordinator, on the other hand, need to manually assign the students with their respective supervisor and panel of examiners, and calculate the final marks for each and every student based on the submitted score sheet. The coordinator need to enter each deliverable marks for each student one by one and calculate the final marks as well. Thus, the FYP marking process is inefficient to be implemented manually as there is redundant process involved that should be completed once instead. This will not only reduce the productivity but also increase the possible error that could happen.

As marking process for FYP courses is manually done which involves human effort, error and mistakes are another major problems that could have happened as well. For instance, the FYP coordinator might accidentally switched information and details between two different students. As the coordinator need to enter manually the students' data and awarded mark one by one, he/she might unintentionally exchange different students with their respective marks.

Whereas, sometimes, the students' supervisors itself do not able to remember the detailed information of their students under their supervision as there are many of them. The same goes to the panel examiners. Therefore, they might enter wrong data for these students. There could also be chances where these examiners and FYP coordinator wrongly calculate the total marks for these students' deliverables. This possible error is one big mistake that could risk the final marks of the students. These

students might possess different mark than they should have received without they even know!

1.2.2 Unorganized and Time-Consuming of FYP Oral Presentation

FYP Oral Presentation or VIVA is one of the most critical parts of the students' evaluation. During VIVA, there are different examiners who will be evaluating the students, which consist of, two examiners which are the students' supervisor and internal examiners for FYP1 and three examiners which are the students' supervisor, internal examiners and external examiners for FYP2. Each of them will be provided with the score sheets to grade the student.

During evaluation, the supervisor and the panel of examiners need to manually fill in the students' detail in the sheet. This is somehow is time-consuming as sometimes they are not able to capture the information of the presenter. Therefore, they will tend to ask again the students information before write down in the sheet. Besides that, once a student has completed his/her presentation, the next presenter need to wait for his/her turn before start presenting as he/she needs to wait for the examiners to complete grading the score sheet of the previous presenter. These problems will eventually cause an unorganized and time-consuming FYP oral presentation evaluation as the examiners take more time than the stated time frame.

Apart from that, for the other deliverables that need evaluation, such as the interim report, the progress report and the final draft of dissertation, the supervisor needs to ensure that the students submit their assessment on time following the FYP timeline given. Besides that, some of the assessment need to be given to the FYP coordinator before it is distributed among of the internal examiners for evaluation. The supervisor somehow, might not be alert with the deliverables that the student need to submit on specific deadline that cause them fail to give marks and submit the score sheet or the respective assessment to the FYP coordinator on time. The FYP coordinator which is responsible to collect the score sheet from each of the supervisor will face major problem when some of the supervisor send the score sheet

or the needed assessment later than others. This will also cause an unorganized of FYP marking system.

1.2.3 Paper Wastage and Confidential Issue.

For each of the evaluation, the supervisor and the panel of examiners will be given a score sheet which is in paper forms. In one semester, FYP1 and FYP2 students will be evaluated for different deliverables for their coursework. Thus, for each deliverable, it needs one score sheet for one student. It is approximately 200 students taking FYP1 and FYP2 course each semester for CIS department only. Therefore, 200 stack of papers needed for one deliverables! This is obviously a paper wastage practice. The cost of buying papers and printing out the score sheet is money wasting that should be reduced.

Apart from that, as the evaluation of the deliverables involve using score papers, these examiners and FYP coordinator might misplace or lost the score sheet as they are a whole stack of them. Moreover, the score sheets are freely available to everyone as they are in paper form; hence both of these problems will lead to confidential issue that could have happen. Therefore, it is a big responsibility for these examiners and FYP coordinator to keep the score sheet from losing or fall to the hands of irresponsible people that has bad intentions.

1.3 OBJECTIVES AND SCOPE OF STUDY

1.3.1 Objectives of the Project

The main objectives of this project are as follow:

- To convert the manual FYP marking process into an automated FYP online marking system, to increase the process efficiency and reduce the possible error chances.
- To have a more organized and time-saving FYP marking process flow.

- To go green and help to preserve the environment.

1.3.2 Scope of Study

The scopes for the project are explained as below:

- FYP marking process out of the overall FYP course process.
- CIS department's lecturer and panel of examiners as the main user.
- System implementation for both of the FYP1 and FYP2 courses.

1.4 PROJECT FEASIBILITY

1.4.1 Project Scope Feasibility

For the FYP online marking system (FOMS) project, the focus of the project will be entirely only on the marking process flow for two of the FYP courses in UTP which are FYP1 and FYP2 only. Hence, I need to emphasize on the current FYP1 and FYP2 marking process as the system implementation is covering for both.

In order to gain more understanding on the scope of the project, I have made an interview with the FYP coordinator to gather information related to the FYP marking process flow. This is essential as I need to do further research on my project and therefore I need to ensure that it is relevant to be done. Apart from that, I have done a survey among the CIS lecturer to get their opinion on the current FYP marking process to help me analyses and determine if such problems that I stated in problem statement does actually occur among of the supervisor and FYP coordinator.

1.4.2 Time Frame Feasibility

I have my FYP course divided between FYP1 and FYP2, where each is completed within one semester respectively. During FYP1, I focused more on making further research on the project. During the planning and analysis phase, I find out the problem statement to determine the real problem that I need to solve. Besides that, I need to determine the objective and the scope that I'm going to cover for FOMS

project. Research on literature review is another analysis made on the project to determine if such project has been done before and analyzing any comment on similar project or problem identified.

On the other hand, during FYP2 course I focused more in designing the interface and framework of the system to help planning on the overall complete system. Besides that, I also focused on the development and implementation of the project prototype and perform testing to ensure the system has every functions needed and are error-free.

As the FYP course is divided evenly between the two semesters, I believe the FOMS project will be able to complete within the time frame.

CHAPTER 2

LITERATURE REVIEW

2.1 PROBLEM IDENTIFICATION OF MANUAL MARKING PROCESS

Today, most university lecturers specifically, still grade and mark their student's assessment manually. This also means that the students submit the assignment in hardcopy form and the lecturer will grade them manually. Based on the thesis "*Web-based automated grading system for programming assignment*" (Ellia A., 2006), she claimed that manual grading and marking process has created hassles to the lecturers, since it is time consuming task and causing overburden to the lecturer workload. Thesis made by Ellia A. which mostly focuses on converting the manual marking process of programming assignment has also claimed that manual grading fail to give timely feedback. In normal practice, timely feedback is hard to achieve as the graders will only return the assignment after the entire student's assignment has been marked [1]. In the book *"Computer-Based Testing: Building the Foundation for Future Assessment"* (Camara W., 2002), he also claimed that scoring manually has limits the large testing programs to be held. This is due to the larger the student, the more the workload of the graders to grade each of the students [2].

All of these claimed is true since the FYP coordinator need to compile the score sheet from each of the supervisors and the panel of examiners, hence some of them could have returned the score sheet later than the other examiners. Because of this problem, it caused the FYP marking process to have an unorganized process flow since some of the supervisor or the panels of examiners are unable to give the score sheet to the FYP Coordinator on time making the coordinator unable to produce the coursework mark on the scheduled time. Besides that, the manual marking process is a time consuming process and also increase the workload of the supervisor and the panel of examiners where for every deliverables that need grading will require them to enter the students' detail and the graded marks manually in the score sheet. They

also need to calculate the total marks manually. Moreover, the FYP Coordinator needs to compile and calculate the grand total marks for more than 100 FYP students at the end of the semester making he/she to have an overburden to the his/her existing workload.

2.2 THE NECESSITY AND BENEFITS OF AUTOMATED MARKING SYSTEM

To solve the problem occurred by having a manual marking process in grading the assessment of the students, an automated grading system should be implemented. In the book *"Computer-Based Testing: Building the Foundation for Future Assessment"* (Camara W., 2002), Camara is not optimistic that automated scoring will replace manual scoring in the future, however he believes if this does being implemented, it will reduce the reliance on human graders [2]. However, according to another author of the book *"Computer-Based Testing: Building the Foundation for Future Assessment" (*Dodd B.G. & Fitzpatrick S.J., 2002), the author stated that they have focused their attention to a relatively new area of investigation which is to develop the automated scoring for complex assessment tasks. In the book, they responded by saying that implementing automated scoring system could make scoring processes rapid and economical [2].

There are benefits from administering an exam on computers which include cost saving on printing and improvement in test security, as handling and protecting electronic files are much more easy than handling stack of test forms and booklets, according to the book of "*practical considerations in computer-based testing*" (Cynthia G.P., Judith A.S., John C.K. & Tim D., 2002) [3]. This statement is true as by having an automated system, all of the students' deliverables will be assess directly from the computer thus reducing the paper usage and help to preserve the environment. This will save a lot on printing cost. Furthermore, as the score sheet will automatically be submitted online once it is completed by the panel of examiners, there will be no confidential issues occur. Besides that, as the score sheet

is directly submitted, therefore there will be no delay for submission of score sheet to the FYP coordinator thus save more time. Automated FYP marking system will also have greater security in protecting the data as only the administrator, which is the FYP coordinator, has access to the overall student data.

According to book of "*practical considerations in computer-based testing*" (Cynthia G.P., Judith A.S., John C.K. & Tim D., 2002), the author has also identify another advantage of automated testing system, where according to them, the data can be collected automatically by computer and simplifies the process of scoring the exam [3]. I agree with this statement, as automated marking system will make the FYP marking process flow more organized as once the supervisor and the panel of examiners submitted the students' awarded mark for each deliverable, these marks will directly be store in the server. The FYP Coordinator on the other hand could access this marks anytime, especially towards the end of the semester in order to compile the entire coursework mark of the FYP students. .

Based on his experience, the author of the article *"An Online system for Assignment Marking"* (Baker G., 2003), he found that having the mark stored electronically is very valuable. When student approach the lecturer with concern about the mark, he just need to enter into the system and quickly review on the comments. If the students want to change the mark, he will also be able to quickly load the data in system, edit the mark and resubmit. [4]

2.3 COMMENTS ON IMPLEMENTED AUTOMATED MARKING SYSTEM

According to the book *"Computer-Based Testing: Building the Foundation for Future Assessment" (*Dodd & Fitzpatrick, 2002), they claimed that, for improvement in the scoring system, development of a more structured item formats is required before automated scoring can be deployed independently[2]. Nevertheless, the FYP marking process in UTP has already been constructed with a structured format and process flow, only that they currently being implement manually. Hence, the current

FYP marking process needs only a conversion into an automated FYP marking process for conveniences in grading process.

According to the article *"An Online system for Assignment Marking"* (Baker G., 2003), he stated that each assignment has a list of criteria which students are expected to meet. These can be configured by the instructor or the markers using an online interface and they could enter the mark and comment for each of the criteria [4]. Agree with the statement, the FYP score sheet has its own grading format with a list of category and criteria that the students are expected to meet in each of their deliverables. This category and criteria is for the supervisor and panel of examiners references before grading the students' deliverables. In the score sheet also, the panel of examiners could enter the mark and give comment directly to the students. The format of this current FYP marking score sheet will continue be used in the FYP Online Marking System.

This is because according to another author of the book *"Computer-Based Testing: Building the Foundation for Future Assessment"* (Plake B.S., 2002), he stated that this is to ensure that the new items format do not alter the construct being measured and to keep the format as it is after the development of the automated process.[2] Hence, the current format will be maintained and the only changes made in the FYP Online Marking System is the conversion from a manual process into an automated marking system.

2.4 AUTOMATED MARKING SYSTEM FRAMEWORK

According to the article *"Computer-based Assessment. Can it deliver on its promise?"* (http://www.wested.org/), the author comments on the hardware and software aspect for the implementation of the automated grading system. According to the author, on the hardware side, advances in the speed, capacity and availability of computer nowadays, has allow application that is impossible to be implement in previous generation. On the software side, development in data structure, simulation

technologies and artificial intelligence improve the efficiency and capabilities of assessment administration, scoring and reporting [5].

According to the book *"Practical Considerations in Computer-based Testing*" (Cynthia G.P., Judith A.S., John C.K. & Tim D., 2002), the author also commented on the software and hardware issue in implementing the automated scoring system. The selection or development of a software program for computerized test administration should be based on the inclusion of essential software features such as measurement model, delivery method, innovative item types and others. The specification for hardware will usually include at least; type of computer, operating system, RAM, and hard disk used [3].

Based on the comment given from both of the authors on the specification and advanced in software and hardware application, I am confident that I will be able to implement and develop the FYP Online Marking System. This is because in this current year, all of the needed software is freely available in the market and could be easily get for a cheaper price. Therefore, it is not hard for me to get the related software that is essential to help me implementing the FYP Online Marking System. Apart from that, the hardware in this recent year has getting advanced every day and enables the entire program to be applied and develop easily.

2.5 EXISTING AUTOMATED MARKING SYSTEM

During my research, I have found some of the successful automated grading system that has actually being implemented. Among of them are as below:

2.5.1 Vula Marking System.

According to the article *"Online Marking System for Vula"* (http://pubs.cs.uct.ac.za/archive/00000366/01/TechnicalReport.pdf), Vula Marking system is a web-based interface which is develop with the objective to help the instructors and tutors mark and grade students assignment online. This application is developed for the Center of Higher Education of the University of Cape Town. It has

aimed which is to improve the marking assignment and feedback for all departments [7].

2.5.2 MEAGER.

According to book *"MEAGER: MICROSOFT EXCEL AUTOMATED GRADE"* (Hill T.A., 2005), MEAGER is an automated grader which is use by the instructor in Microsoft Excel and Microsoft Office application. MEAGER has two goals which are to grade assignment more accurately and in greater handling as well as to reduce the time and effort required in grading Excel assignments [6].

2.5.3 KASSANDRA

According to the book "Kassandra: The Automatic Grading System" (Matt U.V., 1994), KASSANDRA is an automatic grading system which is presented for grading assignment in scientific computing. The student can use the system to check on their assignment correctness. For the correct solution, the grade is automatically recorded based on the related student answer. [8]

CHAPTER 3

METHODOLOGY

3.1 RESEARCH METHODOLOGY

For the completion of FYP Online Marking System (FOMS) project, the methodology used is one of the Rapid application Development (RAD) methodologies which is prototyping.

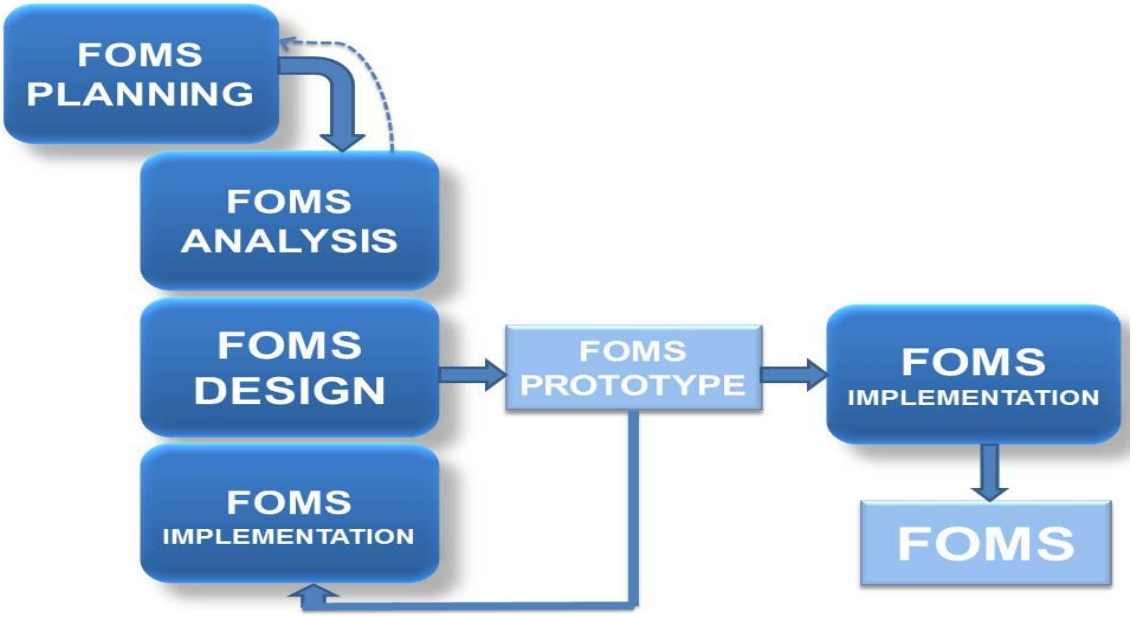


Figure 1: Prototyping

One of the reason prototyping methodologies is used for implementation of FOMS project is that prototyping allow the analysis, the design and the implementation of the project to be done concurrently and repeatedly until complete. Therefore, at the first stage, the project is started with the initial analysis, design and implementation of the FOMS prototype and then another analysis is made to determine for any deficiency, followed by the design of the additional features and the implementation of that additional features in the current prototype. This process is repeated all over

again until all the required features are available and completed at the final stage. With this, FOMS prototype is able to be produced quickly at the first stage followed by similar other stages until it is completed at the final stage. Among of the major activities occurred at each of the prototyping methodologies during the implementation of FOMS include:

3.1.1 FOMS Planning

Among of the activities occurred during the FOMS planning phase are:

- **Proposing Project Title.**

During this stage, the FOMS project title is proposed to the selected supervisor by submitting a document that includes simple description on the project that is going to be implemented.

- **Identification of problem statement and objectives of the project.**

One of the crucial parts during the planning phase is the identification of the major problem within the project and to determine whether such problem does exist in the area of study. Besides that, the main objectives of implementing this project also need to be analyses and listed out in order to ensure the project implemented follow its objectives.

- **Analysis of project feasibility and relevancy.**

The project feasibility is another crucial analyses made. The project feasibility is important to determine whether the project is relevant to be implemented. Among of the analysis made include the scope of the project and the time-frame of project implementation.

3.1.2 FOMS Analysis

The second stage of the prototyping is the project analysis. Among of the activities done during the analysis of the project are:

- **Literature review research.**

For the project, several literature reviews that are relevant to the project have been gathered. Among of the sources of the literature research are books, journal and website. The literature review is important to determine if there is similar project has been done in the past and to analyses on the strength and weaknesses of that past project based on the comment written by the author of the books, journal and the website.

- **Gathering requirement for the project.**

Apart from that, during the analysis phase, another important activity is to gather the entire requirement for the project from the real user who later will be using the complete system. The user of FOMS is the lecturer from the CIS department itself. Therefore, it is necessary to gather information from them in order to gain better understanding on the project.

3.1.3 FOMS Design

Another critical phase during the project implementation is the design phase. During this stage, it is required to come out with the framework and the architecture of the project. Among of the project framework that has been designed is:

- **Activity diagram**

Activity diagram shows the process performed by the system and how data moved within. Further explanation is available at the next chapter.

- **Use-case diagram**

Use-case diagram identify the real user of the system implemented and their major roles. The design is available at the next chapter of the report.

- **Class diagram**

Class diagram shows the entire database that is involved in the project. This is one of the most important diagrams that need to be design because it will later be used in the system. The design is available in the next chapter.

- **Interface design**

The rough sketch of the interface that is going to be implemented in the system is another design needed. This is to give rough pictures on the interface of the system that is going to be developed.

3.1.4 FOMS Implementation

Last but not least, one of the toughest stages is the system implementation. This stage will include most of these activities which are:

- **Written coding for the program to develop the system**

This stage takes most of the time as to code the program for the prototype development is the most difficult stage.

- **Testing and bugs fixing.**

For every prototype made, the system need to be test for to debug for any error and to ensure that the system is functioning properly and following the requirement gathered.

3.2 PROJECT ACTIVITIES

Listed below are the project activities done throughout the implementation of FYP Online Marking System (FOMS):

3.2.1 Define Project Problem

For this project, the problem has been identified which is the inefficiency and error-likely of FYP manual marking process, unorganized and time-consuming of FYP oral presentation and paper wastage and confidential issue. Therefore, the implementation of FYP Online Marking System is vital with the objectives to convert the manual FYP marking process into an automated FYP online marking system, to increase the process efficiency and reduce the possible error chances, to have a more organized and time-saving FYP marking process flow, to go green and help to preserve the environment.

3.2.2 Review previous research findings

Critical analysis on the literature is conducted in order to have a broader understanding on the project and also to determine for any existing system available. The review focused mostly on the problem on manual marking process, the benefit of automated marking system and its framework.

3.2.3 Data Gathering

In order to gather the requirement for the project, a survey is conducted among the CIS lecturer. Please refer appendix 1 for example of survey. This survey is conducted with the intended to get feedback and comment from the FYP coordinators and CIS lecturer, which consist of FYP students' supervisor and internal examiners, on the implementation of FYP online marking system (FOMS). The survey wish to get the response on the problem they face by using the current manual FYP marking process and whether the FYP coordinators and the lecturers would like to use the automated

FYP Online Marking System (FOMS) if it is going to be implemented in the future. The result of the survey is further explained at the results and discussion chapter.

3.2.4 System Design

During FOMS project activities, among of the activities implemented involve mostly in designing the framework and architecture of FOMS project which includes:

- **Activity Diagram**

Activity diagram shows the process performed by the system and determine on how data moved among them. Therefore, for FOMS, an activity diagram has been designed that shows clearly the process performed by the system and how data move within the system which is shown by each of the users involved in FOMS. By designing the activity diagram, it helps to clearly specify the important activities that each of the users is able to be performed in FOMS. Besides that, it shows the decision that FOMS should be able to make under different circumstances. From the decision made, it will then shows the activities that the user need to perform following the decision of either true or false. With the designation of FOMS' activity diagram, it helps a lot in designing the interface of the prototype as it clearly shows the main function that the user could performed in FOMS.

- **Use Case Diagram**

Use case diagram emphasize on the user of the system thus connecting the system with its environment. Therefore, a use case diagram shows the available users of the system and their main role in FOMS. With the designation of use case diagram, it allows to clearly list out the major available users of FOMS and list out the roles for each of them. With this, there will be no characters being left out from the system and no missing out of the important roles that each character should performed where this could possibly lead to the inefficiency and ineffectiveness of the system being implemented.

- **Class Diagram**

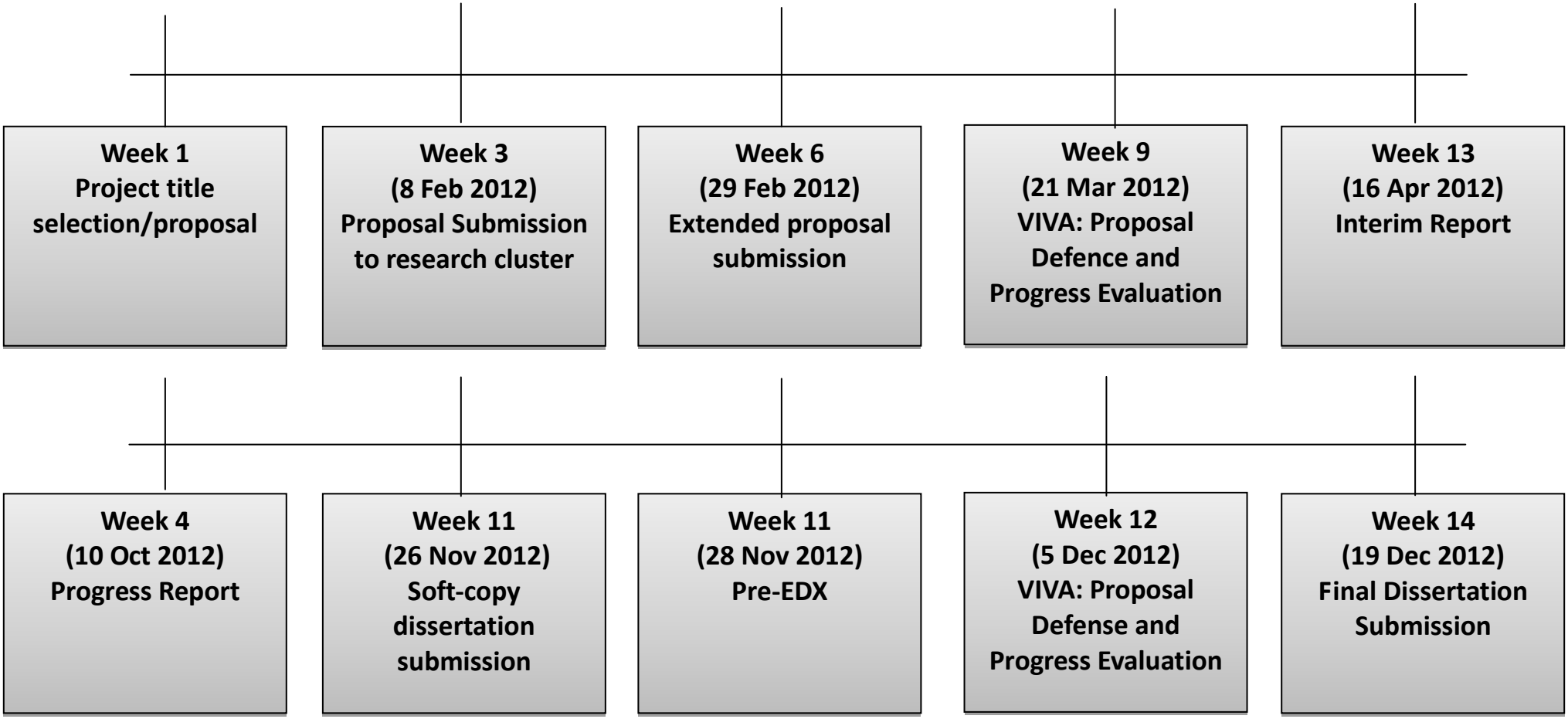
Class diagram shows the database and their relationship that involve in the system. This is the most crucial activity and also requires most of the time to design it. Class diagram shows all the classes involve in the project together with attributes specification and operations of each of the classes. After determining those classes, then it is needed to find the relationship among of them. Database is one of the major elements in FOMS as it comprises of many classes related with each other. Each of the user in FOMS has their own classes as each of them are related with each other. This also includes the relationship of each of these users with their operations and functions. The relationship of the classes is link together to identify the connection between them.

The result for each of the design mentioned will be further shown in the result and discussion chapter.

3.2.5 System Development

The system implementation involves the development of the FYP Online Marking System (FOMS) into an executable system. This will include the implementation of user interface, integration with database and other components. The system will be implemented based on the framework and architecture designed previously. Once completed, the system will be testing with their user to determine whether the system has all the functions needed and following the user requirement.

3.3 KEY MILESTONE



3.4 GANTT CHART

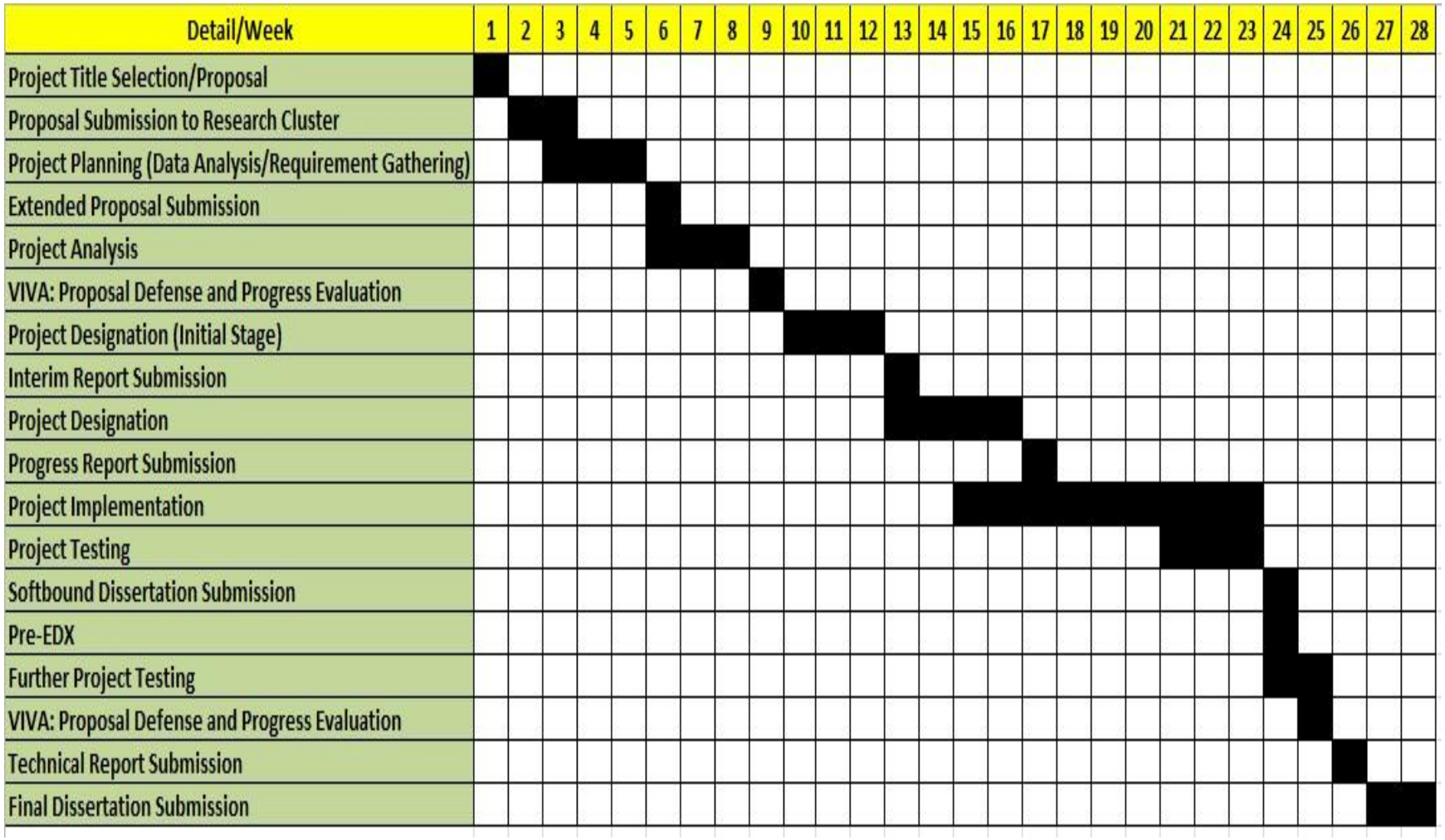


Table 2: Gantt chart for FYP1 and FYP2

3.5 TOOLS REQUIRED

3.5.1 Microsoft Visual Studio 2005 (ASP.Net)

Microsoft Visual Studio 2005 is the major platform used for the development of the FYP Online Marking System (FOMS). The project use one of the Visual Studio development tools which is ASP.Net that support in the creation of a web application. FOMS will be a web-based system as it is easier for the user to retrieve it anywhere they are. Therefore, ASP.net is the most suitable tool used to create the project. Besides that, ASP.Net. Visual Studio is well-known with its ability to create an interactive interface thus it helps a lot in creating an elegant yet functional system for the users.

3.5.2 MySQL GUI (SQLyog)

The second tool that is use for FOMS development is SQLyog MySQL GUI. This tool acts as the database developer for FOMS project. It is a powerful tool that helps to manage the database and its relationship. Besides that, for every query created, SQLyog will automatically produce and shows the result. This ability help a lot in coding the system that involves the database connection within. Besides that, this tool is compatible to be connected with Microsoft Visual Studio 2005 and thus is the perfect choice to be choosing from whom act as the storage of all the related classes in FOMS project.

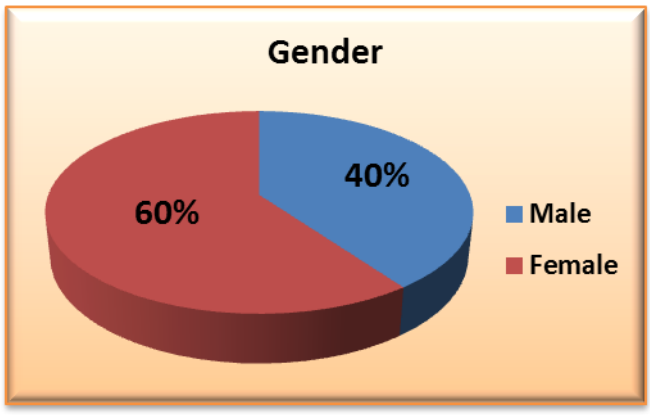
CHAPTER 4

RESULT AND DISCUSSION

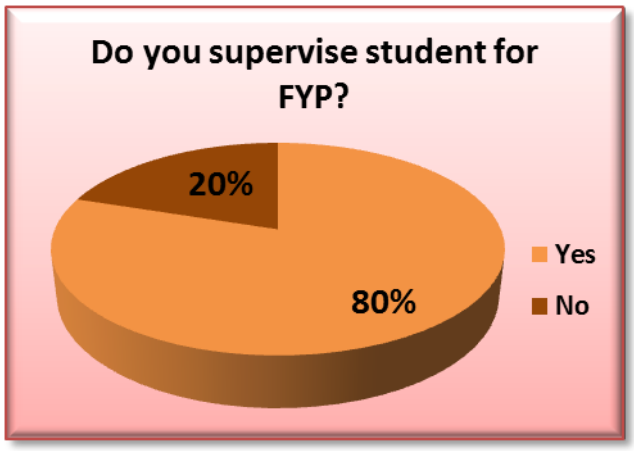
4.1 FINDINGS AND DATA GATHERING

4.1.1 Survey Result

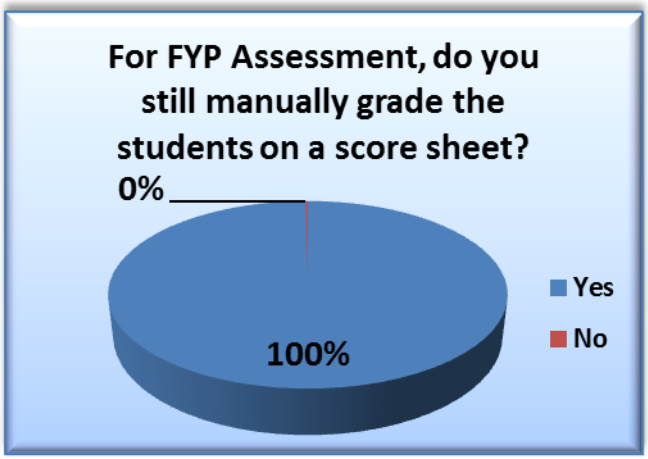
A survey has been conducted among the lecturer of CIS department in UTP with the purpose to get their feedback on the current FYP marking process, the problems that they face and their comment on the implementation of FYP Online Marking System (FOMS). The result of the survey and their discussion are as below:



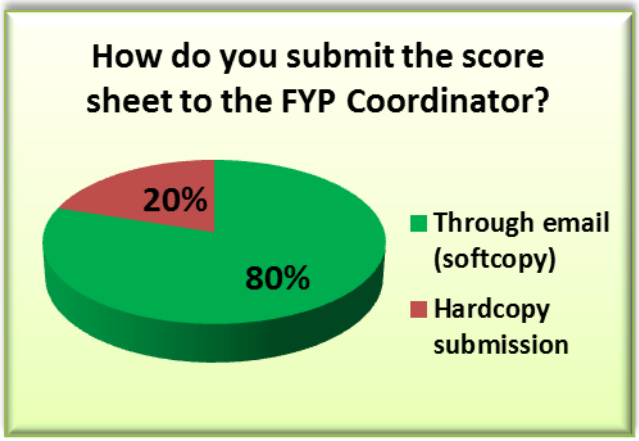
All of the respondents of the survey are the lecturer from the CIS department. Based on the lecturer that is managed to be surveyed, 60% of them are female and the remaining 40% are male lecturer.



Based on the respondent surveyed, 80% of them do supervise student for FYP while 20% of them do not supervise any FYP students, based on the pie chart above. This is because some of the lecturers further their study or is not available on that current semester. The number of students that each of these lecturer supervises per semester is usually ranging from 3 to 8 students. Therefore, it could be said that the implementation of FOMS is crucial as more than half of CIS lecturers do actually supervise FYP students each semester.

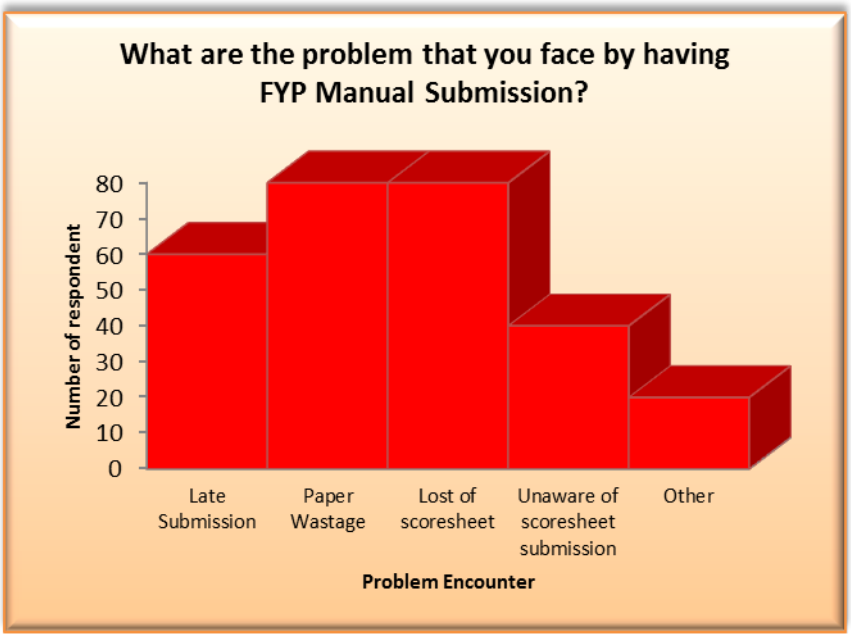


Based on the survey made, 100% of the respondent state that they are still grade the FYP students manually in the score sheet for each of the deliverables that need scoring. This has given firm evidence that the current FYP marking system is still manually implemented for FYP courses. Besides that, this survey has given more proved that the implementation of FOMS project is vital. This is because as the grading of the FYP deliverables is still manually done, therefore error such as wrong students' information entered, wrong calculation of awarded marks and the possible switching information or marks between two students are highly possible to be happening. Thus FOMS is needed to be implemented as soon as possible with the objective to reduce these possible chances of error.



The lecturers have also been asked on the ways they submit the score sheet to the FYP coordinator. 80% of them send a hardcopy submission which is in a paper-based score sheet to the FYP Coordinator. Meanwhile, 20% of them send the score sheet through email which is in the softcopy version. Based on this respond, it can be seen that some of the lecturers are still using paper-based score sheet to grade the students' assessment. Apart from that, the submission is still manually being done either through email or directly submits to the FYP coordinator. Therefore, the ways these lecturers submitted the score sheet is not consistent between one lecturer with the other. This will become a

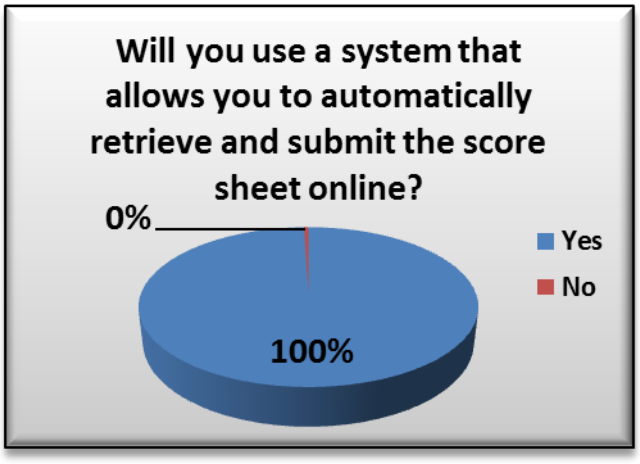
burden for the FYP coordinator as he/she need to check one by one of the submission through different medium which is time-consuming. Besides that, the high amount of papers needed to submit the hardcopy score sheet is a wasting practice.



In the survey, the respondents have also been asked on the problem that they face by having the FYP manual submission. 80% of the respondents state that the paper wastage is one of the consequences of manual submission. This is because they need to print out the paper-based scored sheet to grade each the students' deliverables. Moreover, 80% of them also responded that loss of score sheet is another problem encounter. As the score sheet is in paper form, the lecturers state that they tend to misplace the graded paper before submitting to the FYP coordinator. While 60% of the lecturers state that late of submission is another problem face. This could be because of the 40% of the respondents are unaware of the score sheet submission deadline. The lecturers tend to forget the deadline of the score sheet submission which causes them to submit late to the FYP coordinator. However, this cause a trouble to the FYP coordinator as due to the late

submission of some of the lecturer, making the total scores compilation late as well. On the other hand, 20% of the respondents state that the other problem they face by having the manual FYP marking process is that they need to fill in the students' details manually and count the total marks graded manually. For them, this has increased their workload as they need to write the students all over again for different deliverables. Besides that, the lecturers also admit that they tend to forget the information of the student under their supervision. This is because, they supervise many students in one semester, and it is impossible for them to remember their information in detail every time.

This is true as during the survey, one of the respondent give her suggestion for the FYP Online Marking System (FOMS) that is to be implemented where she suggested that the system should be able to capture the information for each of the students as soon as the students has been assigned with their respective supervisor. This is because according to her, she faces the problem of remembering the detail information of the students under her supervision; thus if the system is able to provide this information earlier, she does not need to enter the information of the students for each of the score sheet



Due to all of these problems, the survey asked the respondent if they will use a FYP Online Marking System (FOMS) that allows them to automatically retrieve and submit the score sheet online if it is to be implemented. 100% of the respondents agree to use the system; hence it is proved that the system will be fully accepted by the lecturer or also the real user of the system. This is because such system will be useful and beneficial to the supervisor, panel of examiners and also the FYP coordinator. With the implementation of FOMS, it will reduce the burden of the lecturer, saving their time and help them in a lot more ways.

4.2 DATA ANALYSIS

4.2.1 Activity Diagram

Activity diagram for FYP Online Marking System (FOMS) as shown in the diagram below shows the detail activities and processes performed within FOMS. According the diagram, at the beginning of the process it is compulsory for the user to login into the system first. From here then, the system will identify whether the user whom login is either the FYP coordinator or supervisor or panel of examiners.

If the login user is FYP coordinator, then he/she will see a main page that display FYP1 and FYP2 image. The FYP coordinator can choose either to open the FYP1 or FYP2 image. The content for both of the FYP1 and FYP2 are the same. After choosing either one of these two, he/she can perform several functions as an administrator. One of it is that the FYP coordinator can add user to the system. For FYP1, the FYP coordinator could either add FYP1 students or supervisor while for FYP2, he/she could also add external examiners into the database. Apart from that, the coordinator can assign the students for that particular FYP chosen with their supervisor and panel of examiners. He needs to make sure that each student is assigned with a supervisor and panel of

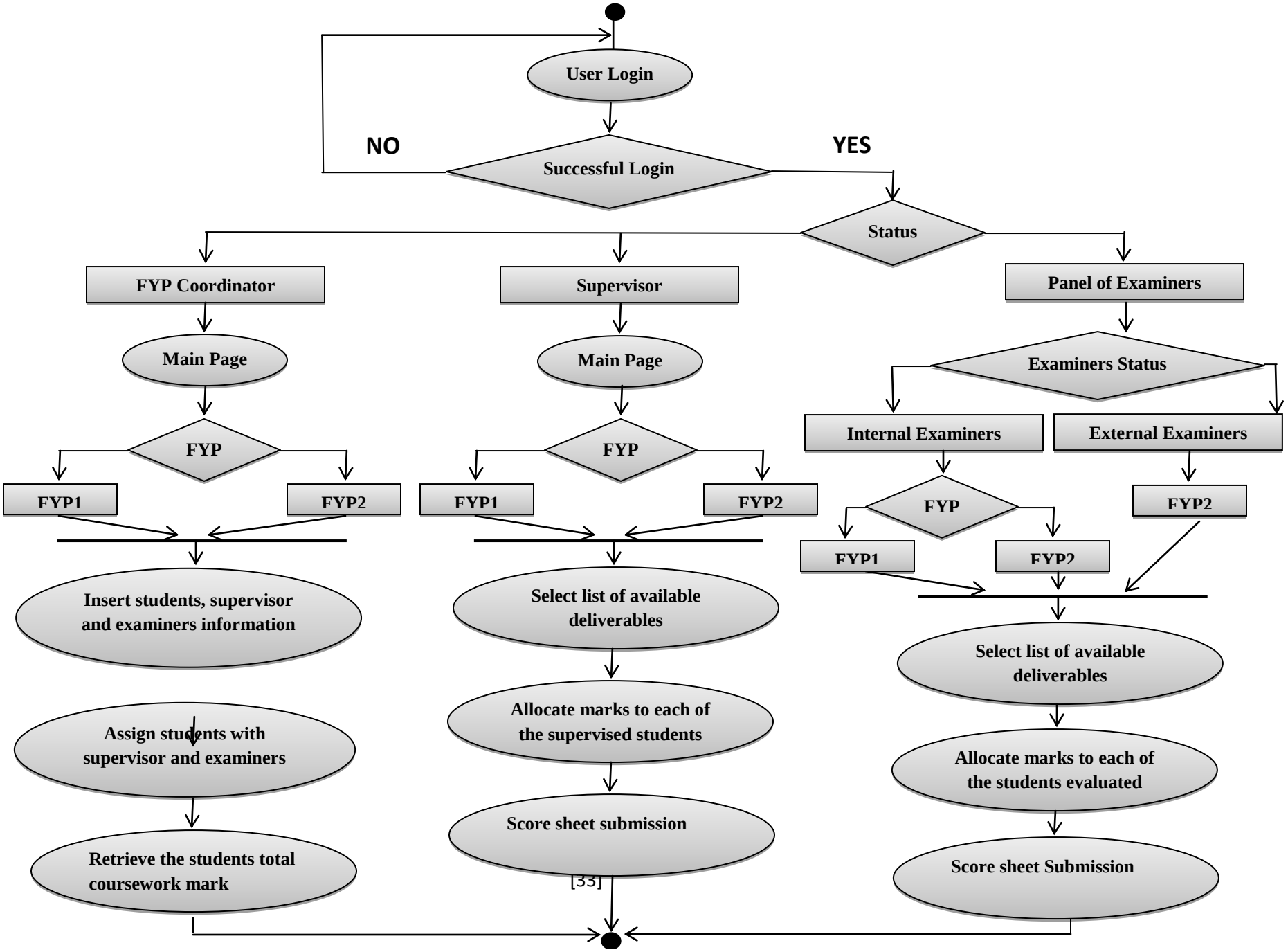
examiners. At the end of the semester, the FYP coordinator could retrieve the total coursework marks for each of the students.

On the other hand, if the login user is the supervisor, he will also see a main page that shows FYP1 and FYP2. The supervisor can choose to open either one of the FYP listed where from here he will be able to see a list of deliverable that he needs to grade. From this list, he is able choose either one of the deliverables and then allocate marks for each of the students that the supervisor supervises. After confirming on the allocated marks, the supervisor finally needs to submit the score sheet.

If the login user is panel of examiners, then the system will identify whether it is either internal examiners or external examiners. If it is internal examiner, then he will see a main page that displays both FYP1 and FYP2. The internal examiners can then open either one of the FYP listed. Internal examiners will then also see a list of deliverables that he needs to grade. However, only selected deliverables that the internal examiners need to grade, thus they able to view on this chosen deliverables only. He will choose either one of the listed deliverables and filling in the grade for each of the students assigned. He then will need to submit the form after confirmation.

On the other hand, if the user login is external examiners, they will see a main page that shows FYP2 only. This is because only FYP2 that have external examiners to examine the FYP students. This external examiner will also see a list of FYP2 deliverables that he needs to complete only. He will fill in the grade for each student assigned and submit the deliverables after confirmation.

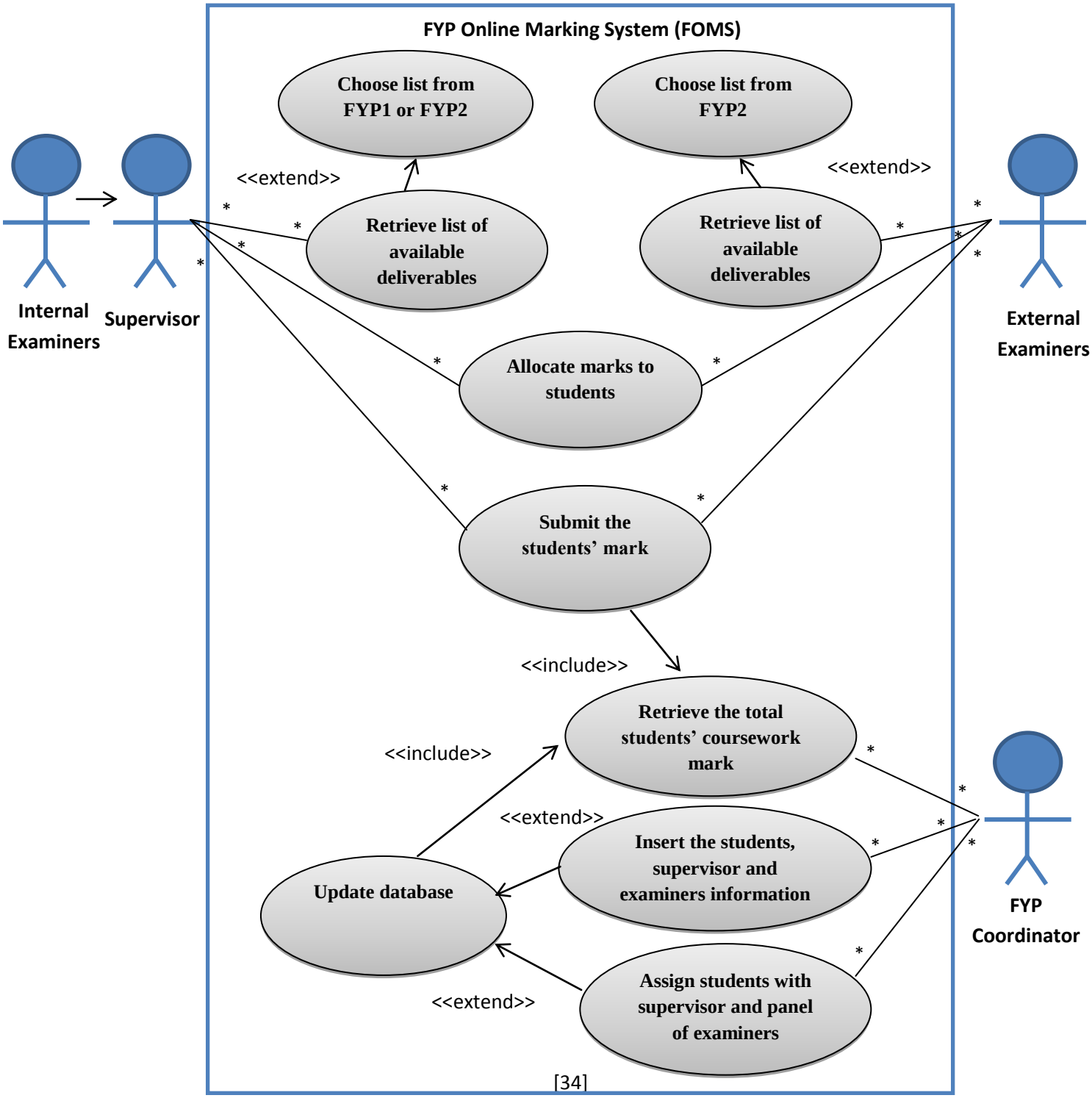
Hence, there are three users of FOMS and each one of them has different activities that they able to perform according to their roles.



[33]

Figure 2: Activity Diagram

4.2.2 Use Case Diagram



[34]

Figure 3: Use Case Diagram

The diagram shown above is the use case diagram which illustrates all the main users in FOMS and their major roles. There are four main actors in FOMS where each of them has different roles that they play. The four users are supervisor, internal examiners, external examiners and FYP coordinator.

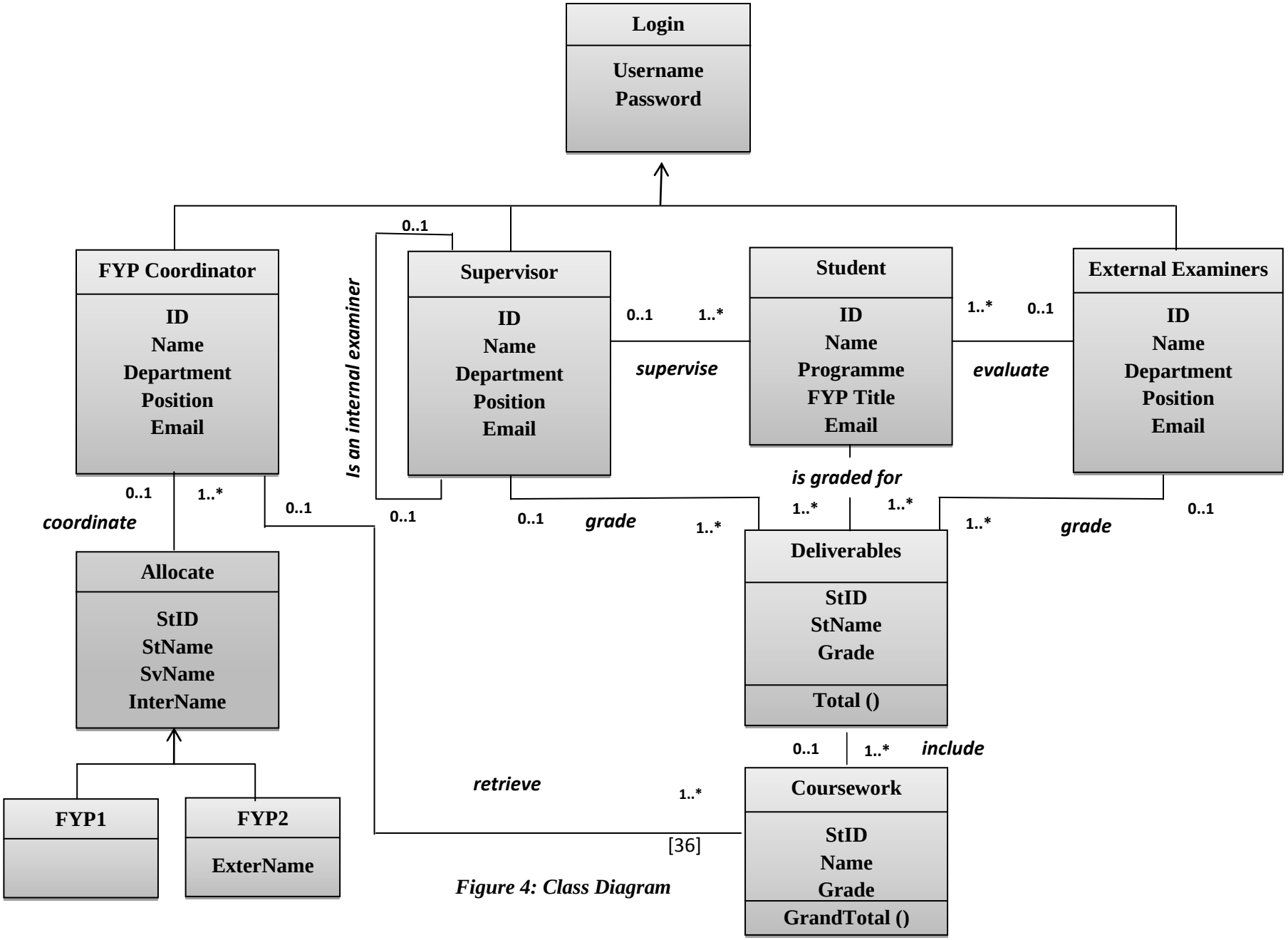
As shown in the diagram, internal examiners are also among of the supervisor of the students. This means that a supervisor of a student's will be an internal examiner for another group of students. Somehow, sometimes there is special case occurred where the internal examiner is not the supervisor as he/she does not supervised any students on that current semester but is invited to be one of the internal examiners.

Both of the supervisor and the internal examiners have the same roles. Among of their roles are to retrieve list of available deliverables, which is shown after choosing between either FYP1 or FYP2, to allocate marks to each of the students assigned under them and submit the marks after confirmation.

The major role of the external examiners, on the other hand, is to retrieve list of available deliverables in FYP2 only. They also responsible to allocate marks to the FYP2 students assigned under them and submit the graded marks after completion to be compiled.

FYP coordinator is the administrator of FOMS. He/she is the one who responsible to insert the information of the students, supervisor and external examiners into the database. FYP coordinator is also responsible to assign the students with their respective supervisors and panel of examiners. Both of these actions will be updated in the database. After receiving the score sheet submitted by the supervisors, internal and external examiners, FYP coordinator will be able to retrieve all of these allocated marks for compilation of final result for both FYP1 and FYP2. Those are among of the major roles in FYP Online Marking System (FOMS) and their respective responsibility.

4.2.3 Class Diagram



[36]

Figure 4: Class Diagram

The above class diagram shows a database that is involved in FYP Online Marking System (FOMS). There are classes with each class has their own attributes and operation, if available.

The first class in the database is login class. It has the attributes username and password. This class will store the username and password data that the users have made. Based on the diagram below, the username has been specified according to their roles which are admin for FYP coordinator, externalsv for external examiner, internalsv for internal examiners and supervisor for supervisor.

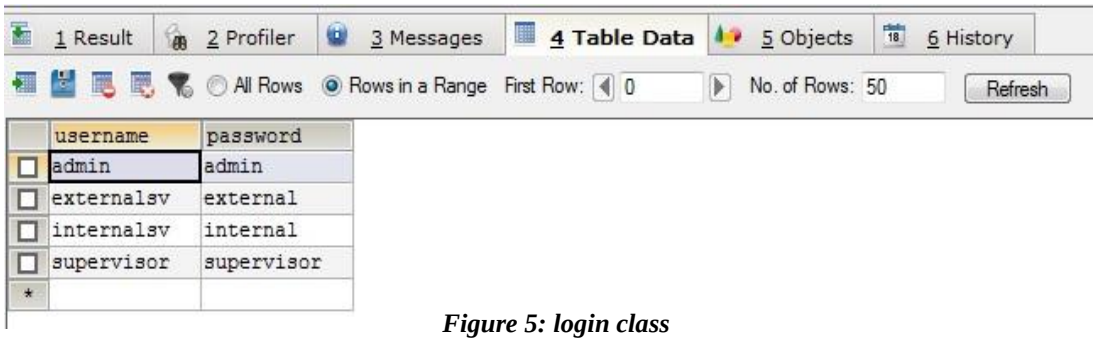


Figure 5: login class

There are also classes for each of the users which are the FYP Coordinator, Supervisor and external examiners. The purpose is to keep the information for each of the user in the database. However, the information of FYP coordinator and internal examiners is both located in the supervisor class. This is because both of them are also among of the students' supervisor and also among of the lecturer itself. The information in supervisor class includes ID, name, department, position and email.

1 Result | 2 Profiler | 3 Messages | 4 Table Data | 5 Objects | 6 History

All Rows | Rows in a Range | First Row: 0 | No. of Rows: 50 | Refresh

SvId	SvName	SvDept	SvPost	SvEmail
10001	Dr. Alan Oxley	CIS	Professor	alanoxley@petronas.com.my
10002	Dr Mohd Fadzil Hassan	CIS	Associate Professor	mfadzil_hassan@petronas.com.my
10003	Dr. Baharum B Baharudin	CIS	Associate Professor	baharbh@petronas.com.my
10004	Dr. Dayang Rohaya Bt Awang Rambli	CIS	Associate Professor	roharam@petronas.com.my
10005	Dr. Wan Fatimah Bt Wan Ahmad	CIS	Associate Professor	fatimhd@petronas.com.my
10006	Dr. Dhanapal Durai Dominic Panneer Selvam	CIS	Associate Professor	dhanapal_d@petronas.com.my
10007	Dr. Jafreezal Bin Jaafar	CIS	Senior Lecturer	jafreez@petronas.com.my
10008	Dr. Low Tang Jung	CIS	Senior Lecturer	lowtanjung@petronas.com.my
10009	Dr. Mohamed Nordin B. Zakaria	CIS	Senior Lecturer	nordinzakaria@petronas.com.my
10010	Dr. Rohiza Binti Ahmad	CIS	Senior Lecturer	rohiza_ahmad@petronas.com.my
10011	Dr. Shuib B Basri	CIS	Senior Lecturer	shuib_basri@petronas.com.my
10012	Dr. Suziah Bt Sulaiman	CIS	Senior Lecturer	suziah@petronas.com.my
10013	Foong Oi Mean	CIS	Senior Lecturer	foongoimean@petronas.com.my
10014	Halabi Bin Hasbullah	CIS	Senior Lecturer	halabi@petronas.com.my
10015	Ahmad Izuddin B Zainal Abidin	CIS	Lecturer	izuddin_z@petronas.com.my
10016	Ainol Rahmah Shazi Binti Shaarani	CIS	Lecturer	ainolars@petronas.com.my
10017	Chen Yoke Yie	CIS	Lecturer	chenyokeyie@petronas.com.my
10018	Dr. Yong Suet Peng @ Vivian	CIS	Lecturer	yongsuetpeng@petronas.com.my
10019	Faizal Bin Ahmad Fadzil	CIS	Lecturer	faizal_ahmadfadzil@petronas.com.m
10020	Helmi Bin Md Rais	CIS	Lecturer	helmim@petronas.com.my
10021	Jale Bin Ahmad	CIS	Lecturer	jale_ahmad@petronas.com.my
10022	Khairul Shafee Bin Kalid	CIS	Lecturer	khairulshafee_kalid@petronas.com.

Figure 6: Supervisor class

Besides that, there is also external examiner class. The external examiners are usually people from industry which are invited to evaluate the FYP2 students. Therefore, they only graded the FYP2 deliverables which include dissertation and VIVA. The information in external examiner class includes ID, name, company, phone number and e-mail.

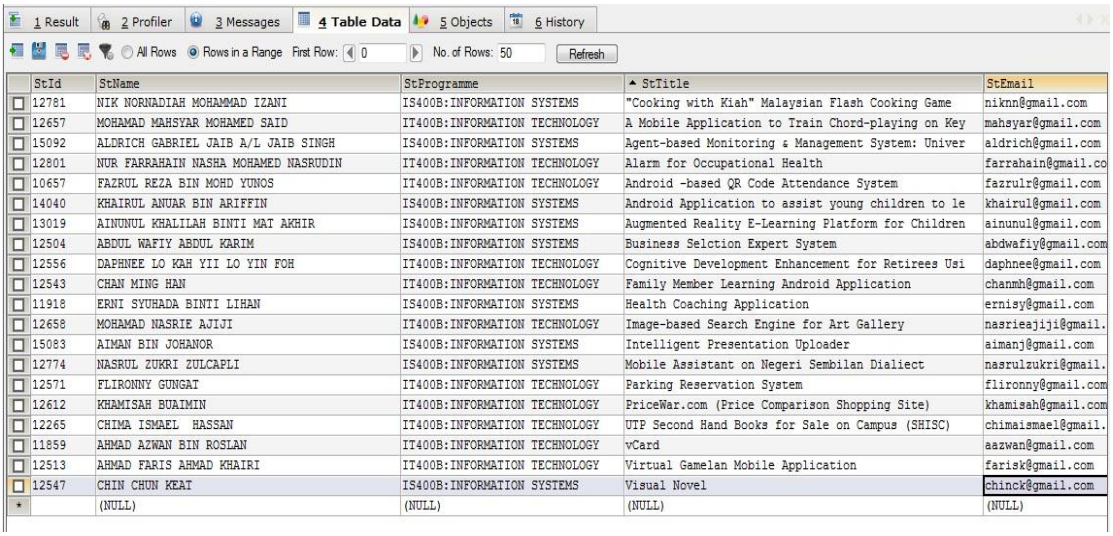
1 Result | 2 Profiler | 3 Messages | 4 Table Data | 5 Objects | 6 History

All Rows | Rows in a Range | First Row: 0 | No. of Rows: 50 | Refresh

ExId	ExName	ExCo	ExPhone	ExEmail
0001	Ahmad Burhan Bin Ahmad Kadir	Schlumberger	019-7894998	aburhan@gmail.com
0002	Aisyah Aqilah Bt Johan	Schlumberger	017-5634592	aisyahaq@gmail.com
0003	Chan Wei Soon	Schlumberger	019-2562997	chanws@gmail.com
0004	Davathi Arumugam	Intel Malaysia	019-5442838	adavathi@gmail.com
0005	Jailani Ahmad	Intel Malaysia	012-3456780	jailani@gmail.com
0006	Shamsuddin Bin Abdul Jabbar	Intel Malaysia	012-2220090	shamaj@gmail.com
0007	Salina Bt Hamid	Intel Malaysia	017-2315678	salina@gmail.com
0008	Puteri Aida Bt Azam	PETRONAS	019-9878762	puteriaida@gmail.com
0009	Yashini Chuppiah	PETRONAS	019-6543990	cyashini@gmail.com
0010	Zurina Bt Abdul Malik	PETRONAS	012-3577268	zurinamalik@gmail.com
*	(NULL)	(NULL)	(NULL)	(NULL)

Figure 7: External examiner class

There is also student class. This class will store all the information of the students' who are taking FYP1 or FYP2 course on that current semester. Among of the attributes of students are ID, name, programme, title of FYP project and email.



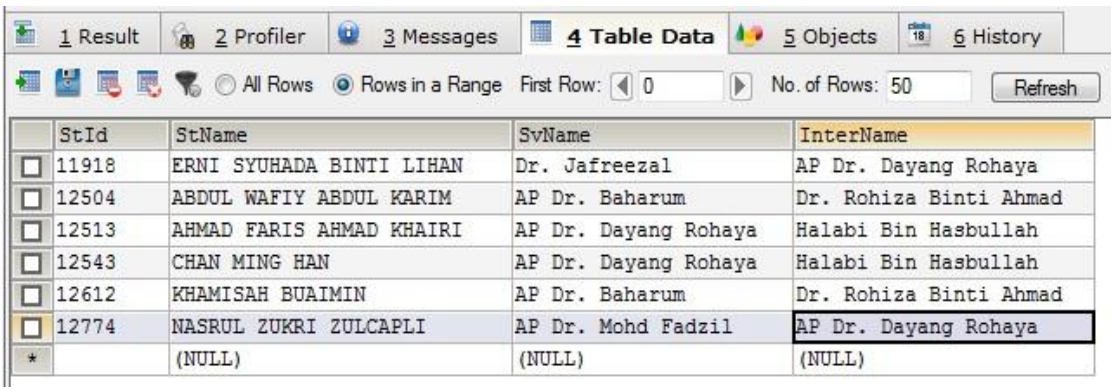
1 Result | 2 Profiler | 3 Messages | 4 Table Data | 5 Objects | 6 History

All Rows | Rows in a Range | First Row: 0 | No. of Rows: 50 | Refresh

StId	StName	StProgramme	StTitle	StEmail
12781	NIK NORNADIAH MOHAMMAD IZANI	IS400B:INFORMATION SYSTEMS	"Cooking with Kiah" Malaysian Flash Cooking Game	niknn@gmail.com
12657	MOHAMAD MAHSYAR MOHAMED SAID	IT400B:INFORMATION TECHNOLOGY	A Mobile Application to Train Chord-playing on Key	mahsyar@gmail.com
15092	ALDRICH GABRIEL JAIB A/L JAIB SINGH	IS400B:INFORMATION SYSTEMS	Agent-based Monitoring & Management System: Univer	aldrich@gmail.com
12801	NUR FARRAHAIN NASHA MOHAMED NASRUDIN	IT400B:INFORMATION TECHNOLOGY	Alarm for Occupational Health	farrahain@gmail.co
10657	FAZRUL REZA BIN MOHD YUNOS	IT400B:INFORMATION TECHNOLOGY	Android -based QR Code Attendance System	fazrulr@gmail.com
14040	KHAIRUL ANUAR BIN ARIFFIN	IS400B:INFORMATION SYSTEMS	Android Application to assist young children to le	khairul@gmail.com
13019	AINUNUL KHALILAH BINTI MAT AKHIR	IS400B:INFORMATION SYSTEMS	Augmented Reality E-Learning Platform for Children	ainunul@gmail.com
12504	ABDUL WAFIY ABDUL KARIM	IS400B:INFORMATION SYSTEMS	Business Selction Expert System	abdwafiy@gmail.com
12556	DAPHNEE LO KAH YII LO YIN FOH	IT400B:INFORMATION TECHNOLOGY	Cognitive Development Enhancement for Retirees Usi	daphnee@gmail.com
12543	CHAN MING HAN	IT400B:INFORMATION TECHNOLOGY	Family Member Learning Android Application	chanmh@gmail.com
11918	ERNI SYUHADA BINTI LIHAN	IS400B:INFORMATION SYSTEMS	Health Coaching Application	ernisy@gmail.com
12658	MOHAMAD NASRIE AJIJI	IT400B:INFORMATION TECHNOLOGY	Image-based Search Engine for Art Gallery	nasrieajiji@gmail.
15083	AIMAN BIN JOHANOR	IS400B:INFORMATION SYSTEMS	Intelligent Presentation Uploader	aimanj@gmail.com
12774	NASRUL ZUKRI ZULCAPLI	IS400B:INFORMATION SYSTEMS	Mobile Assistant on Negeri Sembilan Dialiect	nasrulzukri@gmail.
12571	FLIRONNY GUNGAT	IT400B:INFORMATION TECHNOLOGY	Parking Reservation System	flironny@gmail.com
12612	KHAMISAH BUAIMIN	IT400B:INFORMATION TECHNOLOGY	PriceWar.com (Price Comparison Shopping Site)	khamisah@gmail.com
12265	CHIMA ISMAEL HASSAN	IT400B:INFORMATION TECHNOLOGY	UTP Second Hand Books for Sale on Campus (SHISC)	chimaismael@gmail.
11859	AHMAD AZWAN BIN ROSLAN	IT400B:INFORMATION TECHNOLOGY	vCard	aazwan@gmail.com
12513	AHMAD FARIS AHMAD KHAIRI	IT400B:INFORMATION TECHNOLOGY	Virtual Gamelan Mobile Application	farisk@gmail.com
12547	CHIN CHUN KEAT	IS400B:INFORMATION SYSTEMS	Visual Novel	chinck@gmail.com
	(NULL)	(NULL)	(NULL)	(NULL)

Figure 8: Student class

The next class is the allocate class. This class stores all the information of Student ID, student name, supervisor name, internal and external examiners name. The allocate class is based on the allocation made by the FYP coordinator. Therefore, each student will be allocated with at least one supervisor and one internal examiner for FYP1 or one internal examiner and one external examiner for FYP2. The table below shows the allocation for FYP1 and FYP2 students:

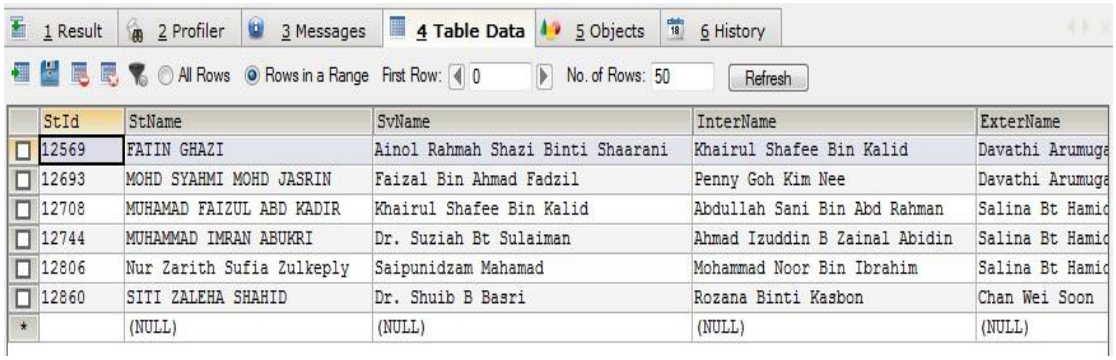


1 Result | 2 Profiler | 3 Messages | 4 Table Data | 5 Objects | 6 History

All Rows | Rows in a Range | First Row: 0 | No. of Rows: 50 | Refresh

StId	StName	SvName	InterName
11918	ERNI SYUHADA BINTI LIHAN	Dr. Jafreezal	AP Dr. Dayang Rohaya
12504	ABDUL WAFIY ABDUL KARIM	AP Dr. Baharum	Dr. Rohiza Binti Ahmad
12513	AHMAD FARIS AHMAD KHAIRI	AP Dr. Dayang Rohaya	Halabi Bin Hasbullah
12543	CHAN MING HAN	AP Dr. Dayang Rohaya	Halabi Bin Hasbullah
12612	KHAMISAH BUAIMIN	AP Dr. Baharum	Dr. Rohiza Binti Ahmad
12774	NASRUL ZUKRI ZULCAPLI	AP Dr. Mohd Fadzil	AP Dr. Dayang Rohaya
	(NULL)	(NULL)	(NULL)

Figure 9: Allocation class for FYP1



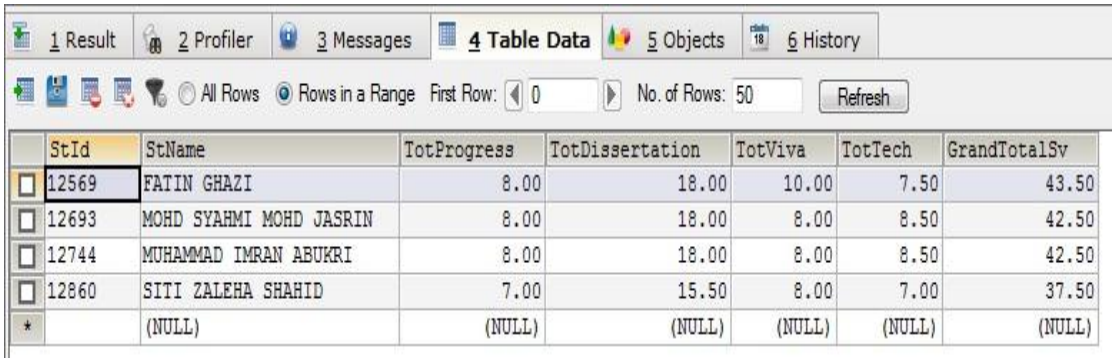
1 Result | 2 Profiler | 3 Messages | 4 Table Data | 5 Objects | 6 History

All Rows | Rows in a Range | First Row: 0 | No. of Rows: 50 | Refresh

StId	StName	SvName	InterName	ExterName
12569	FAIIN GHAZI	Ainol Rahmah Shazi Binti Shaarani	Khairul Shafee Bin Kalid	Davathi Arumuga
12693	MOHD SYAHMI MOHD JASRIN	Faizal Bin Ahmad Fadzil	Penny Goh Kim Nee	Davathi Arumuga
12708	MUHAMAD FAIZUL ABD KADIR	Khairul Shafee Bin Kalid	Abdullah Sani Bin Abd Rahman	Salina Bt Hamid
12744	MUHAMMAD IMRAN ABUKRI	Dr. Suziah Bt Sulaiman	Ahmad Izuddin B Zainal Abidin	Salina Bt Hamid
12806	Nur Zarith Sufia Zulkeply	Saipunidzam Mahamad	Mohammad Noor Bin Ibrahim	Salina Bt Hamid
12860	SITI ZALEHA SHAHID	Dr. Shuib B Basri	Rozana Binti Kasbon	Chan Wei Soon
*	(NULL)	(NULL)	(NULL)	(NULL)

Figure 10: Allocation class for FYP2

The next class is deliverables class which stores the total marks for each deliverables that the specific users need to complete. Basically, there are three classes under the deliverables classes which consist of deliverables mark by supervisor class, deliverables mark by internal examiners class and deliverables marks by external examiners class. Each class has different detail of attributes which consist of student ID, student name and grade for each deliverable that is allocated to them. The purpose of having different class for the marks allocated by different user is to keep the record of marks awarded to the students for each deliverables. This class has an operation total () where its function is to calculate the total grade allocated for each of the deliverables. The table below shows the class for the deliverables marks awarded by supervisor, internal examiner and external examiner for FYP2 deliverables:

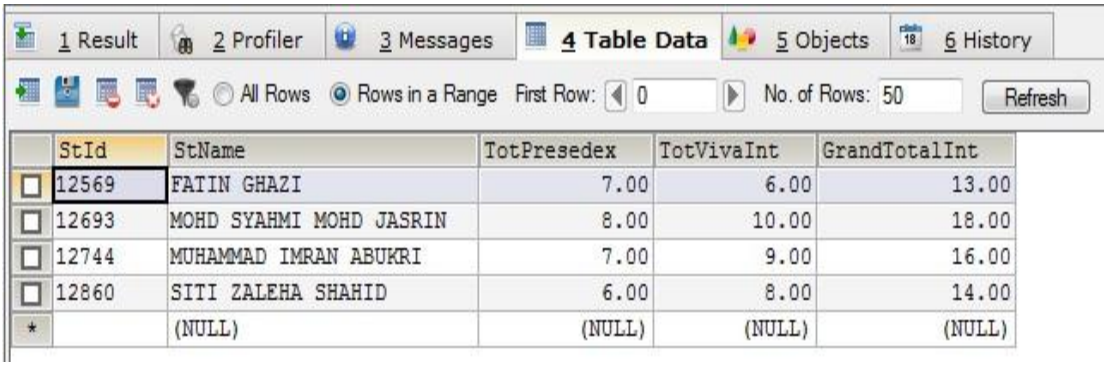


1 Result | 2 Profiler | 3 Messages | 4 Table Data | 5 Objects | 6 History

All Rows | Rows in a Range | First Row: 0 | No. of Rows: 50 | Refresh

StId	StName	TotProgress	TotDissertation	TotViva	TotTech	GrandTotalSv
12569	FATIN GHAZI	8.00	18.00	10.00	7.50	43.50
12693	MOHD SYAHMI MOHD JASRIN	8.00	18.00	8.00	8.50	42.50
12744	MUHAMMAD IMRAN ABUKRI	8.00	18.00	8.00	8.50	42.50
12860	SITI ZALEHA SHAHID	7.00	15.50	8.00	7.00	37.50
*	(NULL)	(NULL)	(NULL)	(NULL)	(NULL)	(NULL)

Figure 11: Deliverables Mark by Supervisor Class

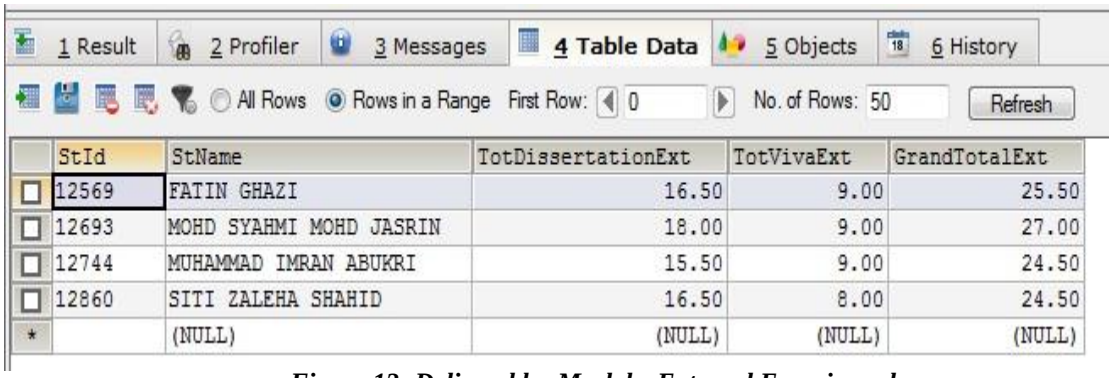


1 Result | 2 Profiler | 3 Messages | 4 Table Data | 5 Objects | 6 History

All Rows | Rows in a Range | First Row: 0 | No. of Rows: 50 | Refresh

StId	StName	TotPresedex	TotVivaInt	GrandTotalInt
12569	FATIN GHAZI	7.00	6.00	13.00
12693	MOHD SYAHMI MOHD JASRIN	8.00	10.00	18.00
12744	MUHAMMAD IMRAN ABUKRI	7.00	9.00	16.00
12860	SITI ZALEHA SHAHID	6.00	8.00	14.00
*	(NULL)	(NULL)	(NULL)	(NULL)

Figure 12: Deliverables Mark by Internal Examiner class



1 Result | 2 Profiler | 3 Messages | 4 Table Data | 5 Objects | 6 History

All Rows | Rows in a Range | First Row: 0 | No. of Rows: 50 | Refresh

StId	StName	TotDissertationExt	TotVivaExt	GrandTotalExt
12569	FATIN GHAZI	16.50	9.00	25.50
12693	MOHD SYAHMI MOHD JASRIN	18.00	9.00	27.00
12744	MUHAMMAD IMRAN ABUKRI	15.50	9.00	24.50
12860	SITI ZALEHA SHAHID	16.50	8.00	24.50
*	(NULL)	(NULL)	(NULL)	(NULL)

Figure 13: Deliverables Mark by External Examiner class

Last but least, there is also coursework class that has attributes of student ID, student name, grand total for each deliverable within either FYP1 or FYP2 and grand total for overall marks allocated. This class has an operation total which calculates the total coursework mark for each student. This database will be retrieve by the FYP coordinator at the end of the semester. The table below shows the coursework class for FYP1 which include student ID, student name, total extended proposal, total interim report, total VIVA and grand total for FYP1 coursework for each student and coursework class for FYP2 which include student ID, student name, total progress report, total pre-SEDEX, total dissertation report, total VIVA, total technical report and grand total for each students' FYP2 coursework mark:

1 Result | 2 Profiler | 3 Messages | 4 Table Data | 5 Objects | 6 History

All Rows | Rows in a Range | First Row: 0 | No. of Rows: 50 | Refresh

StId	StName	TotExtendProp	TotInterimReport	TotVIVA	GrandTotal
12504	ABDUL WAFIY ABDUL KARIM	8.00	40.00	32.00	80.00
12513	AHMAD FARIS AHMAD KHAIRI	7.00	42.50	30.00	79.50
11859	AHMAD AZWAN BIN ROSLAN	7.50	39.50	35.00	82.00
12534	CHAN MING HAN	8.50	39.00	34.50	82.00
*	(NULL)	(NULL)	(NULL)	(NULL)	(NULL)

Figure 14: Coursework class for FYP1

1 Result | 2 Profiler | 3 Messages | 4 Table Data | 5 Objects | 6 History

All Rows | Rows in a Range | First Row: 0 | No. of Rows: 50 | Refresh

StId	StName	TotProgress	TotPreSedex	TotDissertation	TotVIVA	TotTech	GrandTotal
12569	FATIN GHAZI	8.00	7.00	34.50	25.00	7.50	82.00
12693	MOHD SYAHMI MOHD JASRIN	8.00	8.00	36.00	27.00	8.50	87.50
12744	MUHAMMAD IMRAN ABUKRI	8.00	7.00	33.50	26.00	8.50	83.00
12860	SITI ZALEHA SHAHID	7.00	6.00	32.50	24.00	7.00	76.50
*	(NULL)	(NULL)	(NULL)	(NULL)	(NULL)	(NULL)	(NULL)

Figure 15: Coursework class for FYP2

4.2.4 System Architecture

Based on the figure 16, it shows the architecture of FOMS system and their functionality. The FOMS system consists of three main modules which are the user module, system module and the data source module. Further explanation for each module is described below:

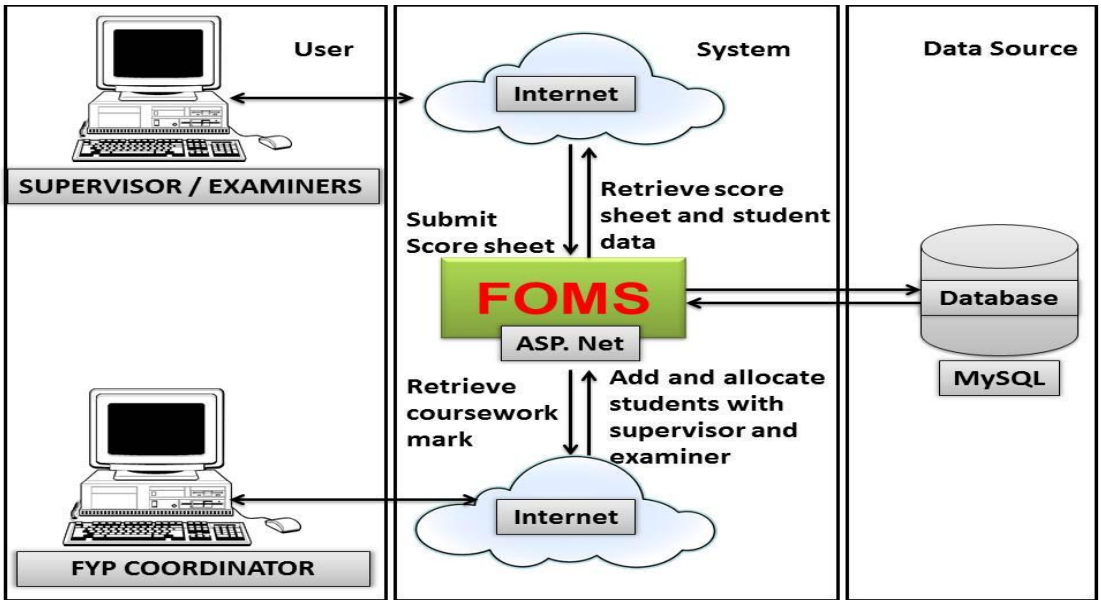


Figure 16: FOMS Architecture

- **User Module**

There are two main users with different ability for FOMS which are the FYP Coordinator that act as the administrator and the supervisor and the panel of examiners that act as another main user. Both of these users need computers to enable them to retrieve FOMS.

- **System Module**

In order for both of the users to retrieve FOMS, they need to have an access to an internet. After accessing, then only the users is allow to use FOMS. FOMS is

developed using the asp.net therefore it is available in web-based form. That is the reason that they users need internet access before able to begin using FOMS.

For the supervisor and panel of examiners, both of them need to login into the system before able to fully use the FOMS system. Once successfully login into the system, the users is allow to retrieve the students' name together with the deliverables that they need to score. After they complete filling in the graded mark, then the users need to submit the score sheet. The users then could log out from the system.

On the other hand, for the FYP coordinator who also act as the administrator, he/she also need to login into the system before begin using the system. After logging in, then the coordinator could add in the students, the supervisor, and the external examiners information into the system. The coordinator also could allocate the students with the supervisor and respective panel of examiners based on the inserted information previously. At the end of the semester, the coordinator is allowed to retrieve the entire coursework marks for each student in that current semester.

- **Data Source Module**

The data source that is used to keep all the related information is the MySQL database. MySQL is the best data source used as it is compatible with Visual Studio. This is where all the record will be save, for instances the students, the supervisor and the examiners information, the awarded mark and the allocated students with their respective supervisors and panel of examiners.

4.3 PROTOTYPE

4.3.1 Login Page

The diagram depicted below is the login page for FOMS. The users need to enter their username and password before able to perform functions within FOMS. The user need to enter the correct username and password, otherwise they are unable to enter into FOMS.

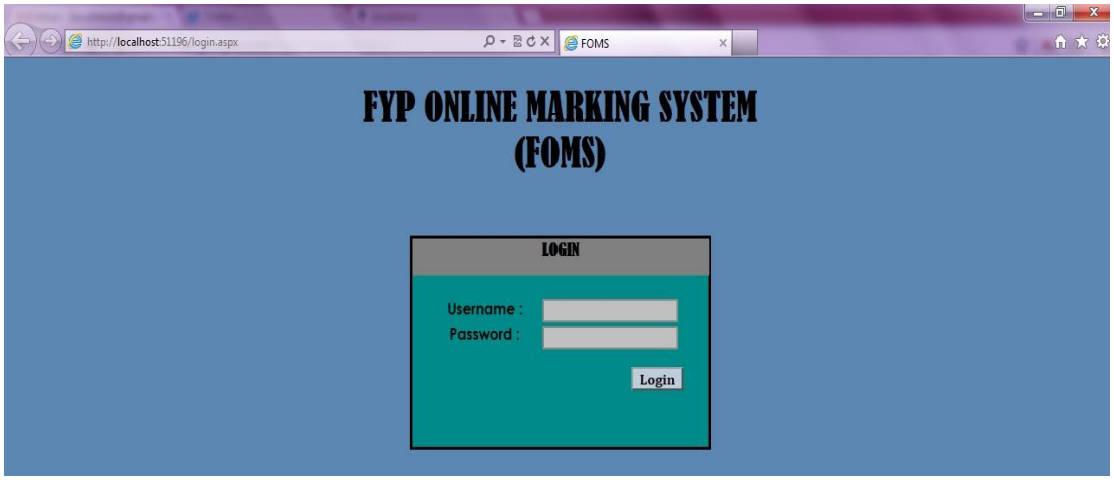


Figure 17: Login Page

4.3.2 Main Page

After successfully login into the system, the FYP coordinator, the supervisor and the internal examiners will be redirect to the main page that contains two images which are FYP1 and FYP2, as shown in figure. They can choose to click either one of the image. On the other hand, the external examiner will be redirect to main page that contain FYP2 image only, as depicted in figure 19.

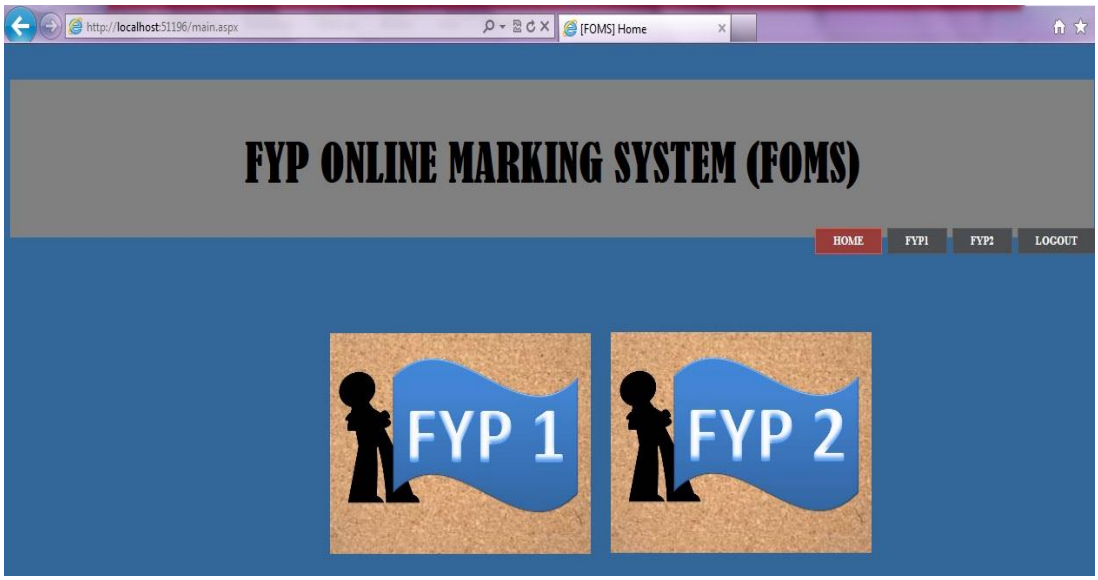


Figure 18: Main Page for FYP Coordinator, supervisor and internal examiner

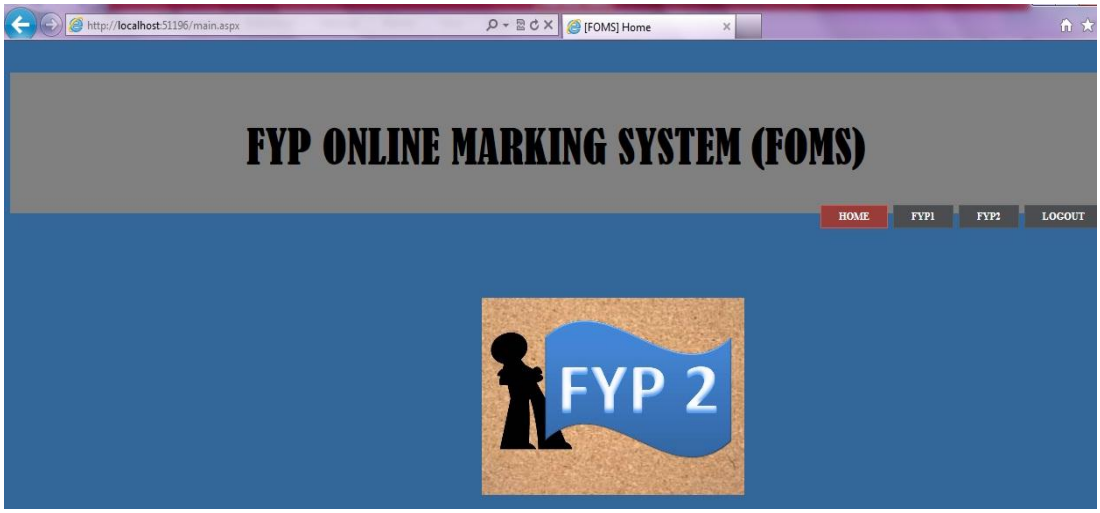


Figure 19: Main Page for External Examiner

4.3.3 Admin Page

The diagram below shows the admin homepage once the FYP coordinator click on either FYP1 or FYP2. There are two sections available which are the database section and FYP1 or FYP2 coursework section. In the database section, there are add user, search and allocation button which each redirect to the related page. While in the FYP1 or FYP2 coursework section, there is coursework mark button that redirect FYP coordinator to the coursework mark page.

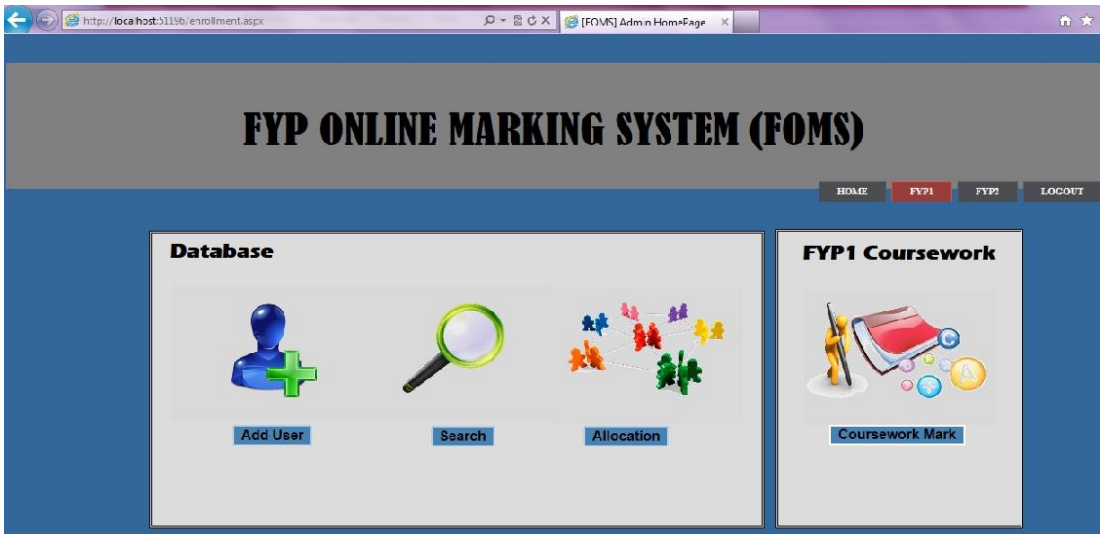


Figure 20: Admin Homepage

The FYP coordinator will be redirect to the add user page after clicking on the add user button on the admin home page. Here, the coordinator could add the students, the supervisor and the external examiner information. Figure 21 shows the add user page for FYP1, where the coordinator need to add the students and supervisor information only. On the other hand, figure 22 shows the add user page for FYP2 where the coordinator need to add external examiner information as well.

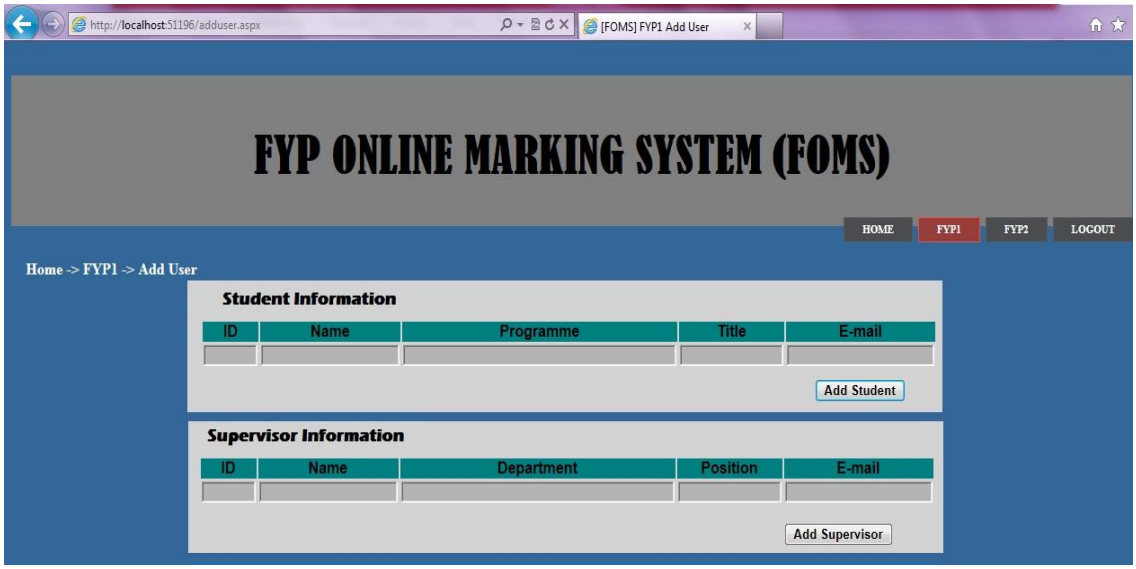


Figure 21: Add User Page for FYP1

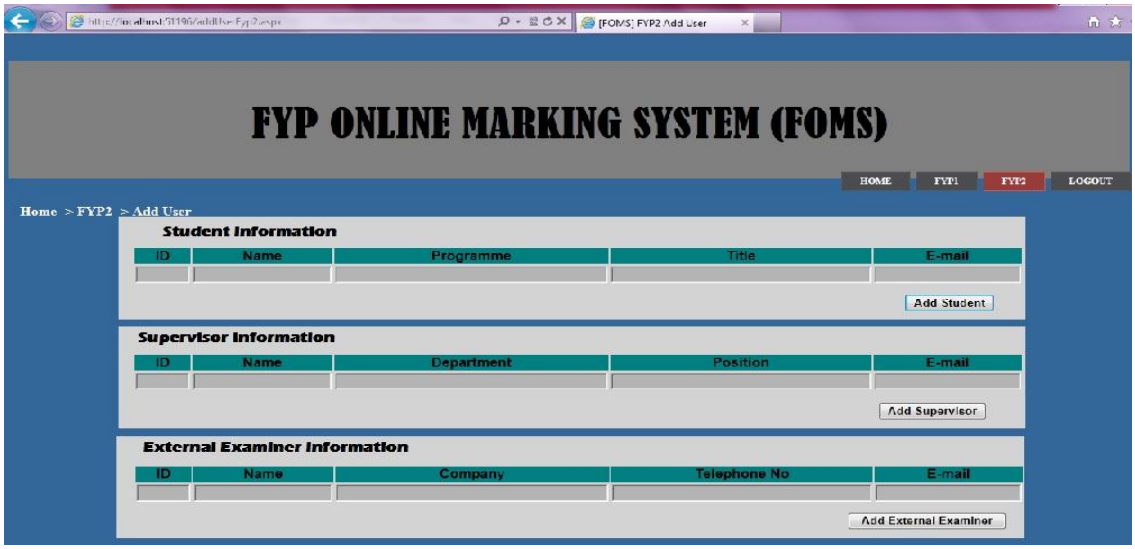
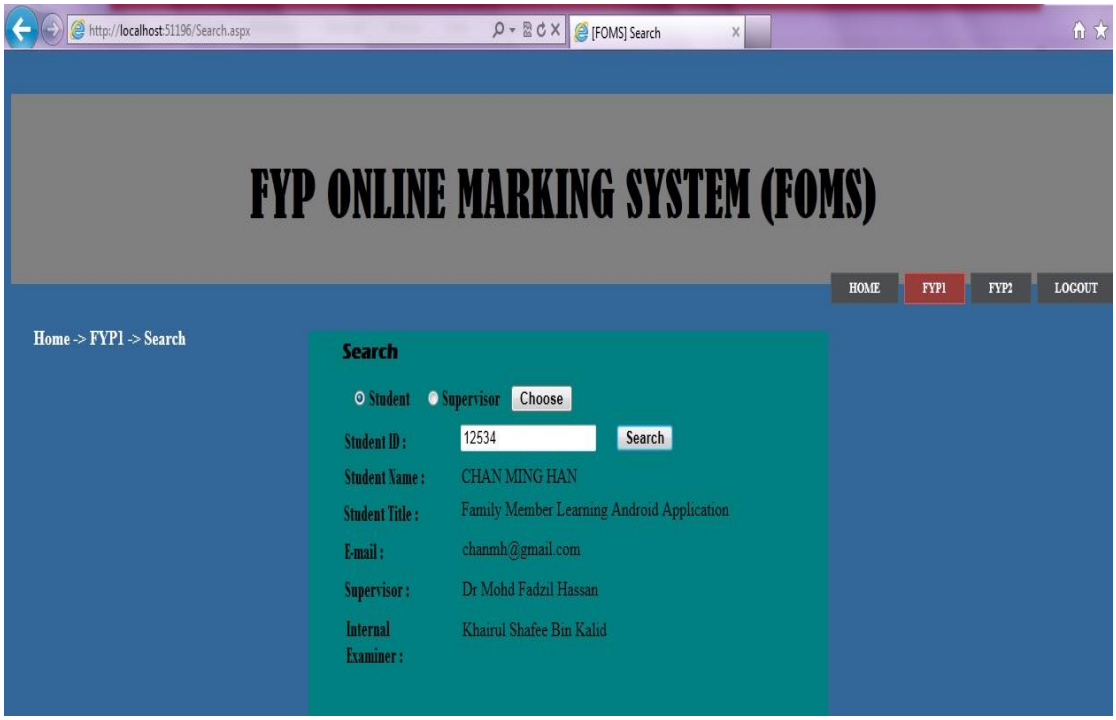


Figure 22: Add User Page for FYP2

Diagram 23 depicted the search page which is one of the functions that FYP coordinator could perform. The coordinator could search by student or by supervisor. In order to search by student, the coordinator need to enter the student ID, and will then get a result showing the student name, student project title, student email, supervisor and internal examiner name for FYP1 or external examiner name for FYP2. The coordinator also needs to enter the supervisor ID if he/she wishes to search by supervisor. This will be follow by the the supervisor name, supervisor department, supervisor email, the student name and the student project title under his/her supervision.



Fiaure 23: Search Paae for FYP1

If the FYP coordinator clicks on the allocation button, then he/she will be redirect to the allocation page. Here, the coordinator could allocate students with the supervisor and internal examiner for FYP1 as shown in figure 24 and allocate students with supervisor together with both internal and external examiner for FYP2 as shown in figure 25.

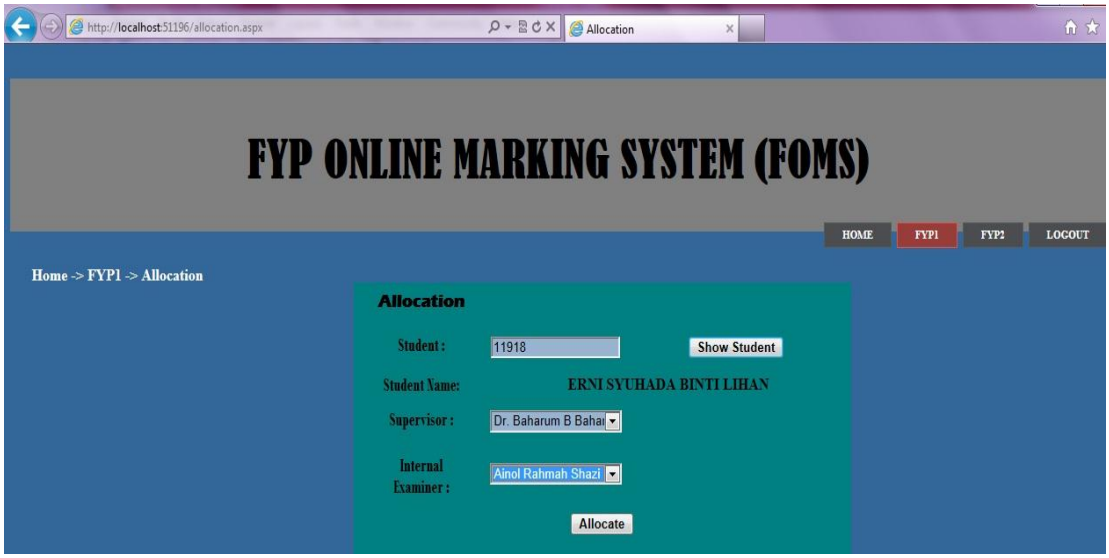


Figure 24: Allocation Page for FYP1

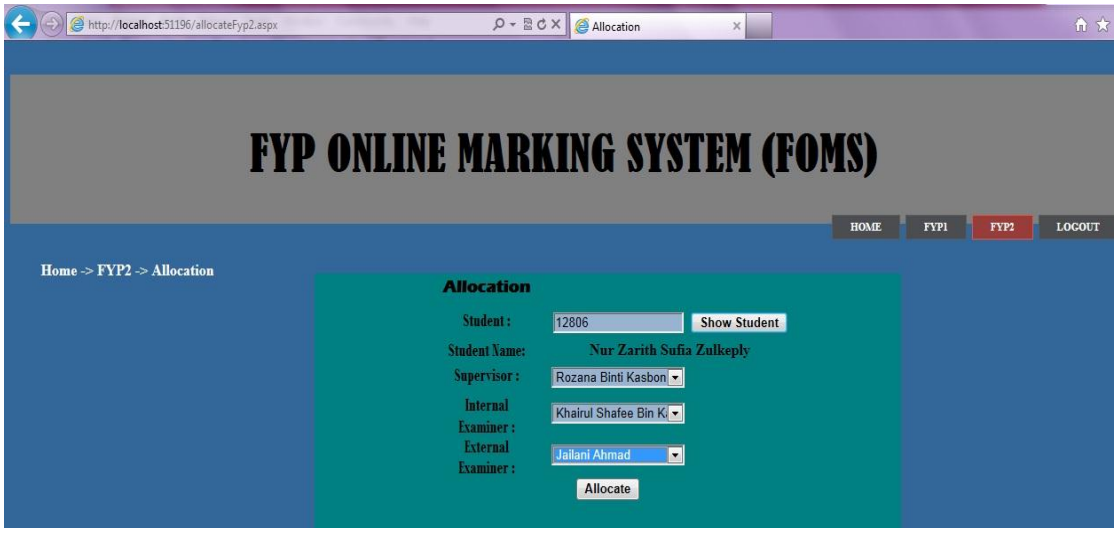


Figure 25: Allocation Page for FYP2

At the end of the semester, the FYP coordinator will click on the coursework mark button to retrieve the grand total mark of the students. The coordinator could choose either to display all the student marks or by selected students he/she wish to display.

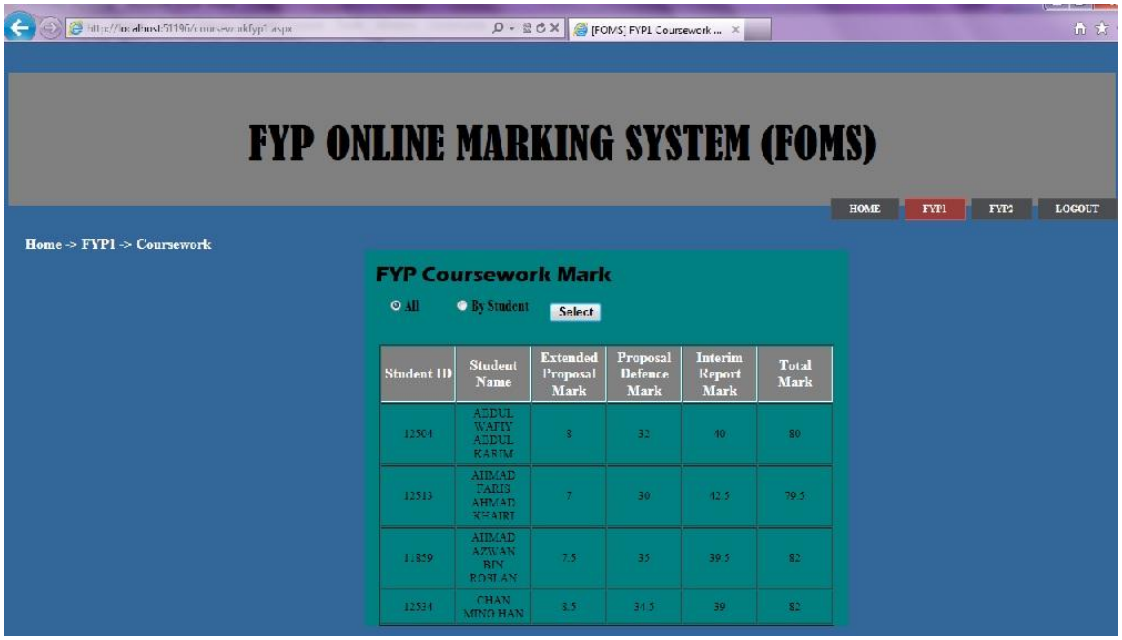


Figure 26: Coursework Mark Page

4.3.4 Supervisor/Panel of Examiner Page

On the other hand, if the supervisor or panel of examiners clicks on either FYP1 or FYP2, they will be redirect to the list of deliverables that they need to grade. Figure 27 below shows the list of FYP1 deliverables that the supervisor need to grade while figure 28 shows the list of FYP2 deliverables that he/she need to grade as well. The panel of examiner need to grade some of the deliverables only, thus they will be seeing those selected deliverables only.

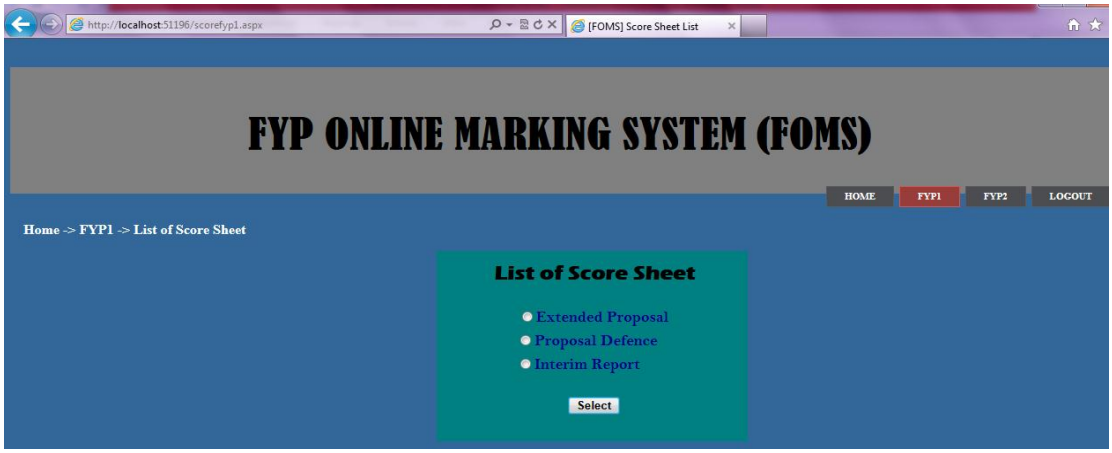


Figure 27: List of FYP1 Deliverables Page

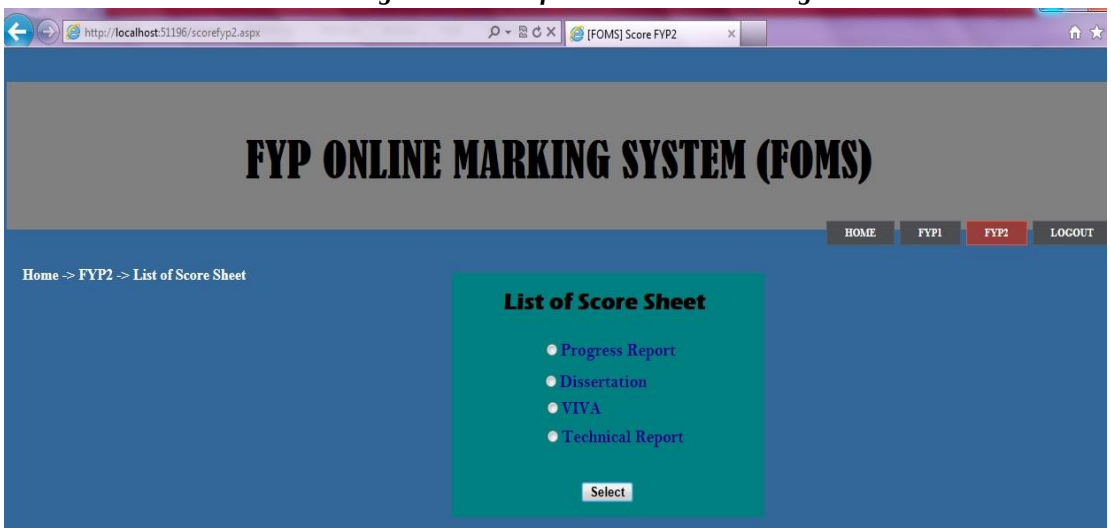


Figure 28: List of FYP2 Deliverables Page

The figure below shows the example of cropped proposal defence score sheet. This is the form that the supervisor will be seen once it is chosen from the list of the deliverables. Here, the supervisor and the panel of examiners need to enter the awarded mark and submit them once completed.

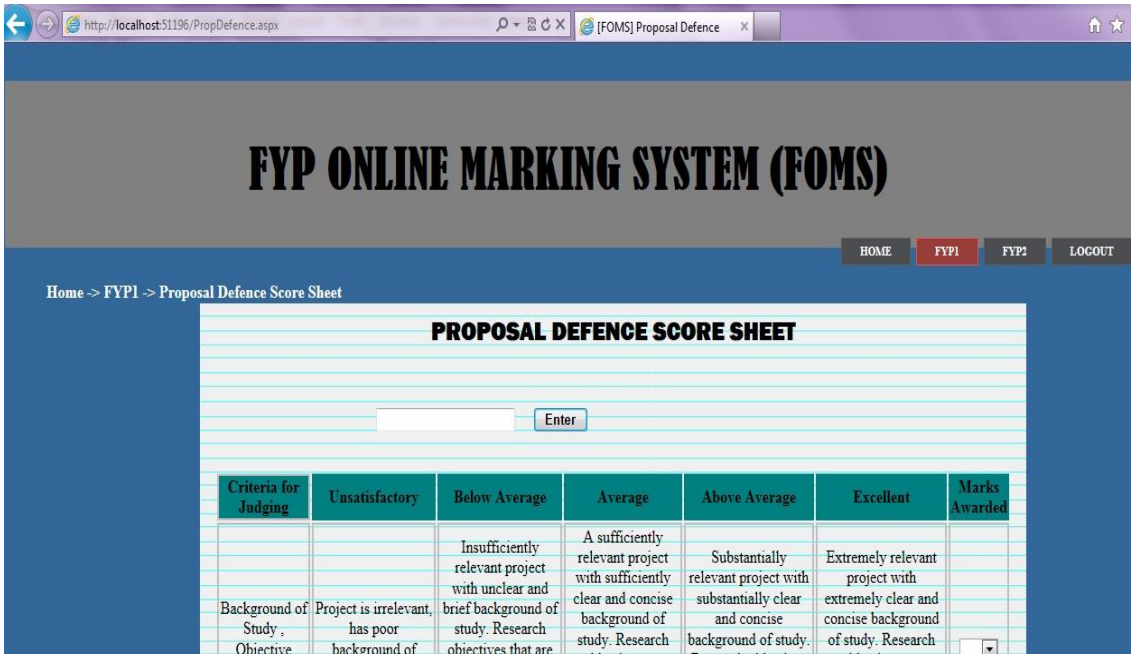


Figure 29: Proposal Defence Score Sheet Page

4.4 TESTING

4.4.1 User testing

User testing is a technique used to determine if the system meets the user requirement (Refer appendix 2) by testing the system with its real user. The user testing is done to discover any barriers, difficulty or confusion that they face while using the system. The user testing has been made initially with the FYP coordinator as they performed most of the function in FOMS, thus it takes time to make the testing. Therefore, it is crucial to test the system with the FYP coordinator first. Two FYP coordinator, one is the current FYP coordinator and the other one is the previous semester FYP coordinator, has been tested with FOMS.

During the user testing, the FYP coordinators are shown with all the function that they could perform in FOMS which include adding the student and panel of examiners, search for students or supervisor, allocate students with the panel of examiners and retrieving the FYP students' coursework mark. They are also being

shown with the students' deliverables grading function for more understanding. Furthermore, some of the FYP coordinator are also supervisor for FYP students, thus they need to also know how the grading of deliverables is done within the system. The comments received from the user testing done with the two of the FYP coordinators are as follow:

1) FYP Coordinator 1: Mr Saipudnizam Mahamad, CIS Department, UTP

- To have a complete database of real student and supervisor used in the system.
- A new FYP1 score sheet has been used starting from May 2012 semester.
- For FYP2, one external examiner is allocated with approximately 10 students; therefore the system should allow this allocation.
- For the grade awarded by the supervisor and panel examiners, it is advisable to use a restricted number of score for better calculation. For instances, to restrict the mark to 70.5, 71, 71.5 instead of awarding any value for scoring like 84.3, 84.7 and so on.
- To have a more formal interface as the main user are supervisor and panel of examiners.

2) FYP Coordinator 2: Miss Penny Goh, CIS Department, UTP

- The system should be able to import and export the Microsoft Excel files. This is because the FYP coordinators receive the FYP students name list from Registra, UTP registration department, for students registering for FYP courses on that current semester. It could be a tedious job to include each one of the students name. Therefore, it is better for the system to be able to import the excel files into the system. Besides that, in the end of semester, the marks

of the students need to be submitted to the exam unit. Hence, the system should be able to export the retrieve marks from the system to the Excel files.

- To integrate the system with PRISM, a UTP Portal. This is so that the system could directly retrieve the students who enroll for FYP course on that current semester. This is because the UTP students will enroll their preferred courses using PRISM. Therefore, it is suggested for the system to integrate with PRISM to enable it to directly retrieve the students registered for FYP courses.

Both of this suggestion has the same objectives which are to enable the system to directly retrieve the registered FYP students on that current semester either by importing the excel files with listed FYP students name or by integrating with PRISM.

- To improve on the colour coordination of the layout.
- The grading function for supervisor is good.

4.4.2 System Usability Scale

For the system usability testing, the technique used is the System Usability Scale or also known as the SUS which was first introduced by John Brooke (refer appendix 3). It one of the testing used for the respondent to evaluate the usability of the system after they have tested it. It consists of 10 questions that the users need to answer. Each question has 5 different response actions with strongly agree being the most positive response and strongly disagree being the most negative response.

The measures of system usability should cover the effectiveness of the system which is the ability of users to complete tasks using the system, and the quality of the output of those tasks, the efficiency of the system in terms of the level of resources consumed in performing tasks and the user satisfaction feeling while using the system.

Table 3: System Usability Scale (SUS) result

Questions	Rating Average (minus 1 or 5 minus the rating average)
1. I think that I would like to use this system frequently.	4 – 1 = 3
2. I found this system unnecessarily complex.	5 – 2 = 3
3. I thought this system was easy to use.	4 – 1 = 3
4. I think that I would need assistance to be able to use this system.	5 – 1 = 4
5. I found the various functions in this system were well integrated.	4 – 1 = 3
6. I thought there was too much inconsistency in this system.	5 – 2 = 3
7. I would imagine that most people would learn to use this system very quickly.	5 – 1 = 4
8. I found this system very cumbersome/awkward to use.	5 – 2 = 3
9. I felt very confident using this system.	4 – 1 = 3
10. I needed to learn a lot of things before I could get going with this system.	5 – 2 = 3
Total	**32**

Based on the table 3 above, it shows the 10 questions available in the SUS and the result of the survey with each question has its own rating. There is specific method used to calculate the SUS score. For questions 1,3,5,7 and 9 (odd numbers), the calculation would be the scale rating minus 1. Whereas, for questions 2,4,6,8 and 10 (even numbers), the calculation would be 5 minus the scale rating. This will result with each questions has a rating ranging from 0 to 4. Then, the sum of the scores derived will be multiply by 2.5 to obtain the overall value of system usability.

As shown in the table 3 above, the total sum of the scores is 32. Therefore, the overall value of the system usability is:

32 x 2.5 = 80

The SUS overall value is 80 percent. Therefore, it shows that FOMS system has high perceived usability from the users. This also proved that the users highly accept the system and satisfy with it. This is because, for SUS that has result of 70 percent is consider as above average. Therefore 80 percent SUS result for FOMS system is considered as almost good. Thus, the FOMS system usability scale is above average and almost good.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

As a conclusion, the current FYP marking process has created hassle to the FYP Coordinator, the supervisor and the panel of examiners due to the many problems arisen as the process is still manually implemented. Because of that, the FYP Online Marking System (FOMS) project is intended to change the whole manual process into the automated FYP online marking system to solve all the problems face by them.

With the implementation of FOMS system, it is able to:

- **Reduce the possible chances of error.**

By using FOMS, the supervisor and panel of examiner will no more facing problem of forgetting the detailed information of the students to be evaluated. Besides that, there will no chances of information switching between two students. The calculation of total awarded marks will also be automatically being compute thus reduce any possible error.

- **Time-saving and more organized FYP marking process**

In order to mark the students deliverables, the only thing that the supervisor and panel of examiners need to do is login into the system, choose the deliverables to be graded, grade the students and submit the form. That's all, as easy as that. Apart from that, the FYP coordinator does not need to collect the score sheet one by one at the end of semester, instead he/she only needs to login into the system and retrieve the coursework mark.

- **Help to preserve the environment by reducing the paper usage**

With FOMS, there will be no more papers needed; therefore will 100% eliminate the usage of papers. Due to this, it will help to preserve the environment as there will be

no more paper wasting practice. Therefore, FOMS system should be used as soon as possible as it will not only reduce the supervisor, the panel of examiners and the FYP coordinator problems but also help to preserve the environment.

However, there are more future works that need to be done for expansion and continuation of the project. Among of the suggested works are:

- **To implement FYP Online Marking System (FOMS) mobile application.**

These suggested tasks are planning to be started as early as possible to enable the FOMS system to be developed in a mobile application. This is because, as the technology is rapidly evolving into new high-tech revolution, more people prefer to use their smart phone, tabs or iPad to online. Therefore, it is highly suggested that FOMS would be implemented in mobile application, in the future.

Last but not least, the FYP Online Marking System (FOMS) is highly relevant and it is essential that this system to be implemented as soon as possible as FOMS will not only help to reduce the supervisor, the panel of examiners and the FYP coordinator problems but also help to preserve the environment. It is hope that the FYP Online Marking System (FOMS) will be able to totally revolutionize the current manual FYP marking process.

REFERENCES

[1] Anuar E. , 2006, "*Web-based automated grading system for programming assignment*", Universiti Teknologi PETRONAS.

[2] Mills C. N., Potenza M. T., Fremer J. J. & Ward W. C., 2002*, "Computer-Based Testing: Building the Foundation for Future Assessment",* London: Lawrence Erlbaum Associates, Inc.

[3] Parshall C.C, Spray J.A., Kalohn J.C. & Davey T., 2002, *"Practical considerations in Computer-Based Testing"*, USA: Springer-Verlag New York, Inc.

[4] Baker G., 2003, "An Online system for Assignment Marking," School of Simon Fraser University. Available online at http://www.cs.ubc.ca/wccce/Program03/papers/Greg/Greg.html, 26 September 2005

[5] Rabinowitz S., & Brandt, T., 2001, "Computer-based Assessment Can it Deliver On Its Promises," Available online at http://www.wested.org/ 27 September 2005

[6] Hill, T. G., 2005, "MEAGER: MICROSOFT EXCEL AUTOMATED GRADE" Northeast Mississippi Community College Booneville, MS, The Journal of Computing in Small Colleges.

[7] Yang I., Rammutla C. & Godongwana T., 2006, "Online Marking System for Vula", available online at http://pubs.cs.uct.ac.za/archive/00000366/01/TechnicalReport.pdf

[8] Matt, U.V., 1994, "Kassandra: The Automatic Grading System," Institute Advanced Computer Studies, Department of Computer Science, ETH Zurich.

[9] Brooke, J. SUS, A quick and dirty usability scale.

APPENDICES

APPENDIX 1

FYP Online Marking System (FOMS)

The survey is intended to determine the attitude on the current FYP marking process and the feedback on the FYP Online Marking System

Gender? *

Male Female

Which department are you from? *

Do you supervise student for FYP? *

Yes No

How many students do you usually supervise per semester? (For both FYP1 and FYP2)

For FYP assessment, do you still manually grade the student on a score sheet? *

Yes No

How do you submit the score sheet to the FYP Coordinator? *

Through email (Softcopy) Hardcopy submission Other:

What are the problems that you face by having the FYP manual submission? *

Late Submission

Paper wastage

Loss of score sheet

Unaware of score sheet submission

Other:

Will you use a system that allows you to automatically retrieve and submit the score sheet online? *

Yes No

Do you have any other suggestion/opinion for the FYP Online Marking System?

APPENDIX 2

User Testing

Name: _____

Position: _____

Contact Number: _____

Email: _____

Questions	Comments
Have you visited any similar system before?	
What do you think the purpose of this system is?	
Could you find what you were looking for?	
Was there something missing that you expecting to see?	
How did you find the layout of the system?	
Is the system easy to be read? (font, size)	
Please provide your comments about this system overall.	

System Usability Scale

Instructions: For each of the following statements, mark <u>one</u> box that best describes your reactions to the system.

	Strongly Disagree				**Strongly Agree**
1. I think that I would like to use this system frequently.	☐	☐	☐	☐	☐
2. I found this system unnecessarily complex.	☐	☐	☐	☐	☐
3. I thought this system was easy to use.	☐	☐	☐	☐	☐
4. I think that I would need assistance to be able to use this system.	☐	☐	☐	☐	☐
5. I found the various functions in this system were well integrated.	☐	☐	☐	☐	☐
6. I thought there was too much inconsistency in this system.	☐	☐	☐	☐	☐
7. I would imagine that most people would learn to use this system very quickly.	☐	☐	☐	☐	☐
8. I found this system very cumbersome/awkward to use.	☐	☐	☐	☐	☐
9. I felt very confident using this system.	☐	☐	☐	☐	☐
10. I needed to learn a lot of things before I could get going with this system.	☐	☐	☐	☐	☐

FYP Online Marking System (FOMS)

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***Abstract* – This paper is based on the FYP marking process. Final Year Project (FYP) is one of the compulsory courses that need to be taken by all of the final year students. In UTP, FYP course is available in two semesters, namely FYP1 and FYP2 respectively. For each of the courses, the FYP students need to submit several deliverables in order to complete their coursework. These deliverables will be evaluated by the students' supervisor and the panel of examiners. The FYP marking process in UTP is still manually implemented. This means that the supervisor and the panel of examiner manually write down the students information and the awarded mark for the students in a paper-based score sheet. The manual FYP marking process causes a lot of problem to the supervisor and the panel of examiners as well as the FYP coordinators, who administrator the FYP course. Among of the problems identified are inefficiency and error-likely of FYP manual marking process, unorganized and time-consuming of FYP oral presentation and paper wastage and confidential issue. Therefore, the implementation of FYP Online Marking System is vital with the objectives to convert the manual FYP marking process into an automated FYP online marking system, to increase the process efficiency and reduce the possible error chances, to have a more organized and time-saving FYP marking process flow, to go green and help to preserve the environment. The scopes that the FOMS project covers include FYP marking process out of the overall FYP course process and the CIS department's lecturer and panel of examiners as the main user. The FOMS system implementation covers for both of the FYP1 and FYP2 courses. In order to complete the FOMS system, prototyping will be the methodology used as it allows the project analysis, design and implementation to be done concurrently and repeatedly until complete. A set of survey has been done to gather the feedback on the current manual FYP marking process and their opinion on FOMS. An acceptance test has also been carry out to gather feedback related to the FOMS system.**

Keywords-FYP, manual marking process, online marking system, supervisor, panel of examiners, FYP coordinator.

I. INTRODUCTION

Final Year Project (FYP) is one of the compulsory courses that should be taken by all final year students. In UTP, FYP course is divided into two which need to be taken in two semesters, namely FYP1 and FYP2 respectively.For FYP1 and FYP2, the students' assessment will be evaluated by different examiners. The examiners for FYP1 would be the internal examiners which are the lecturer from the students' respective programme and the supervisor of the students itself. For FYP2, the examiners that would assess students' deliverables are the students' supervisor, internal examiners and external examiners which are the people from industries. For evaluation, the supervisor and panel of examiners will be given a copy of score sheet for them to fill in the preferred mark for the students' deliverables. Each of the graded assessment is a part of the students' FYP coursework marks. The supervisor and the panel of examiners are responsible to submit the graded score marks to the FYP coordinator for compilation of these scores toward the end of the semester. FYP Coordinator is the FYP administrator for that current semester. The coordinator is responsible in managing the FYP students on that semester, assigning the students with their supervisor and the panel of examiners, planning on the FYP timeline and collecting the students score sheet from their respective supervisor and panel of examiner for compilation. The whole FYP marking process is manually implemented.

A. Problem Statement

Based on the studies made on the FYP courses system flow in UTP, I have found several problems related to the current FYP marking process:

- Inefficiency and error-likely of FYP manual marking process.

  For both FYP1 and FYP2, the grading assessment is done manually where papers and human effort are involved. The supervisor and the panel of examiners will be provided with the score sheet for them to enter the students' information and awarded mark for each of these students' deliverables. These examiners need to manually enter the suitable marks to be given to these students based on the criterion in the score sheet and manually calculate the total mark before submitting to the FYP coordinator. As each step in FYP marking process is done manually, this could create hassle or trouble to the supervisor and the panel of examiners. The same information of one student need to be writes down many times for different deliverable that this student submitted. Therefore, the manual marking process has increase the

workload of these examiners and this could be a burden for them. The FYP coordinator, on the other hand, need to manually assign the students with their respective supervisor and panel of examiners, and calculate the final marks for each and every student based on the submitted score sheet. The coordinator need to enter each deliverable marks for each student one by one and calculate the final marks as well. Thus, the FYP marking process is inefficient to be implemented manually as there is redundant process involved that should be completed once instead. This will not only reduce the productivity but also increase the possible error that could happen.

As marking process for FYP courses is manually done which involves human effort, error and mistakes are another major problems that could have happened as well. The FYP coordinator might accidentally switched information and details between two different students. As the coordinator need to enter manually the students' data and awarded mark one by one, he/she might unintentionally exchange different students with their respective marks. Whereas, sometimes, the students' supervisors itself do not able to remember the detailed information of their students under their supervision as there are many of them. The same goes to the panel examiners. Therefore, they might enter wrong data for these students. There could also be chances where these examiners and FYP coordinator wrongly calculate the total marks for these students' deliverables.

- Unorganized and Time-Consuming of FYP Oral Presentation

FYP Oral Presentation or VIVA is one of the most critical parts of the students' evaluation. During VIVA, there are different examiners who will be evaluating the students, which consist of, two examiners which are the students' supervisor and internal examiners for FYP1 and three examiners which are the students' supervisor, internal examiners and external examiners for FYP2. Each of them will be provided with the score sheets to grade the student. During evaluation, the supervisor and the panel of examiners need to manually fill in the students' detail in the sheet. This is somehow is time-consuming as sometimes they are not able to capture the information of the presenter. Therefore, they will tend to ask again the students information before write down in the sheet. Besides that, once a student has completed his/her presentation, the next presenter need to wait for his/her turn before start presenting as he/she needs to wait for the examiners to complete grading the score sheet of the previous presenter. These problems will eventually cause an unorganized and time-consuming FYP oral presentation evaluation.

- Paper Wastage and Confidential Issue

For each of the evaluation, the supervisor and the panel of examiners will be given a score sheet which is in paper forms. Thus, for each deliverable, it needs one score sheet for one student. It is approximately 200 students taking FYP1 and FYP2 course each semester for CIS department only. Therefore, 200 stack of papers needed for one deliverables! This is obviously a paper wastage practice. The cost of buying papers and printing out the score sheet is money wasting that should be reduced.

Apart from that, as the evaluation of the deliverables involve using score papers, these examiners and FYP coordinator might misplace or lost the score sheet as they are a whole stack of them. Moreover, the score sheets are freely available to everyone as they are in paper form; hence both of these problems will lead to confidential issue that could have happen. Therefore, it is a big responsibility for these examiners and FYP coordinator to keep the score sheet from losing or fall to the hands of irresponsible people that has bad intentions.

B. Objectives

The main objectives of this project are as follow:

- To convert the manual FYP marking process into an automated FYP online marking system, to increase the process efficiency and reduce the possible error chances.
- To have a more organized and time-saving FYP marking process flow.
- To go green and help to preserve the environment.

C. Scope of Study

The scopes for the project are explained as below:

- FYP marking process out of the overall FYP course process.
- CIS department's lecturer and panel of examiners as the main user.
- System implementation for both of the FYP1 and FYP2 courses.

D. Feasibility of the Project

- Project Scope Feasibility

For the FYP online marking system (FOMS) project, the focus of the project will be entirely only on the marking process flow for two of the FYP courses in UTP which are FYP1 and FYP2 only.

- Time Frame Feasibility

I have my FYP course divided between FYP1 and FYP2, where each is completed within one semester respectively. During FYP1, I focused more on making further research on the project. During FYP2 course I focused more in designing the interface and framework of the system to help planning on the overall complete system besides development and implementation of the project prototype and perform testing to ensure the system has every functions needed and are error-free. As the FYP course is divided evenly between the two semesters, the FOMS project will be able to complete within the time frame.

II. LITERATURE REVIEW

A. Problem Identification of Manual Marking System

Today, most university lecturers specifically, still grade and mark their student's assessment manually. Based on the thesis "*Web-based automated grading system for programming assignment*" (Ellia A., 2006), she claimed that manual grading and marking process has created hassles to the lecturers, since it is time consuming task and causing overburden to the lecturer workload [1]. In the book *"Computer-Based Testing: Building the Foundation for Future Assessment"* (Camara W., 2002), he also claimed that scoring manually has limits the large testing programs to be held. This is due to the larger the student, the more the workload of the graders to grade each of the students [2].

B. The Necessity and Benefits of Automated Marking System

To solve the problem occurred by having a manual marking process in grading the assessment of the students, an automated grading system should be implemented. According to another author of the book *"Computer-Based Testing: Building the Foundation for Future Assessment" (*Dodd B.G. & Fitzpatrick S.J., 2002), the author stated that they have focused their attention to a relatively new area of investigation which is to develop the automated scoring for complex assessment tasks. In the book, they responded by saying that implementing automated scoring system could make scoring processes rapid and economical [2]. There are benefits from administering an exam on computers which include cost saving on printing and improvement in test security, as handling and protecting electronic files are much more easy than handling stack of test forms and booklets, according to the book of "*practical considerations in computer-based testing*" (Cynthia G.P., Judith A.S., John C.K. & Tim D., 2002) [3]. According to book of "*practical considerations in computer-based testing*" (Cynthia G.P., Judith A.S., John C.K. & Tim D., 2002), the author has also identify another advantage of automated testing system, where according to them, the data can be collected automatically by computer and simplifies the process of scoring the exam [3].

C. Comments on Implemented Automated Marking System

According to the book *"Computer-Based Testing: Building the Foundation for Future Assessment" (*Dodd & Fitzpatrick, 2002), they claimed that, for improvement in the scoring system, development of a more structured item formats is required before automated scoring can be deployed independently[2]. According to the article *"An Online system for Assignment Marking"* (Baker G., 2003), he stated that each assignment has a list of criteria which students are expected to meet. These can be configured by the instructor or the markers using an online interface and they could enter the mark and comment for each of the criteria [4]. Agree with the statement, the FYP score sheet has its own grading format with a list of category and criteria that the students are expected to meet in each of their deliverables. The format of this current FYP marking score sheet will continue be used in the FYP Online Marking System. This is because according to another author of the book *"Computer-Based Testing: Building the Foundation for Future Assessment"* (Plake B.S., 2002), he stated that this is to ensure that the new items format do not alter the construct being measured and to keep the format as it is after the development of the automated process [2].

D. Automated Marking System Framework

According to the article *"Computer-based Assessment. Can it deliver on its promise?"* (http://www.wested.org/), the author comments on the hardware and software aspect for the implementation of the automated grading system. According to the author, on the hardware side, advances in the speed, capacity and availability of computer nowadays, has allow application that is impossible to be implement in previous generation. On the software side, development in data structure, simulation technologies and artificial intelligence improve the efficiency and capabilities of assessment administration, scoring and reporting [5].

E. Existing Automated Marking System

- Vula Marking System.

According to the article *"Online Marking System for Vula"* (http://pubs.cs.uct.ac.za/archive/00000366/01/TechnicalReport.pdf), Vula Marking system is a web-based interface which is develop with the objective to help the instructors and tutors mark and grade students assignment online.

- MEAGER.

According to book *"MEAGER: MICROSOFT EXCEL AUTOMATED GRADE"* (Hill T.A., 2005), MEAGER is an automated grader which is use by the instructor in Microsoft Excel and Microsoft Office application.

- KASSANDRA

According to the book "Kassandra: The Automatic Grading System" (Matt U.V., 1994), KASSANDRA is an automatic grading system which is presented for grading assignment in scientific computing.

III. METHODOLOGY

A. Research Methodology

For the completion of FYP Online Marking System (FOMS) project, the methodology used is one of the Rapid application Development (RAD) methodologies which is prototyping.

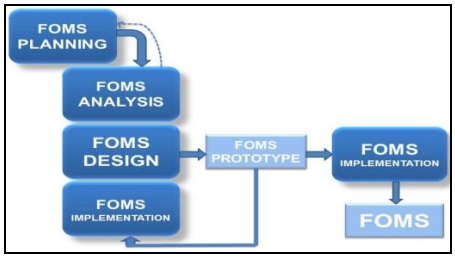


Figure 3A-1: Prototyping

One of the reason prototyping methodologies is used for implementation of FOMS project is that prototyping allow the analysis, the design and the implementation of the project to be done concurrently and repeatedly until complete. With this, FOMS prototype is able to be produced quickly at the first stage followed by similar other stages until it is completed at the final stage.

B. Tools Required

The hardware and software for specification of this project include:

i. Regular laptop
ii. Web browser
iii. SQLyog
iv. Visual Basic 2005 (ASP.Net)

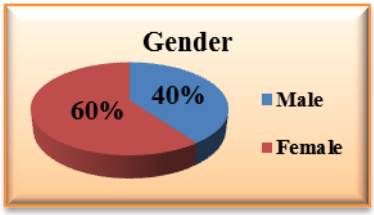
Microsoft Visual Studio 2005 is the major platform used for the development of FOMS. The project use one of the Visual Studio development tools which is ASP.Net that support in the creation of a web application. SQLyog MySQL GUI acts as the database developer for FOMS project as it is compatible to be connected with Microsoft Visual Studio 2005.

IV. RESULT AND DISCUSSION

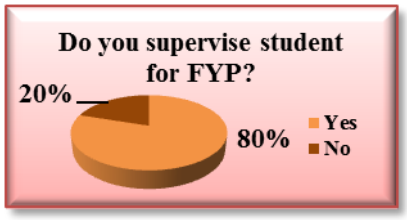
A. Findings and Data Gathering

i. Survey Result

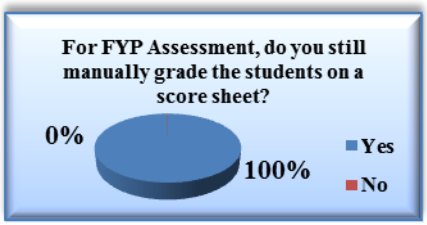
A survey has been conducted among the lecturer of CIS department in UTP with the purpose to get their feedback on the current FYP marking process, the problems that they face and their comment on the implementation of FYP Online Marking System (FOMS). The result of the survey and their discussion are as below:



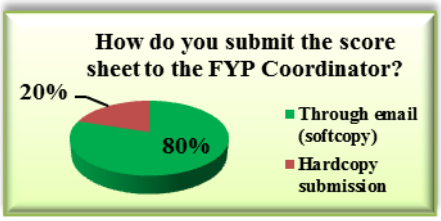
All of the respondents of the survey are the lecturer from the CIS department. Based on the lecturer that is managed to be surveyed, 60% of them are female and the remaining 40% are male lecturer.



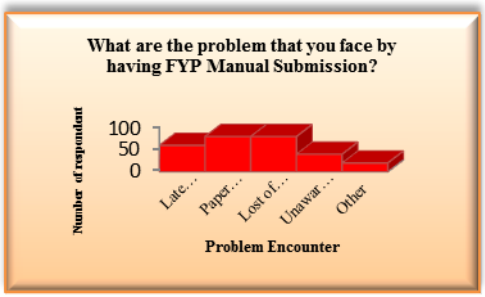
Based on the respondent surveyed, 80% of them do supervise student for FYP while 20% of them do not supervise any FYP students. Therefore, it could be said that the implementation of FOMS is crucial as more than half of CIS lecturers do actually supervise FYP students each semester.



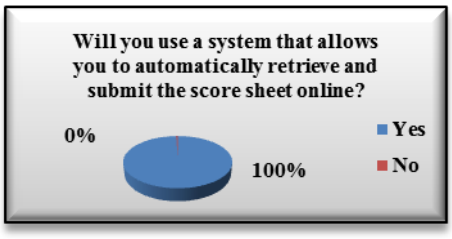
100% of the respondent states that they are still grade the FYP students manually in the score sheet for each of the deliverables that need scoring. This has given firm evidence that the current FYP marking system is still manually implemented for FYP courses.



The lecturers have also been asked on the ways they submit the score sheet to the FYP coordinator. 80% of them send a hardcopy submission which is in a paper-based score sheet to the FYP Coordinator. Meanwhile, 20% of them send the score sheet through email which is in the softcopy version. Based on this respond, it can be seen that the lecturers are still using paper-based score sheet to grade the students' assessment. Apart from that, the submission is still manually being done either through email or directly submits to the FYP coordinator.



In the survey, the respondents have also been asked on the problem that they face by having the FYP manual submission. 80% of the respondents state that the paper wastage is one of the consequences of manual submission. This is because they need to print out the paper-based scored sheet to grade each the students' deliverables. Moreover, 80% of them also responded that loss of score sheet is another problem encounter. As the score sheet is in paper form, the lecturers state that they tend to misplace the graded paper. While 60% of the lecturers state that late of submission is another problem face. This could be because of the 40% of the respondents are unaware of the score sheet submission deadline. The lecturers tend to forget the deadline of the score sheet submission which causes them to submit late to the FYP coordinator. 20% of the respondents state that the other problem they face is that they need to fill in the students' details manually and count the total marks graded manually. For them, this has increased their workload as they need to write the students all over again for different deliverables.



100% of the respondents agree to use the system; hence it is proved that the system will be fully accepted by the lecturer or also the real user of the system.

B. Data Analysis

i. Activity Diagram

Activity diagram as shown in the diagram below shows the detail activities and processes performed within FOMS. According to the diagram, at the beginning of the process it is compulsory for the user to login into the system first. From here then, the system will identify whether the user whom login is either the FYP coordinator or supervisor or panel of examiners. If the login user is FYP coordinator, the supervisor and the internal examiner, then they will see a main page that display FYP1 and FYP2 image. However, the external examiner will see a main page that shows FYP2 only. The coordinator can perform several functions as an administrator which is to add user to the system, assign the students with their supervisor and panel of examiners and retrieve the total coursework marks for each of the students at the end of the semester. If the login user is the supervisor or panel of examiners, they will be able to see a list of deliverable that they needs to grade. From this list, they are able to choose either one of the deliverables and then allocate marks for each of the students assigned.

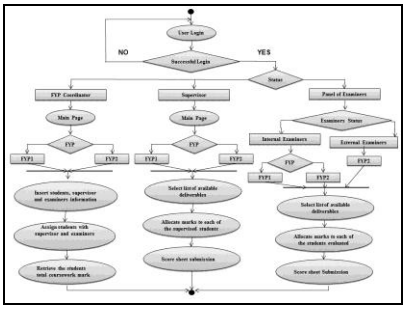


Figure 4B-1: FOMS Activity Diagram

ii. Use-Case Diagram

The diagram shown below is the use case diagram which illustrates all the main users in FOMS and their major roles. There are four main actors in FOMS where each of them has different roles that they play. The four users are supervisor, internal examiners, external examiners and FYP coordinator. Both of the supervisor and the internal examiners have the same roles. Among of their roles are to retrieve list of available deliverables, which is shown after choosing between either FYP1 or FYP2, to allocate marks to each of the students assigned under them and submit the marks after confirmation. The major role of the external examiners, on the other hand, is to retrieve list of available deliverables in FYP2 only. They also responsible to allocate marks to the FYP2 students assigned under them and submit the graded marks after completion to be compiled. FYP coordinator is the administrator of FOMS. He/she is the one who responsible to insert the information of the students, supervisor and external examiners into the database, to assign the students with their respective supervisors and panel of examiners and retrieve all of these allocated marks for coursework marks for each of the students.

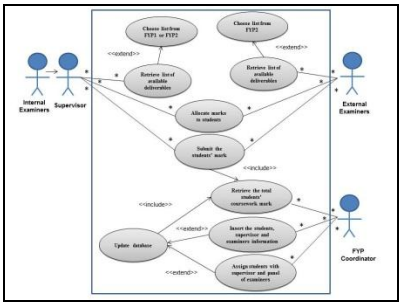


Figure 4B-2: FOMS Use-Case Diagram

iii. System Architecture

Based on the figure below, it shows the architecture of FOMS system and their functionality. The FOMS system consists of three main modules which are the user module, system module and the data source module.

- User Module

There are two main users with different ability for FOMS which are the FYP Coordinator that act as the administrator and the supervisor and the panel of

examiners that act as another main user. Both of these users need computers to enable them to retrieve FOMS.

- System Module

In order for both of the users to retrieve FOMS, they need to have an access to an internet. After accessing, then only the users is allow to use FOMS. FOMS is developed using the asp.net therefore it is available in web-based form. That is the reason that they users need internet access before able to begin using FOMS.

- Data Source Module

The data source that is used to keep all the related information is the MySQL database. MySQL is the best data source used as it is compatible with Visual Studio. This is where all the record will be save.

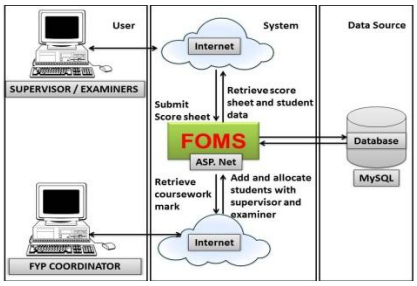


Figure 4B-3: FOMS System Architecture

C. Prototype

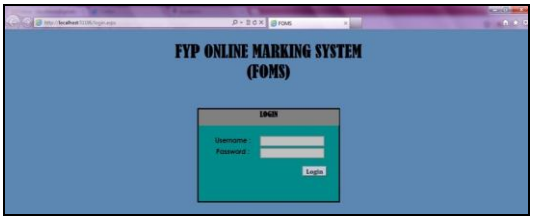


Figure 4C-1: Login Page

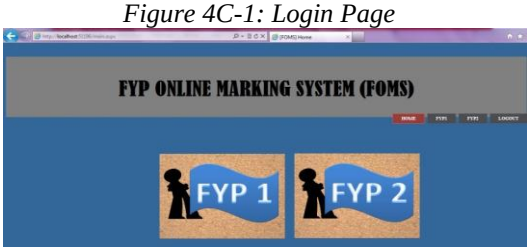


Figure 4C-2: Main Page

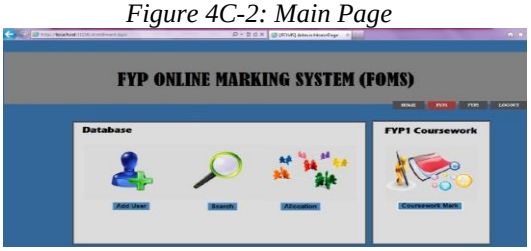


Figure 4C-3: Admin Homepage

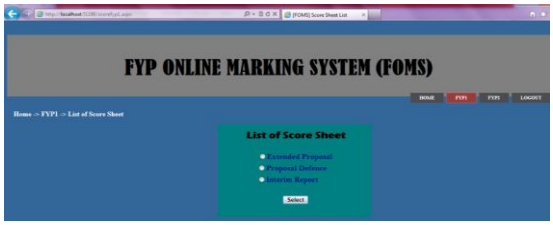


Figure 4C-4: List of Deliverables Page

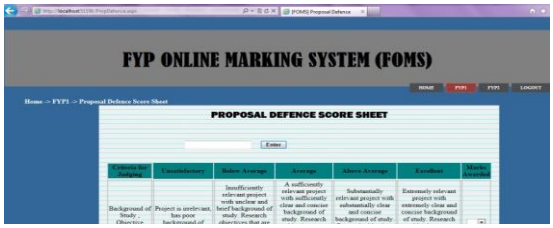


Figure 4C-5: Proposal Defence Score Sheet Page

D. Testing

i. User Testing

The user testing has been made initially with the FYP coordinator as they performed most of the function in FOMS, thus it takes time to make the testing.

1. FYP Coordinator 1: Mr Saipudnizam Mahamad, CIS Department, UTP

- To have a complete database of real student and supervisor used in the system.
- A new FYP1 score sheet has been used starting from May 2012 semester.
- For FYP2, one external examiner is allocated with approximately 10 students; therefore the system should allow this allocation.
- For the grade awarded by the supervisor and panel examiners, it is advisable to use a restricted number of score for better calculation.
- To have a more formal interface as the main user are supervisor and panel of examiners.

2. FYP Coordinator 2: Miss Penny Goh, CIS Department, UTP

- The system should be able to import and export the Microsoft Excel files. This is because the FYP coordinators receive the FYP students name list from Registra, UTP registration department, for students registering for FYP courses on that current semester. Besides that, in the end of semester, the marks of the students need to be submitted to the exam unit. Hence, the system should be able to export the retrieve marks from the system to the Excel files.
- To integrate the system with PRISM, a UTP Portal. This is so that the system could directly retrieve the students who enroll for FYP course on that current semester. This is because the UTP students will enroll their preferred courses using PRISM. Therefore, it is suggested for the system to integrate with PRISM to enable it to

directly retrieve the students registered for FYP courses.

- To improve on the colour coordination of the layout.
- The grading function for supervisor is good.

ii. System Usability Scale

Questions	Rating Average (minus 1 or 5 minus the rating average)
1. I think that I would like to use this system frequently.	4 – 1 = 3
2. I found this system unnecessarily complex.	5 – 2 = 3
3. I thought this system was easy to use.	4 – 1 = 3
4. I think that I would need assistance to be able to use this system.	5 – 1 = 4
5. I found the various functions in this system were well integrated.	4 – 1 = 3
6. I thought there was too much inconsistency in this system.	5 – 2 = 3
7. I would imagine that most people would learn to use this system very quickly.	5 – 1 = 4
8. I found this system very cumbersome/awkward to use.	5 – 2 = 3
9. I felt very confident using this system.	4 – 1 = 3
10. I needed to learn a lot of things before I could get going with this system.	5 – 2 = 3
Total	32

Figure 4D-1: System Usability Scale

By using the System Usability Scaling, the results of the overall usability of the system can be gathered. The table above shows the summary of the whole questionnaire. This value obtain can be used to calculate the SUS score. For questions 1,3,5,7,and 9 the score contribution is the scale position minus 1. For questions 2,4,6,8 and 10, the contribution is 5 minus the scale position. This will result with each questions has a rating ranging from 0 to 4. Then, multiply the sum of the scores by 2.5 to obtain the overall value of SUS. From the table, the total sum of all question is 32. Next, the sum will be multiplied with 2.5; 32 x 2.5 = 80. Based on this, the result is more that 50% which makes the FOMS system has high perceived usability from the users.

V. CONCLUSIONS AND RECOMMENDATIONS

As a conclusion, the current FYP marking process has created hassle to the FYP Coordinator, the supervisor and the panel of examiners due to the many problems arisen as the process is still manually implemented. Because of that, the FYP Online Marking System (FOMS) project is intended to change the whole manual process into the automated FYP online marking system to solve all the problems face by them. With the implementation of FOMS system, it is able to:

- Reduce the possible chances of error.
- Time-saving and more organized FYP marking process
- Help to preserve the environment by reducing the paper usage.

However, there are more future works that need to be done for expansion and continuation of the project. Among of the suggested works is:

- To implement FYP Online Marking System (FOMS) mobile application.

As the technology is rapidly evolving into new high-tech revolution, more people prefer to use their smart phone, tabs or iPad to online. Therefore, it is highly suggested that FOMS would be implemented in mobile application, in the future.

Last but not least, it is hope that the FYP Online Marking System (FOMS) will be able to totally revolutionize the current manual FYP marking process.

VI. REFERENCES

[1] Anuar E., 2006, "*Web-based automated grading system for programming assignment*", Universiti Teknologi PETRONAS.

[2] Mills C. N., Potenza M. T., Fremer J. J. & Ward W. C., 2002, *"Computer-Based Testing: Building the Foundation for Future Assessment",* London: Lawrence Erlbaum Associates, Inc.

[3] Parshall C.C, Spray J.A., Kalohn J.C. & Davey T., 2002, *"Practical considerations in Computer-Based Testing"*, USA: Springer-Verlag New York, Inc.

[4] Baker G., 2003, "An Online system for Assignment Marking," School of Simon Fraser University. Available online at http://www.cs.ubc.ca/wccce/Program03/papers/Greg/Greg.html, 26 September 2005

[5] Rabinowitz S., & Brandt, T., 2001, "Computer-based Assessment Can it Deliver On Its Promises," Available online at http://www.wested.org/ 27 September 2005

[6] Hill, T. G., 2005, "MEAGER: MICROSOFT EXCEL AUTOMATED GRADE" Northeast Mississippi Community College Booneville, MS, The Journal of Computing in Small Colleges.

[7] Yang I., Rammutla C. & Godongwana T., 2006, "Online Marking System for Vula", available online at http://pubs.cs.uct.ac.za/archive/00000366/01/TechnicalReport.pdf

[8] Matt, U.V., 1994, "Kassandra: The Automatic Grading System," Institute Advanced Computer Studies, Department of Computer Science, ETH Zurich.

[9] Brooke, J. SUS, A quick and dirty usability scale.