Final Year Project Intelligent Scheduling System (FISS)

By

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CERTIFICATION OF APPROVAL

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A project dissertation report submitted to the
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Approved by:

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UNIVERSITI TEKNOLOGI PETRONAS
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May 2012

CERTIFICATION OF 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 acknowledgements, and that original work contained herein have not been undertaken or done by unspecified sources or persons.

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NORHIQMAH ABDUL RANI

ABSTRACT

Final Year Project (FYP) Intelligent Scheduling System (FISS) is an online web-based system developed to ease and assist an FYP coordinator in Universiti Teknologi Petronas (UTP) to schedule the presentations for both FYP1 and FYP2. FISS provides a one stop centre for the FYP coordinators, lecturers, examiners as well as the FYP students to enter FISS from office/home and anywhere as long as there is an internet connection. FISS proven to greatly reduce the paper usage and time saving as the FYP coordinators can use FISS to resolve any FYP schedules creation. For many years, FYP coordinators have been struggled to schedule FYP presentations due to the need to refer to various data (i.e lecturers' data, students' data and etc) manually. Therefore, the coordinators have to allocate extra time and if error occurs somehow they have to delay the releasing of FYP presentations' schedule. To add more, it is difficult to identify an immediate and reliable solution to any sudden request to modify the schedule as there is no database system that stores an updated students and lecturers' information. FISS has been developed to alleviate the problems mentioned and coordinator now can arrange the presentation schedule in a much shorter time and stored the data and information in a new database system. FISS provides an excellent interface which make the creation of a presentation's scheduling a whole lot easier and intelligently provide solution by automatically compile various resources for the best scheduling time according to the various presentation in an FYP course.

Keywords: Scheduling System, Online, Web-Based System

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ABBREVIATION AND NOMENCLATURE

FISS : Final Year Project (FYP) Intelligent Scheduling System

FYP : Final Year Project

ES : Expert System

RAD : Rapid Application Development

CIS : Computer Information Science

FCFS : First Come First Serve

RR : Round Robin

SPN : Shortest Process Next

SRTN : Shortest Remaining Time Next

SDLC : System Development Life Cycle

UTP : Universiti Teknologi PETRONAS

IIS : Internet Information Services

WWW : World Wide Web

WAS : Windows Process Activation Services

URL : Uniform Resource Locator

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Final Year Project (FYP) is a compulsory course for all final year students as requirements to graduate in University of Technology PETRONAS (UTP). Apart of fulfilling the FYP, there are other things that the UTP students need to cater such as classes, assignments, tutorial of other subjects they undertake in a semester. Hence, the FYP students are in need of a real-time scheduling system which could help them to provide information of FYP datelines. In fact, FYP is not an exam-based course and it is important for the students to complete all the tasks and submitted them in schedules. Therefore, an FYP coordinator must design and plan a proper schedule to be used as a roadmap for the students to follow in order to complete their project. One of the important events that need to be schedule by the coordinator is the presentation schedule for both FYP1 and FYP2.

Currently, FYP presentation schedule is done manually and the FYP coordinator need to maintain and to check on the availability of persons involved individually. Frankly speaking, this is the most crucial part faced by the coordinator and at this stage it will involve a lot of participants such as the examiners (both external and internal), lab administrators, the supervisor and the students. The rapid growth in a number of students in the Computer Information and Science (CIS) department has made manual scheduling task become extremely difficult to create. In this case, the coordinator acts as the maintainer to rearrange and update the presentation schedule in case the examiners or the labs are not available on the specific date. Hence, they need to compare the previous schedule and create a new schedule for the presentation. It become more difficult as the manual ways does not have a proper database system which stored all the information of the people involved.

The system in this project; FISS is specifically focused on the presentation schedule of the FYP's presentation. This is crucial for the students and lecturers in order to keep track on

their presentation's date, time and venue. Therefore, FISS is developed to ease and help the coordinator to schedule the presentations. Hence, there is no need to do the manual analysis and comparison anymore. Possibly, a web-based system like FISS can solve the coordinator problem as this system provides feature of storing information and data of the peoples involve in scheduling the presentation. The purpose of using this system is to increase productivity, reduce scheduling time, simplify the coordinator's task and manage resource scheduling efficiently. Furthermore, the entire task will be accomplished by the system after particular data needed was inserted.

1.2 Problem Statement

1.2.1 Problem Identification

According to the research done based on the manual ways of scheduling the presentation. Below are the lists of identified problem that might occur when the nature of manual ways been implemented in developing a scheduling system.

i) Manual preparation of a new FYP presentation schedule is time consuming and tedious especially when it involved a lot of other timetable ranging from student timetable, lab timetable, examiners timetable and utilities and devices available.
ii) Problem to identify a quick solution for a sudden request to change timetable schedule of FYP presentation which involve students and examiners. The FYP's coordinators need to refer back to all the timetable of each person to rearrange the schedule manually.
iii) No FYP database for students currently exist that enable fast searching of a particular data when requested
iv) A lot of data redundancy

1.2.2 Project Significance

FYP Intelligence Scheduling System (FISS) main contribution is to enable the coordinators to manage the presentations' schedule in a way much easier. Thus, this system will help to acknowledged all the peoples involved such as; the examiners (both

internal and external), supervisors and the students about their schedule for the presentation earlier meanwhile the lab administrators can prepare and checked on the labs before the presentation started to avoid any technical problem. Therefore, FISS will help to reduce the time uses and human labour in preparing the schedule.

Furthermore, this system will also help in reducing cost as the coordinator will be using less paper in order to complete arranging the schedule. Moreover, FISS will have a good platform of database and it will decrease the possibility of data redundancy. Besides, with this system the coordinator's can have fast searching of particular data when requested thus it will also lead to zero data redundancy.

By incorporating the expertise of the human expert into a computer program, we can actually reduce the size of search space for solving problems as the expertise will describes the valid inferences which can be deduced from the known problem features.

1.3 Objective and Scope of Study

1.3.1 Objective

Every project has its own objectives that work as drivers to achieve success at the end of the whole progression. The objectives of the system that needs to be implemented are as stated below;

i) To create a system that can expedite FYP presentation scheduling data creation much faster and reliable in which the system will have the following features;
   - Online system for FYP presentation scheduling system.
   - Automation of creating FYP presentation schedule.
   - Easy to modify and update immediate changes on the scheduling data.
   - A new FYP database system thus removes data redundancy.

ii) To reduce the paper usage in order to reduce cost as the current way all the data relates to scheduling matter are in a paper-based.

1.3.2 Scope of Study

This system will be focus on the development of a web-based system for presentation scheduling process of FYP1 and FYP2. It will help and ease the coordinator works in arranging the schedule for all the presentations in this course. The author will be focusing on storing the data for CIS department to smaller the scale of study and also it will be easy for her to get all the resources from the respective person; academic assistant.

The system will also focus on developing a system that is online and available for the user to access the system in order to view the presentation schedule. Emphasis on what action should be taken next will be given to knowledge acquisition to develop the knowledge base and inference methods in order to deduce the solution. Besides, the scope of this project will evolve around the learning of the website development; VB.net and My SQL in developing this system. This will also include the creation of necessary database for the users, interface in building the application and its implementation.

Since, this will be the first system develop to manage the FYP presentation schedule there will only a small amount of function been covered. Those functions covered are;

i) Generating and manages the schedule.
   The schedule will be generated based on the data inserted or selected by the person-in-charge/ administrator of the system. Basically, this function is only for the system's administrator.

ii) Inserting and saving new data
   This function is applicable for the system's administrator. In this function, administrator can insert new data and save it into the database for future uses. Besides, this system will allow the administrator to update the data inside the database.

iii) Verification for security purpose
   In order to login into the system, users need to insert "user id" and "password". Different level of user can access different level of application.

iv) Viewing data

All users can use this function but different level of users can view different data.

Basically, all the main function above can describe all the function inside FISS system. However, the system cannot generate a dynamic schedule but there will be an additional characteristic depends on the functions during the development phase.

1.4 Relevancy of the Project

The main objective of FISS is basically to create a system that can expedite the FYP presentation scheduling data creation much faster and reliable. This application system will generally help the coordinator task in arranging the presentation schedule. Besides, the coordinator can also solve all the identified problem of using a manual way in scheduling the presentation with the existence of this system. Furthermore, the FISS is related to the author's course of study hence this project is relevant to be conducted.

1.5 Feasibility of the Project

1.5.1 Technical Feasibility

Technical feasibilities are defined by the technical aspects that can be taken into consideration before starting the development phase. It is also determine the sensible and practicality of the whole application. As for this, there are a few risk areas that should be considered;

i) Familiarity with Technology

For this project, the technology involved is the online web-based system as the front-end where the user will use this as the main interface of this application. Besides, the database platform SQLyog as back-end will be used to store all the data and information regards to FISS.

ii) Familiarity with Application

For the application feasibility, the Microsoft Visual Studio 2005 will be used as the platform to create the interface and the system itself using VB.net programming language. Here, the risk is medium since VB.net is easy to learn and the author can shoot the questions up in the forum as it is one of the usual languages used by web developer.

1.5.2 Scope Feasibility

This system is developed for CIS department where is in a smaller scale. Therefore, it will be easy for the author to get the information from the respective people such as the academic assistant. Furthermore, the study will evolve around the website development using; VB.net and MySQL. Therefore, the risk is medium since the software used Microsoft Visual Studio 2005 is user friendly and easy to learn. It also has the user guidelines and information about the software.

1.5.3 Economical Feasibility

Looking on the economical or cost efficiency of this project, the risk is low since, the application used in order to develop the system can be downloaded for free. Besides, this system is an online web-based system hence all the user can have the access to the system whenever they are as long as they have the internet connection. With this, the availability of this system is huge.

1.5.4 Time Feasibility

The project has been divided into two (2) phases; FYP1 and FYP2. The planning, analysis and also the design phases will be done throughout the FYP1 meanwhile the development, testing and implementation phases will be carried out during the FYP2. Therefore, the research and studies regards to the system developed need to be done during the FYP1 and the prototype must be delivered at the end of the FYP2.

There is ample time to carry out the project because the author starts to conduct research during FYP1 with the duration of fourteen (14) weeks. Hence, one semester provides

enough time for the author to gather most of the important data that related to this study and come out with the output of FYP1 which is the FISS system design. Those designs will be referred by the author in other to continue the project in FYP2 phase. Since the system architecture and design was done during the early stage; FYP1 the development of FISS will be easier and can be done within the time limit.

Besides, this development of this project does not require any purchase of hardware or tools, so there is no blocking time for the author to complete the development of FISS. Hence, this project is feasible to be conducted during these two (2) semesters.

CHAPTER 2

LITERATURE REVIEW

Optimize utilization of resources and human power can only be possible if there is a proper scheduling system in place. This chapter presents a review of scheduling in general. Based on several researches that have been made, there are also some studies made from the previous system and there are some systems that used almost a similar concept like this system. Basically, studies had been done by searching, analysing and also drawing conclusion based on reading on relevant body of literature. All the findings will be concluded in this site.

2.1 Scheduling: Definition and Concept

Based on the previous report of FYP by Madina Hijriani (2003), a student from UTP, she stated in her report according to TTMaker Website, "Scheduling is a broad term that refers to a wide range of processes. For example, rostering, booking appointments, timetabling, planning, and meetings and allocating resources, are all forms of scheduling. Timetabling is a particular form of scheduling that involves placing groups of people or objects into a predefined set of times according to some set of criteria. Timetabling features on the grouped to be scheduled. A good example of timetabling, which most people can relate to, is the school timetable. For example, classes "Mathematics", "Literature", "Science", "History", "Geography" must all be scheduled 10 periods each week."

Scheduling is similar to timetabling where we want to schedule people or objects in a particular period. In FISS, we want to schedule presentation, which is objects in particular period and it could be more than five sessions. It may be scheduled at one lab or several labs depending on the free slots with different peoples involved.

The field of scheduling has attracted a lot of attention and one of the most prominent works on scheduling was by Henry Laurence Gantt, who introduced the Gantt Chart in 1917 (Schwalbe,2002). Besides, Brucker (2001) mentioned in his book that "A schedule is for each job an allocation of one or more time intervals to one or more machines." Meanwhile Pinedo said "Scheduling concerns the allocation of limited resources to tasks over time. It is decision-making process that has goal of optimisation of one or more objectives." Therefore, it can be summarised that the scheduling involves dedicating one or more limited resources towards completing one or more objectives, by spreading the tasks over time intervals in such a way that efficiency can be achieved.

Scheduling is most likely applicable when these factors are present;

i) There is element of time-dependency, either in the form of equal time-distribution or completion before specific due-date.
ii) There is more than one task to be completed or that a task is divided into several sub tasks.
iii) There might be some kind of weighting that determine which task or subtask should be performed first over the others.

From the TimeTabler website, scheduling or timetabling "has a powerful effect on the life of a school or college, and if you are a timetable you carry a heavy responsibility" Furthermore, modern technology such as; TimeTabler etc. can relieve much of the donkey-work timetabling, leaving with more time to apply skill and judgement to produce a high quality timetable. As of what have been observed from the academic administration who did scheduling the timetable; the staff have to use their artificial intelligent to arrange the timeslots and its will burden them. For future, they will need a system that will schedule the courses automatically and efficiently.

From TTMaker website, clashing occurs when a person has been scheduled to be in two places at one time where the actual facts is a person cannot be in two different places at one time. Thus, in FISS clashes should not occur for a session as if the coordinator placed a lecturer at the two different sessions for a particular presentation, the lecturer will get the first session as it will be based on the First Come First Serve (FCFS) basis.

2.2 Current State-Of-The-Art

Currently the coordinators use spreadsheets such as Microsoft Excel to store and analyse all the information related to the student FYP's presentation. However, eventually a spreadsheet becomes too cumbersome to store records and it might become inconvenient to search for individual spreadsheet; different level of examiners information, students with different supervisors and the supervisors themselves. Consequently, this will lead to a lot of data redundancy which will lead to data anomalies and corruption. FISS will not only solve this problem but it also can be further used to customize solutions that integrate easily with the Web. Besides, it will be customized unique solution of its kind would use backend relational database for storage, retrieval and analysis data.

According to Mohd Fakhruzzaman (2008) in his research topics "Automated Scheduling System-FTMK Direct Entry Students", FTMK currently used manual process to build the timetable as the staff will be arranging the timetable based on courses. At the end of the timetable arrangement, the timetable will be check again to avoid redundancy. Some of the problems were related to human mistakes since the timetables were written on paper, this process can caused several missing on important data as it is not properly kept.

Besides that, as have been stated in the website, basicsofcomputer.com there are many disadvantages of a manual file-based system. The disadvantages are it is very slow method to process data as the data is transferred from one function to another manually, it is very costly method because a large number of employees have to be appointed to operate the system, the managers cannot easily obtain summary information for making quick decisions as it is difficult to search for specific file or a piece of information and duplication of data might be exist.

2.3 Existing System related to Scheduling

The existed system found is CELCAT scheduling tool. It is popular and flexible scheduling tool used extensively in Colleges and other teaching centres. CELCAT timetabler allows the users to turn off active clash checking so that they can quickly construct a timetable without interferences from the clash checker. However, to subsequently check for clashes the users

can always select type of resources they want to check such as, same rooms, times or dates. Hence, it is sometimes useful to clash check only events that occur after a given date. According to CELCAT website, "CELCAT has been proven to reduce time spent on scheduling by more than 65 percent" which means for every thirty (30) hours spent on creating a scheduling manually, this system can save almost twenty (20) hours.

Figure 1: CELCAT main page

TimeTabler is one of the examples of existing system. It is a fast and friendly computer program that is carefully designed to help schedule the user timetable quickly and accurately. Besides, TimeTabler requires no knowledge of computers which is designed very straightforward to use even for the inexperienced computer user. It is designed and allow the user to sit at the keyboard controls and drive their way through the timetable. This system is totally self-checking, as it will never allow the users to allocate by mistake one teacher to two classes at the same time. It is an interactive, faster and automatic scheduling. Hence, many hundreds of schools and colleges now use TimeTabler to do the actual scheduling of their timetables on a computer.

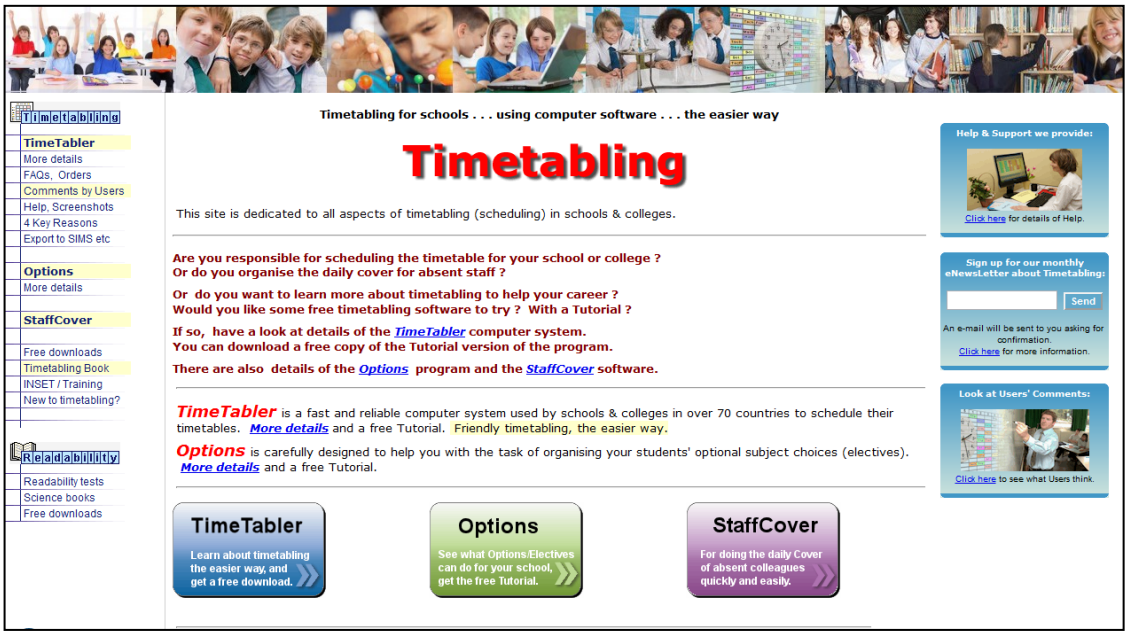

Figure 2: TimeTabler main page

From the both of cased research above, scheduling software's are demanded and needed to help scheduling job. Hence, some important clues have been discovered that make an important role for the scope of FISS. All over the past research the scope of the entire system development will be analyzed that can fulfil the user requirements. Refer to the both findings; there are some features in the TimeTabler system will be delivering in the FISS. Those features, are increased productivity, reduced scheduling time and manage resource scheduling.

2.4 Online Web-Based System

Based on studies carried by Kevin Kruse (2004) from elearningguru.com, he pointed that online web-based system has several benefits or advantages. The benefit of web-based system is the fact that access to the content is easy and requires no distribution of physical materials. This concludes that web-based system additional benefits are among them;

i) Access is available anytime, anywhere, around the globe. In University of Technology PETRONAS (UTP), the lecturers always have access to a potentially system whether they are working from home, in the office or from the hotel room. This will help the

coordinators to access the system anywhere and anytime in case there are sudden changes in the lecturers or examiners availability.

ii) Content is easily updated. This is perhaps the single biggest benefit to a web-based system where the coordinators can easily checked and amended if there are any faults to the presentation schedule that they have made and send the notifications emails to the respective persons.

According to the previous report of FYP by Kiranjeet Kaur, he stated in his report a research by Dr.Suzana from University of Malaya (2003), she pointed out that using online based system as an assessment and reporting tool will indirectly save the environment. The statement is reliable because all the data and documents are in the electronic or softcopy form compared to the hardcopy which use paper and need more trees being cut down. Besides, it is free as the software used and the languages programming sources are free. A reporting tool could lead to a lesser time and money consumption to spend on money and binding process.

2.5 Technique

FISS used two tier architecture. The two-tier application programming model provides user with improved usability, scalability and flexibility of applications. This architecture means that the client acts as one tier application in combination with server that acts as another tier. Besides, the user system interface is usually located in the user's desktop environment and the database management services are usually in a server. The processing management is split between the user system interface and the database management server environment while the database management server provides stored procedures and triggers.

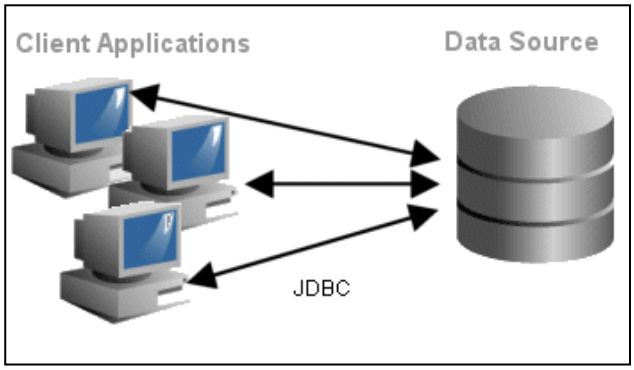

Figure 3: Two-Tier Architecture

2.6 Scheduling Methods

In order to schedule jobs there are several scheduling methods that can be followed such as First Come First Serve (FCFS), Round Robin (RR), Shortest Process Next (SPN) and Shortest Remaining Time Next (SRTN).

i) First Come First Serve

According to Callari in his website, FCFS is a non-pre-emptive technique where a single queue of ready process is maintained and the dispatcher always picks the first one. It does not emphasize throughput. Besides, the response time can be high with respect to the execution time, especially if there is a high variance in process execution times. Flyyn (1997) says that "it is very simple algorithm to implement because it uses FIFO type of queue" (p.84). It is suitable for most of batch system as the interactive users normally expect quick response time.

ii) Round Robin

RR is a pre-emptive technique where a single queue of ready process is maintained and a fixed time quantum assigned to each of the running process. After the quantum expires, the process will be blocked and put at the end of the queue then the next process is executed.

iii) Shortest Process Next

SPN is a non-preemptive technique where the execution time of a program can be accurately estimated in advance. A suitable selection criterion is to always pick-up the shortest process.

iv) Shortest Remaining Time Next

SRTN is a pre-emptive technique in which the scheduler always dispatched those ready processes which has the shortest expected remaining time to completion. When a new process is submitted, the currently running process is dispatched when it has obviously a smaller remaining time that all other ready ones.

CHAPTER 3

METHODOLOGY

This chapter will highlight on how this project will be developed. By using suitable methodology and project activities are the most important part in order to make sure that the project is working. Moreover, this chapter will also discuss the procedure identification, project work, key milestone, Gantt Chart and tools required. This whole methodology and project activities are based on experimental and consistent research.

3.1 Research Methodology

In general, research methodology refers to a set of procedures used to conduct a research project. There are three (3) types of basic research methods which are; quantitative research, qualitative research and participatory research. Basically, for the quantitative research it involves information or data in the form of numbers which allows us to measure or to quantify a whole range of things meanwhile for the qualitative research, it do focus on our understanding about something and usually this means going beyond the numbers and the statistics. Hence, qualitative research helps us to 'flesh out the story'.

Participatory research is a very good methodology to raise awareness around issues that a community or group might face and it will also helps in developing appropriate action plan in developing the system. In developing FISS, all the basic research methods will be implemented to gather all the important data in order to prepare a systematic and user-friendly system. Currently, both qualitative and participatory researches have been done.

3.1.1 Interview

Interviewing method is the main method use in this project, due to the fact that it is easier to meet with involved persons directly in order to gather information. The data captured

might be more accurate and meaningful as the movements and the gestures of the interviewees could be physically seen and interpreted. This physical contact might initiate another idea which can lead into important information acquirement. Moreover, by interviewing this person, it helps in building a relationship between us and them and later this kind of relationship might be used again as one of the important resources in continuing to develop this project. Interview was conducted with the CIS department, FYP coordinator; Madam Rozana binti Kasbon to get more information on the scheduling matters. The main point is to try to understand the complexity of the research's issue experienced by the person in charged.

3.2 System Methodology

3.2.1 Procedure Identification

This project implements throwaway prototyping methodology. It is under the Rapid Application Development (RAD) methodology. It is pretty much the same like the prototyping methodology where it includes the development of the prototype. The key difference in this methodology is the prototypes are done at a different point of System Development Life Cycle. Prototypes are used for different purposes and also they have a different appearance.

This methodology has a thorough analysis phase that is used to collect information and to develop ideas for the concept of the system. Furthermore, developing a system is challenging, as it play around the technical issues, misunderstanding, and others issues. The processes that need to be gone through in order to overcome those issues are by analyzing, designing, and building a design prototype.

Design prototype is not a practical or working system; it is a product that represents a part of the system according to the requirements that have been draft out. The purpose of having a prototype is to enable users to understand the issues under consideration. Therefore, a series of mock-up screen would be developed and looks like the real system, but actually they really can do nothing.

Moreover, this methodology balances the benefits of well-thought analysis and design phases with the advantages of using prototypes to refine key issues before a system is built. Even though, it takes longer to deliver the final system as compared with prototyping-based methodologies, but the approach usually produces more stable and reliable system.

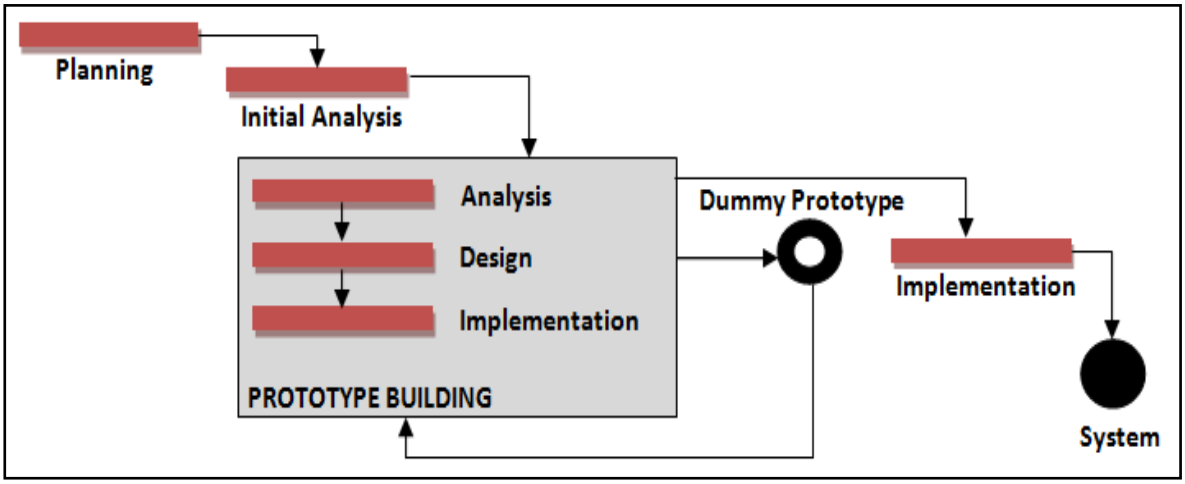

Figure 4: Throw-away Prototyping Methodology

3.2.2 Data Interpretation

The main problem should be understand and analyzed in order to interpret the data. This step is important because it can help to keep track on the project development. Each term used in the system should be interpreted properly because this will ensure the users understand ability. The way on how the data is arranged then the format used in FISS should be clarified correctly to prevent redundancy problem. Therefore, data interpretation is very important because each term used in application will be compiled in the database. The format and how it works for each section should be clearly interpreted.

3.3 Project Activities

3.3.1 Initiation

Initiation phase begins with the identification by the developers towards a need where the need is identified by recognizing the relevancy of having this system that could be developed in order to fulfil the flaws from existing systems. The relevancy of the project is to familiarize with the online scheduling system. The significance of this project is to help and ease the coordinator task in arranging the presentation schedule for both FYP1 and FYP2. A proposal is created in this initiation phase containing the objective, the summary of what the project is mainly about, the problem that could be stated based on the early analysis and also the skill and technology that will be needed in developing this system.

***Deliverable*:** Extended Proposal

3.3.2 System Concept Development

The scope and boundary of this system will be defined in this phase. All the details regarding cost benefit and analysis, feasibility studies and risk management plan will be discussed. The reason of this study is to ensure the efficiency of this application system throughout its development timeline. Besides, every single report will determine the competency of future prototype and either it is fulfilling user's requirement.

***Deliverable*:** Report on feasibility studies, risk management plan.

3.3.3 Planning

All the planning documents will be developed in this phase where its include the Gantt Chart of the project, the timeline, a mock-up system and the future prototype outcome. In this phase, the author needs to translate the scope of the project into a practical plan on how to complete the project. The purpose of having this phase is to describe the functionality of the system in details. Below are several tasks that have been done throughout this phase;

i) Creating the Project Schedule

The author will create a milestone-driven scheduled for the time taken to develop this project,

ii) Creating functional specification

By having this, it will include a functional specification that describes the solution requirements, architectures and the detail design for the features. Besides, this task will be the bridge between the user and the developer.

iii) Validating the technology

Technologies validation will be examined in order to make sure that the author meets the needs for specific functions and solutions.

iv) Close the planning phase

Planning phase will be completed along with the approval process for the project plans.

Deliverable: A functional specification document and the Gantt Chart for this project.

3.3.4 Requirement Analysis

User requirement as well as systems requirements information are gathered and documented in this phase. Beside, research and literature reviews about related information of the systems are studied by gathering journals, books, articles and surfing through the Internet. The main area of studies for this project are implementation of web-based system VB.net, web and database servers, database software and other related hardware devices such as computers. Basically, short interviews were also done during this phase. The major target for the interview is to identify the problems faced by the coordinators in arranging the presentation schedule.

Deliverable: User specification requirements.

3.3.5 Designing

In this phase, storyboard of the system is drafted based on the information gathered during the analysis phase. Draft of the system interface and algorithms of the system will also be identified during this phase. Besides, the sub-systems and functional part of the system will be developed. Basically, the actions include are the development of the interfaces storyboard on how they interconnected with each other as well as the functions available, the development of the database, and how the user interfaces will look like.

3.3.5.1 Database design / Class Diagram

The database is the backbone of any system; therefore it took longer time in identifying the entities involved together with its attributes and relationships to one another. Besides, a structural model is a formal way of representing objects that are used and created by a business system. It illustrates people, places or things about which information is captured and how they are related to each other. The Class Diagram shown is an important element of the system as it shows in details not only the classes, but also the attributes. Referring to diagram, these are the main classes and its relationships; *user_info, ref_user_role, ref_student, ref_lecturer, schedule_info, and ref_lab, ref_time, ref_course, ref_sem, ref_year* and *audit trail.*

i) user_info
   - Describes all the actors involve in the system.
   - User is inherited by three sub-classes; students, lecturers and examiners.
   - All three sub-classes have their own unique identification ID.

ii) schedule_info
   - All the generated schedule will be saved inside this table.
   - Describe the details of the presentation schedule (ie. Venue and etc)

iii) audit_trail
   - Describe all the activity done throughout the system.

iv) ref_user_role

- To differentiate the user role since they have their own unique ID.

v) ref_lecturer

- To store the data of the lecturers

vi) ref_students

- To store the data of students, FYP project title, course and program taken

vii) ref_sem

- To differentiate the semester since UTP are having tri-semester which are January, May and September

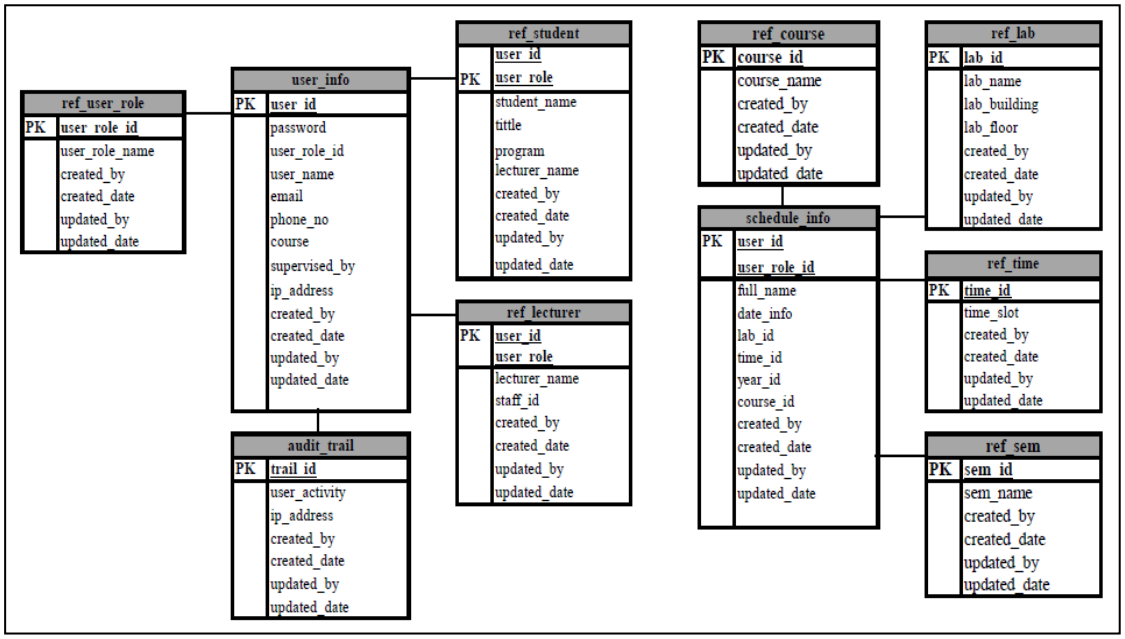

Figure 5: FISS class diagram

3.3.5.2 Storyboards

A website storyboard is an illustration of the relationships between the web pages that constitutes the site. In FISS, a storyboard has been developed in order to assist the author upon designing the interfaces in the future and to ensure that the flow is as intended. Basically, there are three basic flows in FISS that can be depicted in a storyboard below:

i) User Management:

Administrator have to log in → Change password for security purposes → Enter User information's → Edit User Information's → View User Details according to user role → Administrator can keep track on the user's activity while using the system in audit trail.

ii) Book Venue:

After viewing the number of students taking FYP1/FYP2 → Administrator can book the lab according the lab's availability.

iii) Presentation Scheduler:

Administrator will select which type of presentation to be schedule according to courses, year and semester → Upon generating, the list of students fulfil the requirement will appear → Admin enter the venue for presentation → Save Schedule.

3.3.5.3 Sitemap

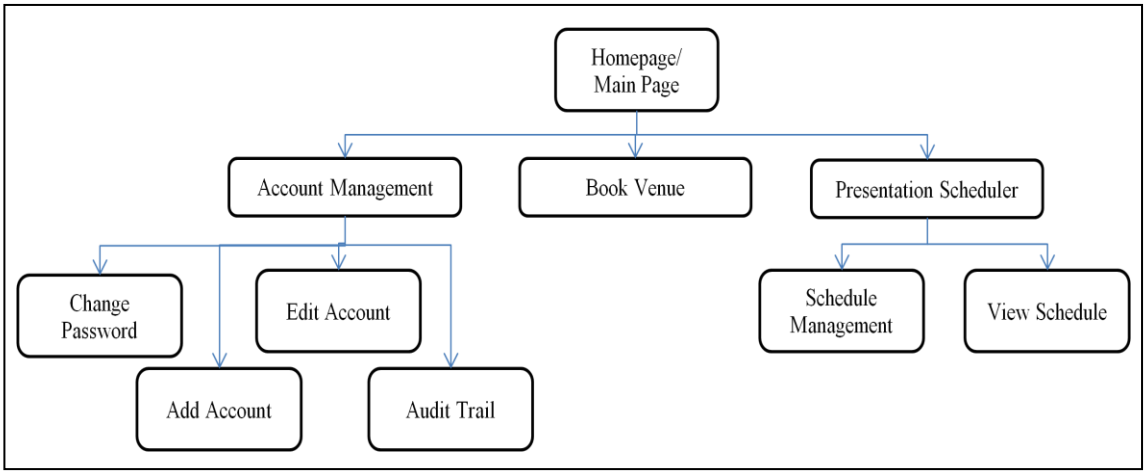

Figure 6: FISS sitemap

3.3.6 Development

In this phase, the sub-systems and functional part will be developed. The development part will start at building a database to store information. After that, system interface will be developed followed by coding and source code for the system. The next step is to configure the database connection to the system so that the system will allow the connection between the databases and interfaces. Subsequently, after all the functional parts that have been developed is combined the whole system will be up and running.

3.3.7 Implementation

During this phase, the system will be 100% complete constructed based on the prototype developed and it undergoes several testing in order to ensure it is bug free in order to run properly and produced the desired result.

3.4 Gantt Chart and Key Milestone

The project milestone for this project took about 8 to 14 weeks for the first part of the project and it also includes the progress report and presentation session. Therefore, planning and system architecture together with database design and diagram were done within the time period being illustrated in Gantt chart (refer Appendix 2).

3.5 System Requirements / Tools

3.5.1 Minimum Software Requirements

Software development tools that will be used during the software development are Microsoft Visual Studio 2005. This software is used to develop the user interface for the system and it is the ideal software to use when developing system with VB.net. FISS system will be using MySQL database platform because it is more reliable to store more data which can support large databases of 50 million rows or more, similarly easy to understand and it is compatible with the vast majority of operating systems (eg; UNIX,

Windows). Besides, Adobe Photoshop CS3 is the software used to create and enhance the banner of the web system or any images, graphics, and button that will be included in the web-based.

Software Name	**Functionality**
Microsoft Visual Studio 2008	System Development
MySQL	Database
Microsoft Office 2007 (Word, Excel)	Documentation
Adobe Photoshop	Logo and etc design

Table 1: Minimum Software Requirement

3.5.2 Hardware Requirement

Hardware plays important roles in developing this system in order for the system to run smoothly and efficiently without any problem. Thus, hardware needed are the computer for running the system, and also act as the database storage, external hard disk for back up, printer to print all the documentation needed throughout the development of the system.

Operating System	Windows XP Professional 2002
Processor	Intel Core 2 Duo
Memory	1024 MB DDR RAM
Hard Disk	120GB

Table 2: Minimum Hardware Requirement

3.5 System Architecture

The FISS web application was built by asp.net 3.5 scripting and architecture. Hence, it requires internet information services (IIS) 7 architecture to integrate the request processing from IIS and ASP.net (Templin, 2010). The core functionality of IIS is to configure the server. For example, managing the web and FTP sites and configure setting in the web sites

or enable or disable sites, services and applications. Besides, IIS 7 components are protocol listener (HTTP.sys) and services World Wide Web Publishing Service (WWW) and Windows Process Activation Service (WAS).

The HTTP request was passes through several sets of modules in the web server core. In each module, it will process the request and native modules will create an AppDomain. Then, after the request finished all the process, it will return a response to HTTP.sys and client will received the response. When user send request to web server, HTTP.sys will get the request and send to WAS. Next, WAS will request configuration to process the client request and WWW service will start the worker process in order to process and authenticate the request before submit back to HTTP.sys and to the client's computer.

CHAPTER 4

RESULT AND DISCUSSION

This chapter will discuss the results and findings from the research methodology tools discussed in Chapter 3. It will cover the qualitative findings from the interview, document review and observation.

4.1 Data and Requirement Gathering

FISS web application systems is a project prepared for identified client and user. The target users are the FYP's coordinator, lecturers, and students. Therefore, interview with the FYP's coordinator were being conducted. All data were gathered from clients through interviews and meetings.

4.1.1 Interview and Observation

Interview is the most common and direct method to gather information. The session has been conducted twice, which the initial interview was conducted through personal meeting with the Computer Information System (CIS) Department. Both interviews have been conducted to understand the current flow of presentation schedule has been made and requirement needed for the system. Below is the interview summary based on the interviews conducted:

i) Person Interviewed:
   Ms Rozana binti Kasbon, FYP coordinator for CIS department

ii) Interviewer:
   Norhiqmah binti AbdulRani

iii) Purpose:

To obtain better understanding on the current system and the requirements for new system to be developed.

iv) Summary of the interview:

- The interview conducted with Ms Rozana exposed the current flow in scheduling a presentation for FYP1/FYP2 in CIS department, which consist of the current existing system, used which is the manual way. Based on the interview, it is found that the coordinator needs to check on the lab availabilities on UTP timetable, and arrange the students according to their supervisor one by one. Basically, all the data gathered such as date, time, supervisor, students and lab will be arranged accordingly in Microsoft Excel before it's been published or sent to the students/lecturers.
- According to the author's informal observation made during the interview, it can be said that the task of the coordinator become easier by having this scheduling system. In addition, it will help them to avoid data redundancy.

4.1.2 Current System/ Process

From the interviews and meetings with the CIS department FYP's coordinator; Madam Rozana Kasbon, the process flow have been identified to guide the project development and database design for marks function. The lecturers, examiners and students detail regards to FYP course, need to be submitted to the coordinators. Then, the coordinator need to arrange all the data according to the slot depends on the number of the students registered for that course. Next, once the scheduled prepared the coordinator need to book several labs as for the presentation's venue. Lastly, all the data that have been submitted to the lecturers and student will be kept in a table in excel format. (see Figure 11).

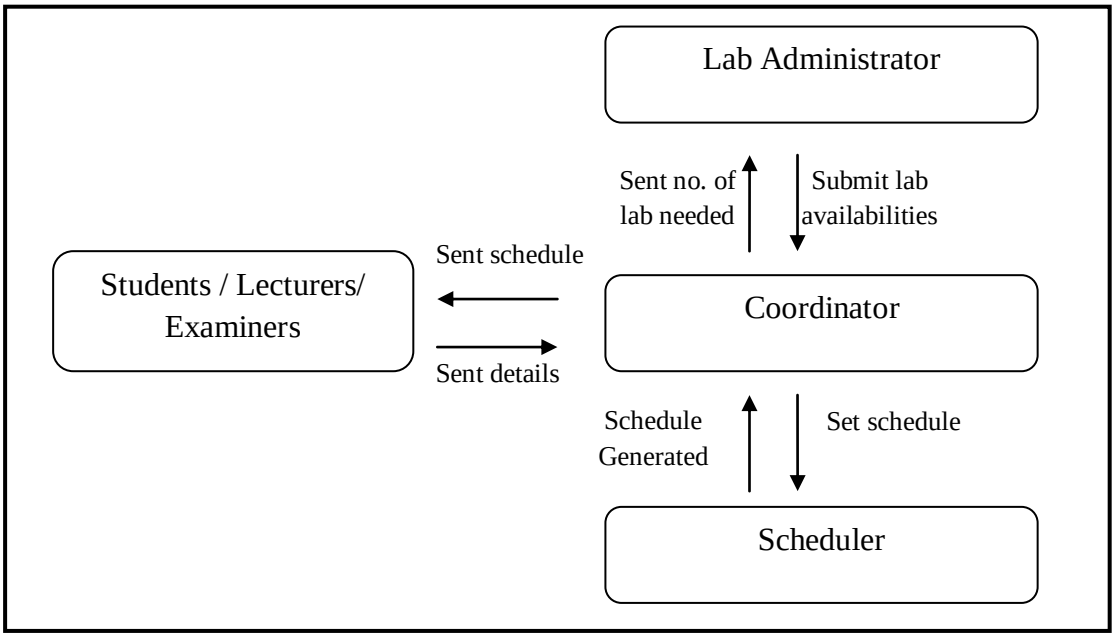

Figure 7: Flow of Current system

4.2 Data and Requirement Analysis

The analysis phase involves taking into consideration all the objectives outlined earlier in the planning phase and gather all the information in order to further proceed with the project. Besides, this is the phase where all the requirements are gathered and defined. Apart from analyzing the documents obtained, another method used to define requirements is by interview. Therefore, the requirement determination is the most critical and important step to the entire System Development Life Cycle (SLDC).

4.2.1 System Main Function

Basically there are two (2) main functions in FISS which are the "Account Management" function where the administrator or coordinators need to enter the details of the students, lecturers and examiners. Only the administrator has the ability to add and manage the other user account. In the account management function, user can only changed their password and also view the details of supervisor and supervisee list.

The second main function is "Presentation Scheduler". The administrator/ coordinator can arrange the presentation schedule at this function. In this function there are two sub-

functions; schedule management (which can only be viewed by administrator) and view schedule (accessible by administrator and normal user)

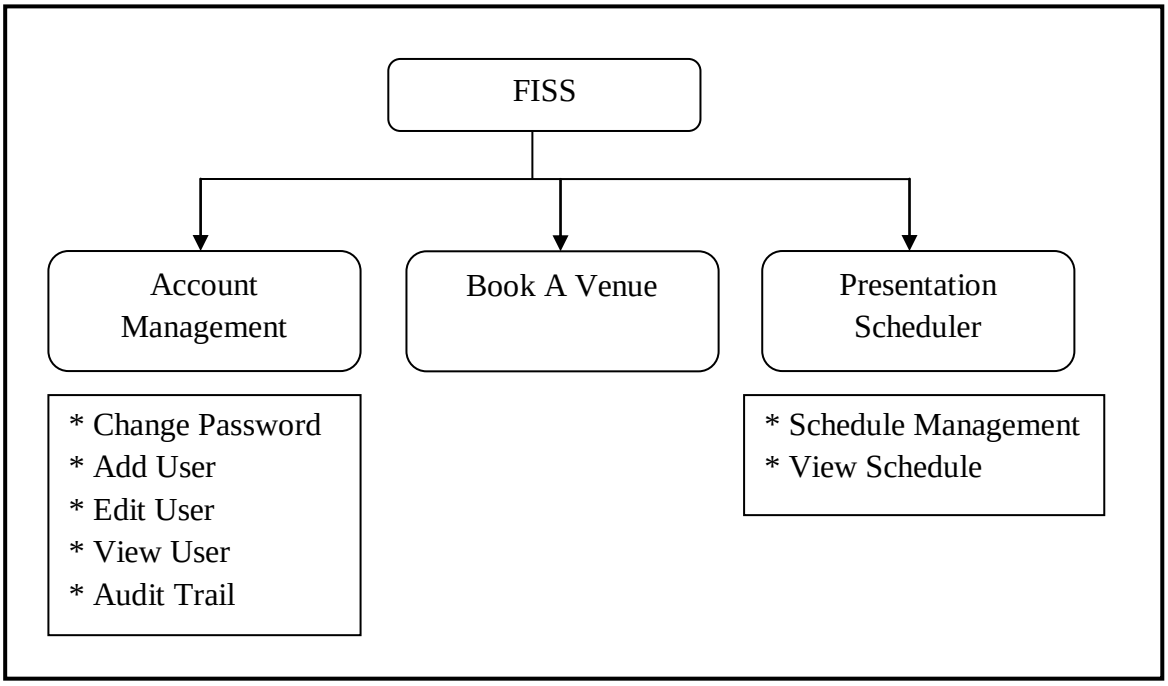

Figure 8: Main Function

4.2.2 Input Process Output (IPO) model

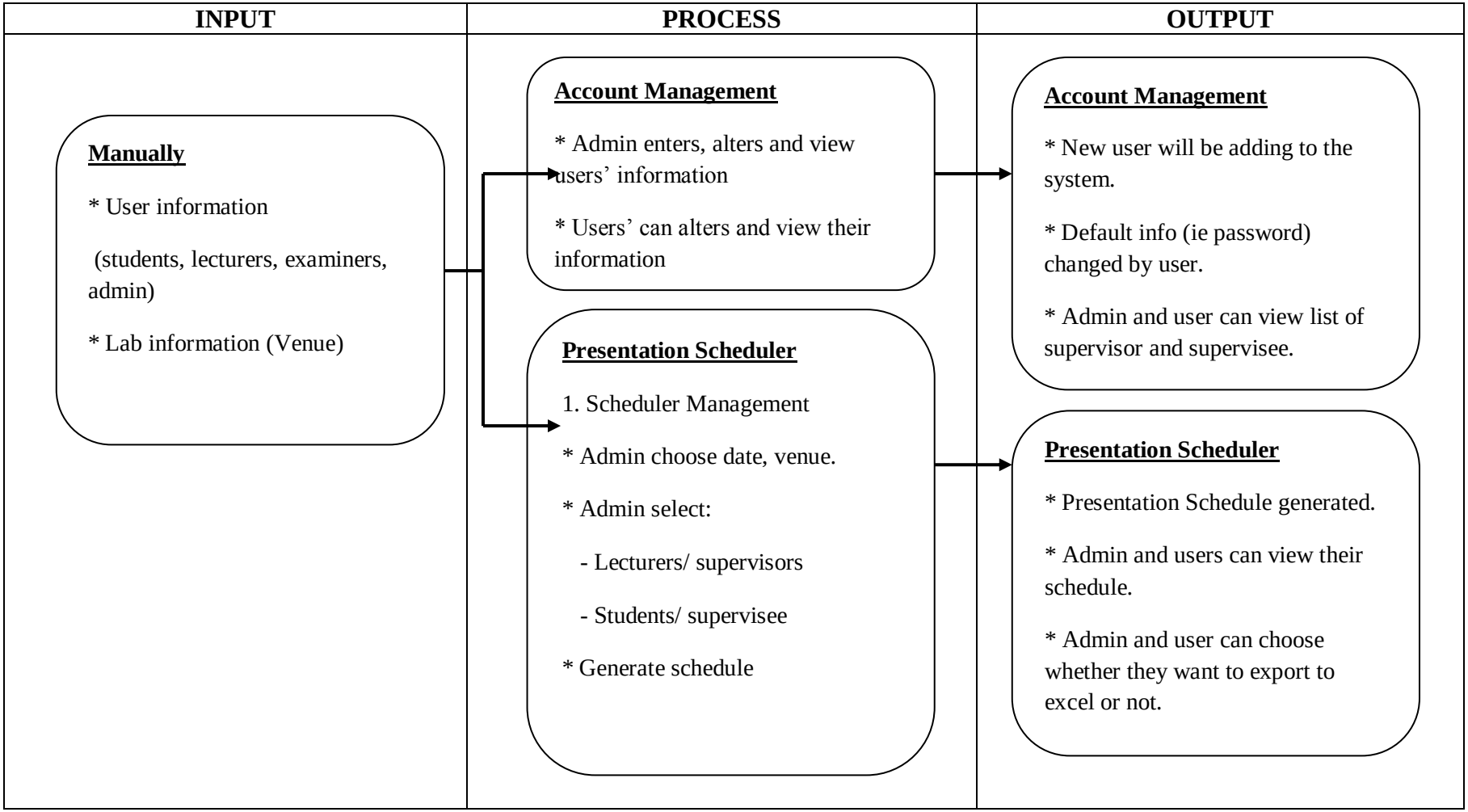

Figure 9: FISS Input Process Output model

Above diagram represents the IPO model of FISS. The diagram shows what are the input, process, sub-process and output involve in this system. In the input column, this system will need the user information and lab details in order to initiate the process. Those information need to be input manually by the administrator for the first time and all the input information will be processed in the next column, process.

There are two (2) processes involve which are; account management and presentation scheduler. Besides the four processes involve are; upload, sort, update, and schedule and they are four major process contain in the system. Once, all of the required information's has been inputted into the system the administrator can start manage the user according to their supervisor or supervisee. The administrator is also able to start arrange the schedule once the data have been completely entered into the system. The output of this system will be the notification sent to the users' email in order to inform the schedule has been generated and they can view once they have accessed to the system.

4.2.3 Use Case Diagram

Use case diagram is to identify the primary elements of the process that form the system. Furthermore, it is used by the developer to represent the functionalities of the system in a simplified and easily understandable manner so that the user will understand the functional aspects of the systems. Basically, each use case represents the functions available in the system, who are the users of the systems and what functions are available for their use. With the help of use case diagrams, the user requirements were modelled and they will lead to the proper development of the system.

Use case modelling is done by constructing a use-case diagram. This is to ensure the author has a better understanding on the functionalities of the system at a very high level. Normally, a use case diagram is drawn to provide a simple straightforward way of communicating what exactly the system does and also defines the boundaries of the system.

For FISS, there are two (2) main users involved, which are the actual user and also the administrator of the system. For a front end user, there are three (3) main activities that can be access, edit the user information, view supervisor and supervisee and view generated schedule. On the other hand, the administrator has four (4) different accesses to the system, manage all the user information, set and manage the schedule, view generated schedule and manage and edit their details.

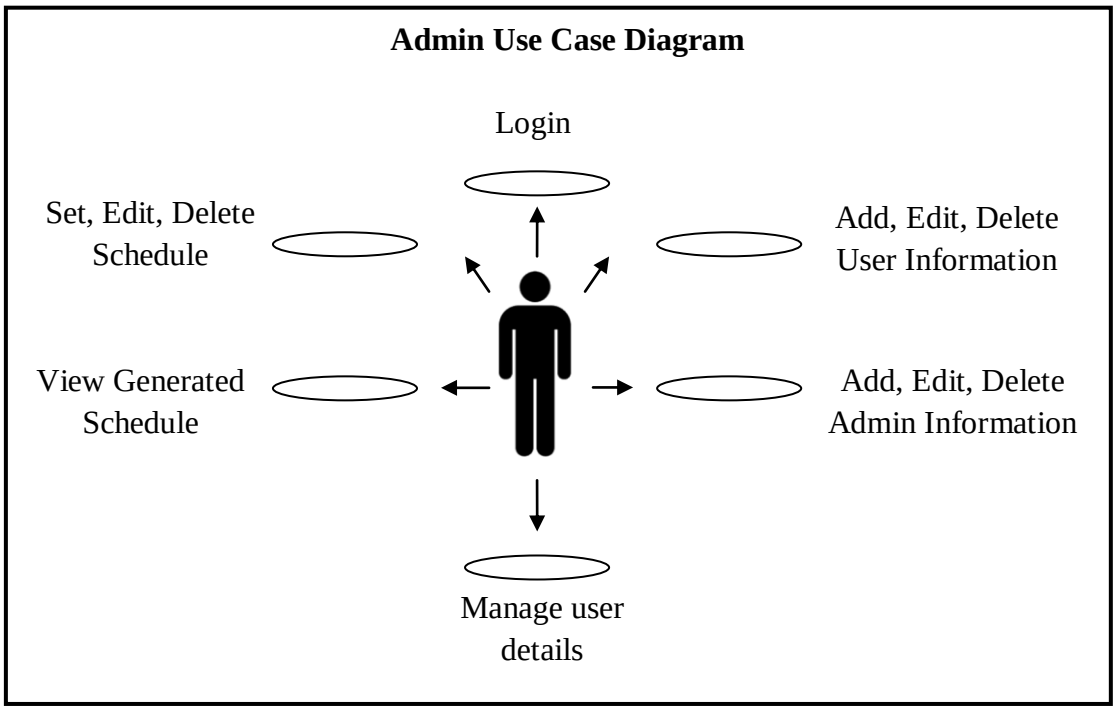

Figure 10: Administrator Use Case Diagram

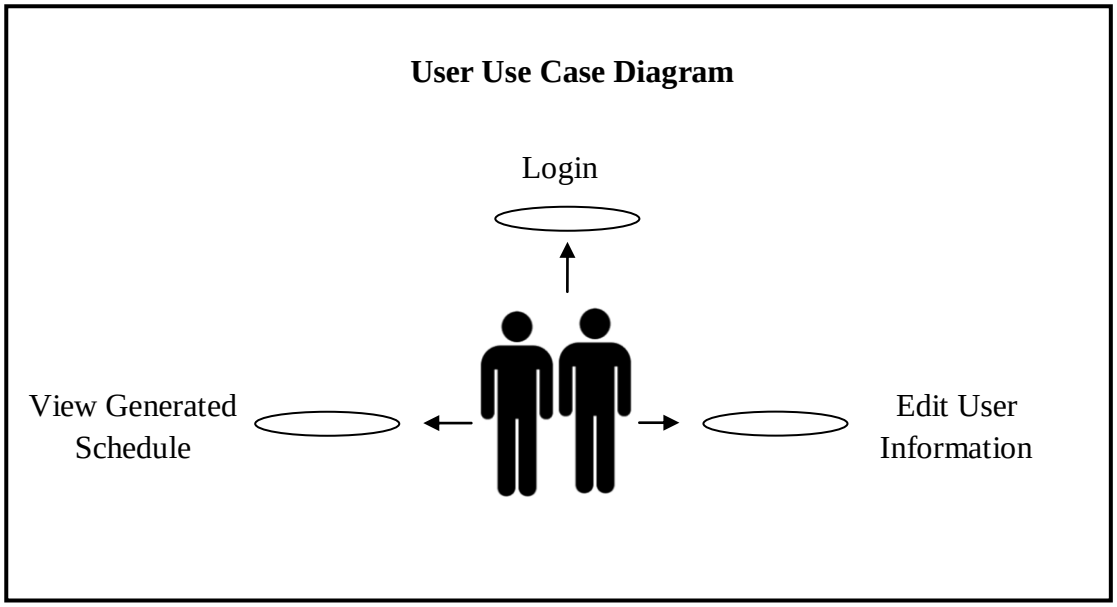

Figure 11: Normal User Use Case Diagram

4.3 Web Application Design

4.3.1 Diagram Design

The FISS web system will be used within the department only. The main user for this system would be the administrator which is the FYP's coordinator meanwhile the normal user will be the lecturers and also the students. Different user will have different user access. By having different user access, it will determine which function can be view or use by the users.

For the version 1, web application system will focus on management the student's information and schedule the presentation for both FYP1 and FYP2. The students and lecturers can have access to the system once the coordinator registered their profile in the system.

Besides, this system is also able to save the last login details. Every time users have access into the system, it will record the username, activity, ip address and date and time to that particular activity. Therefore, the administrator can keep track on the user's activity by checking on the audit trail function.

4.3.2 Deliverables Interfaces

The login page will have simple username and password textbox (see Figure 12). This page is a simple login mechanism where user needs to insert username and password. Each user will have unique login profiles that enable them to have access at certain page or button. Besides, if the user tried to access directly to a certain page by typing the URL without login, the user will be directed to the login page. In addition, if the users enter invalid username and password it will show a message asking the user to enter valid username or password (see Figure 13).

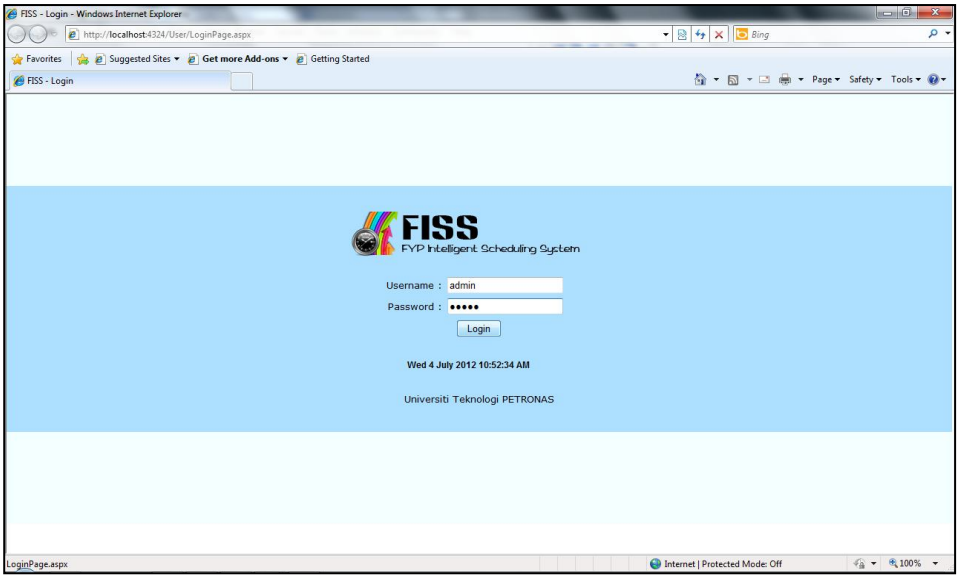

Figure 12: Login Page

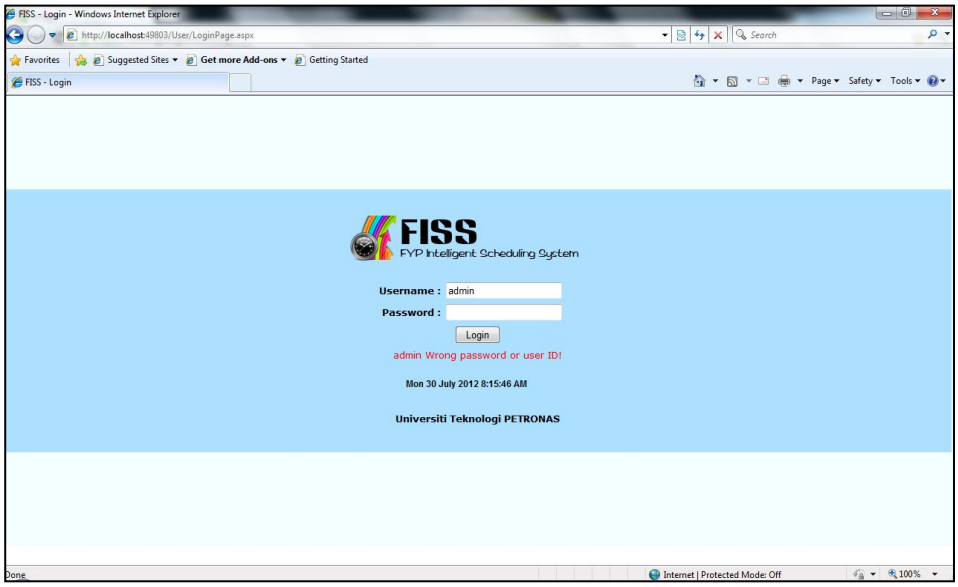

Figure 13: Warning being showed when user enter invalid password

The main page of the FISS consists of all the main functions of the system (see Figure 14). On top of the website there are a tab consists of several links which are home, accounts, venue, schedule and logout button. However, the venue button can only be viewed by the admin.

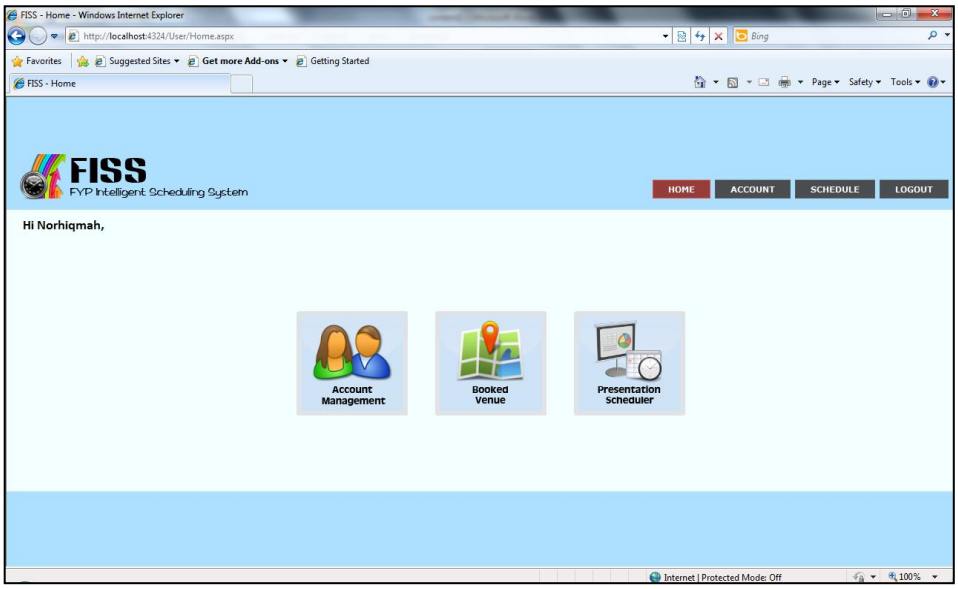

Figure 14: Main Page

In the account management section, the admin can add, view and edit new information of the user details. For the main page of account management section, the admin can view all the functions (see Figure 15) meanwhile for the normal user they are only able to view the change password function. Below are the examples of pages for every function under account management section.

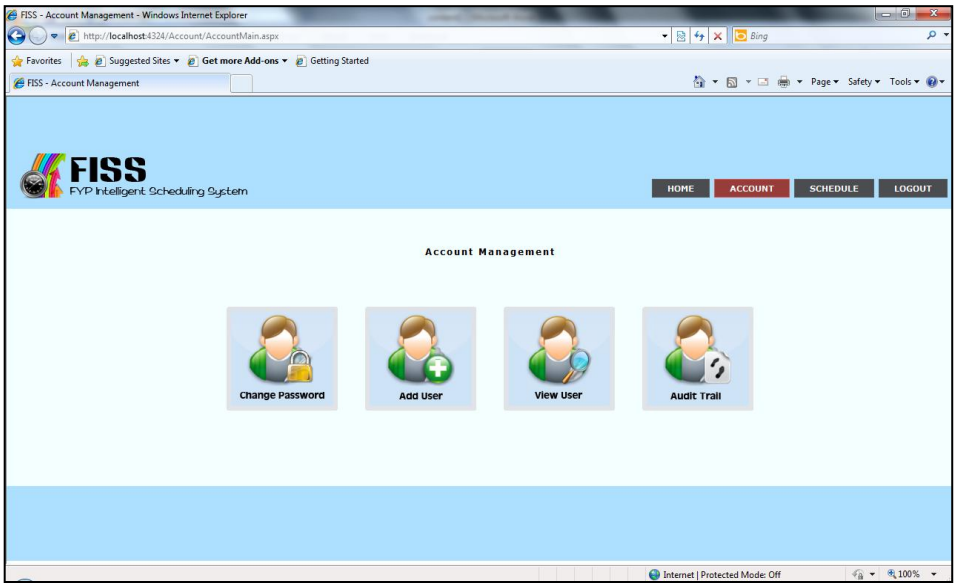

Figure 15: Account Management Main Page

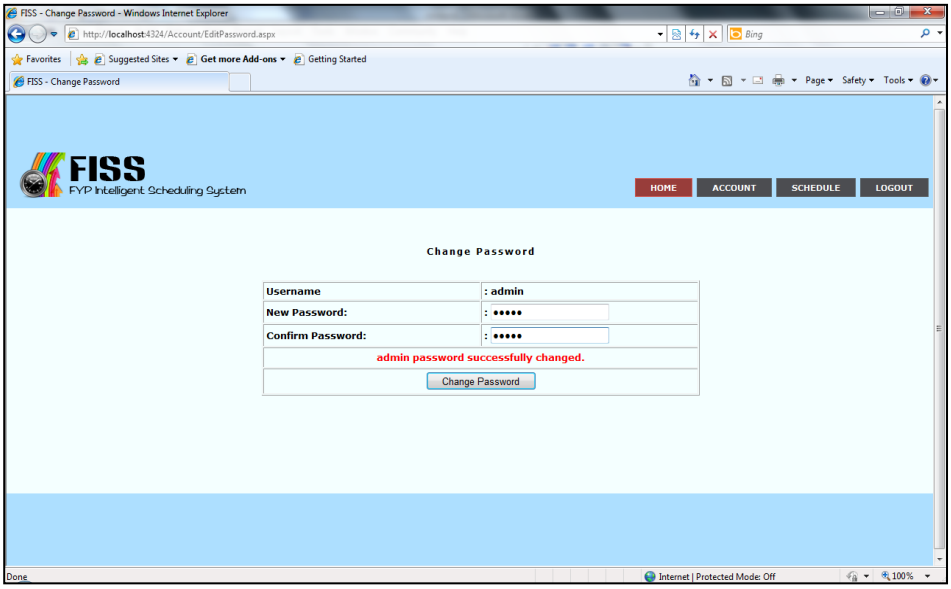

Figure 16: Change Password Page

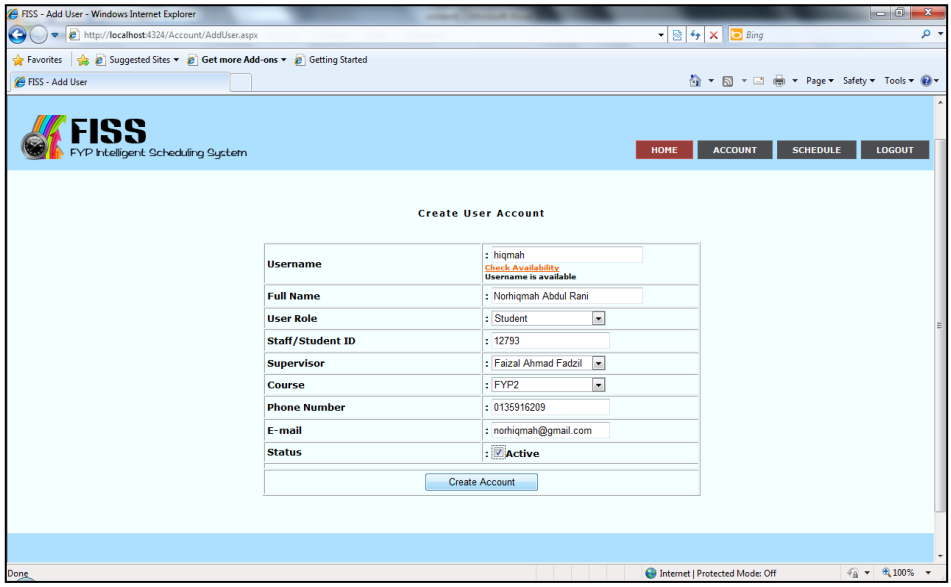

Figure 17: Add User Page

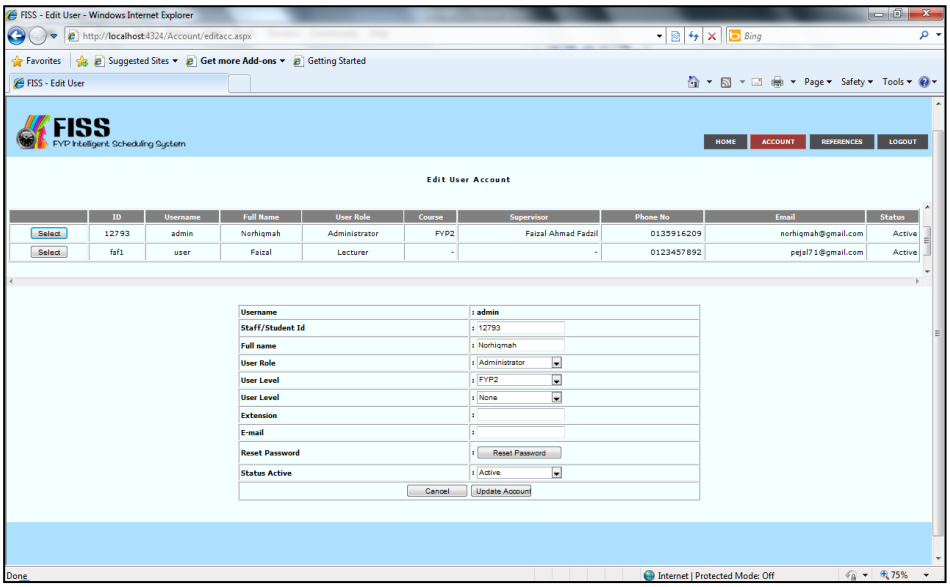

Figure 18: View/Edit User Page

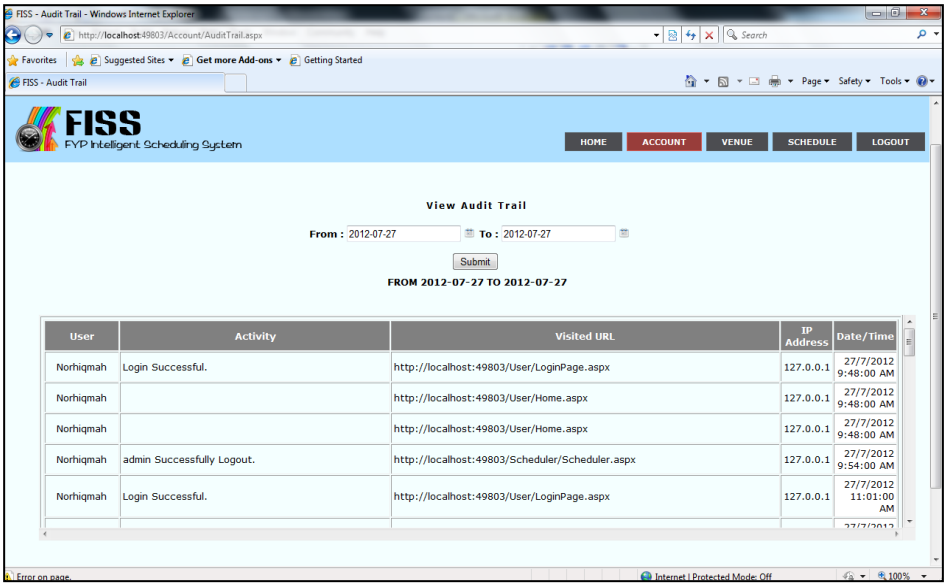

Figure 19: Audit Trail Page

Book A Venue section will only be available for the administrator (see Figure 19). At this section, the administrator needs to select a date and courses before generating. This is to ensure the system to count the number of students registered for that course. By clicking on the checkbox and click the save button, the database for the lab_booked will be updated.

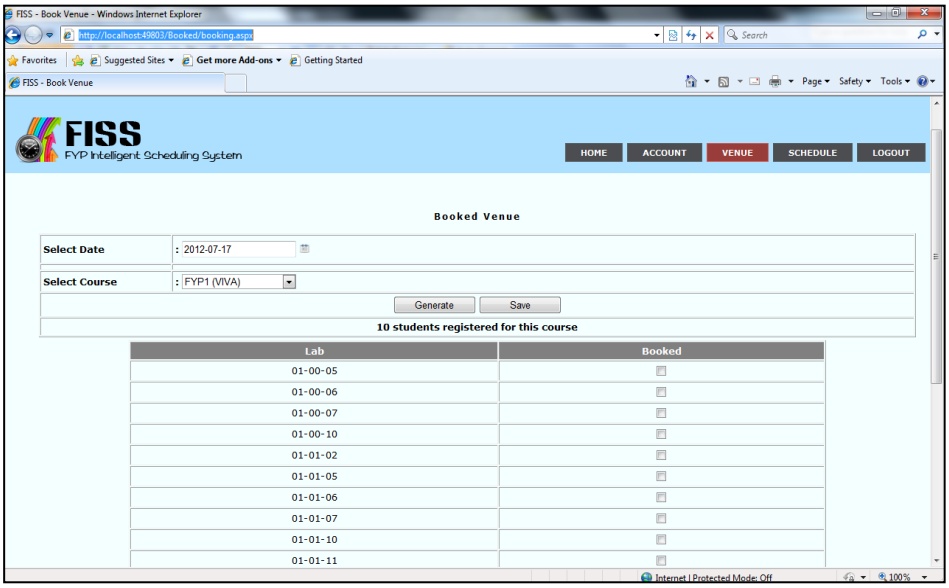

Figure 20: Book A Venue Page

For the presentation scheduler main page, the admin can viewed both functions which are schedule management and view schedule meanwhile for the normal user, they only have view schedule functions (see Figure 21).

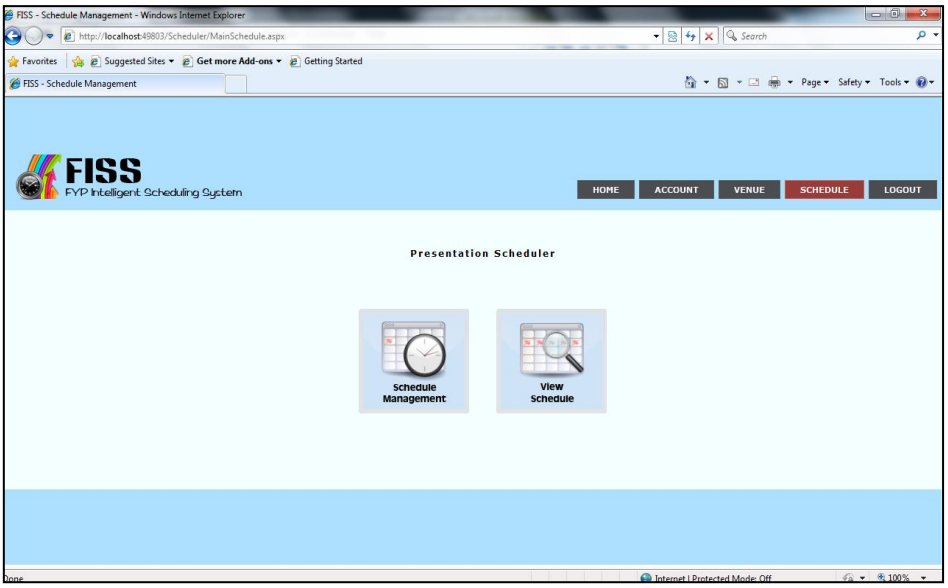

Figure 21: Presentation Scheduler Main Page

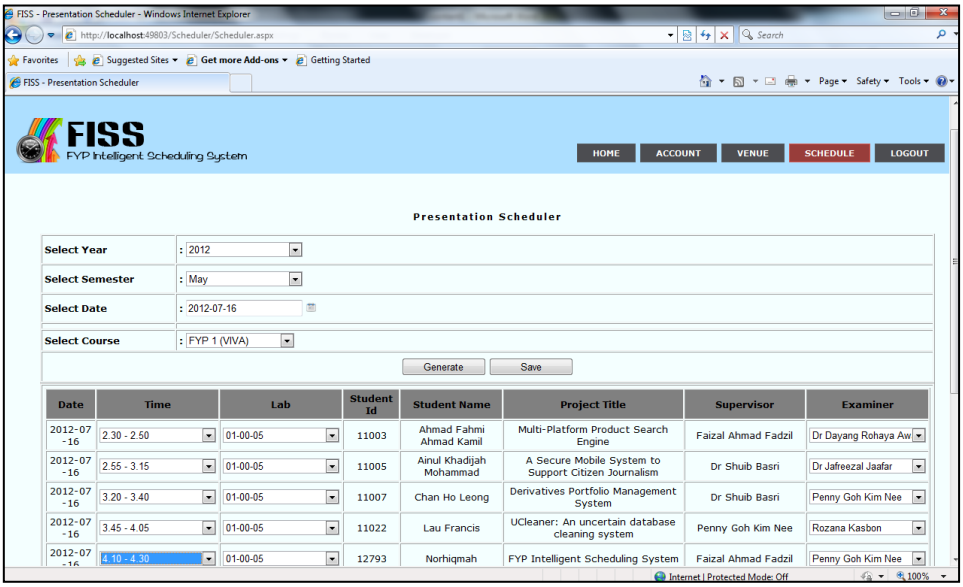

Figure 22: Schedule Management Page

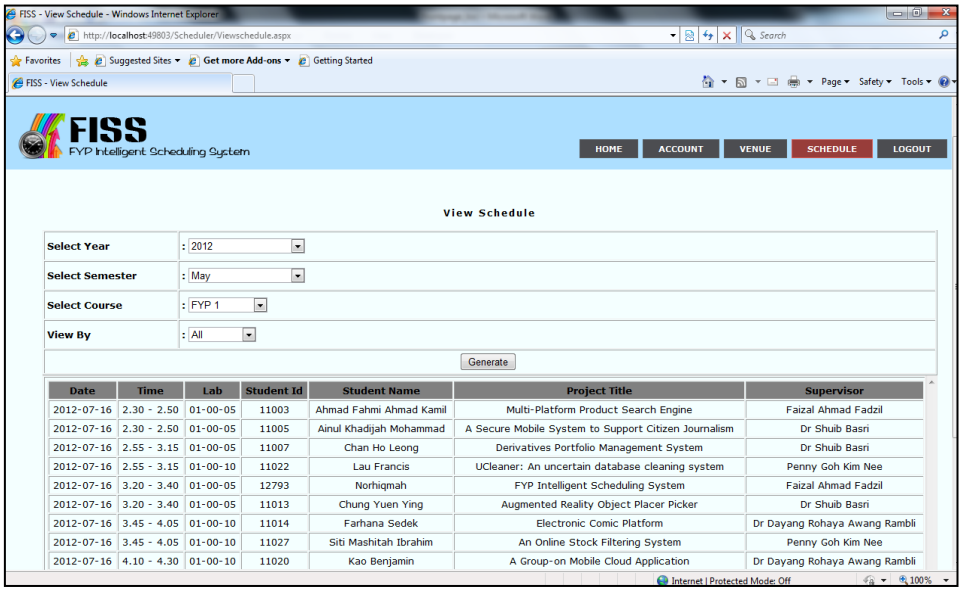

Figure 23: View Schedule Page

4.4 Web Application Usability Test Survey

The survey has been conducted to six (6) respondents with time constraint of five (5) minutes per person in order to have a general browsing experience and to evaluate the general look and feel of the web application. The survey which consists of seventeen (17) questions altogether based on the users general observation (refer Appendix 5). The findings are as below:

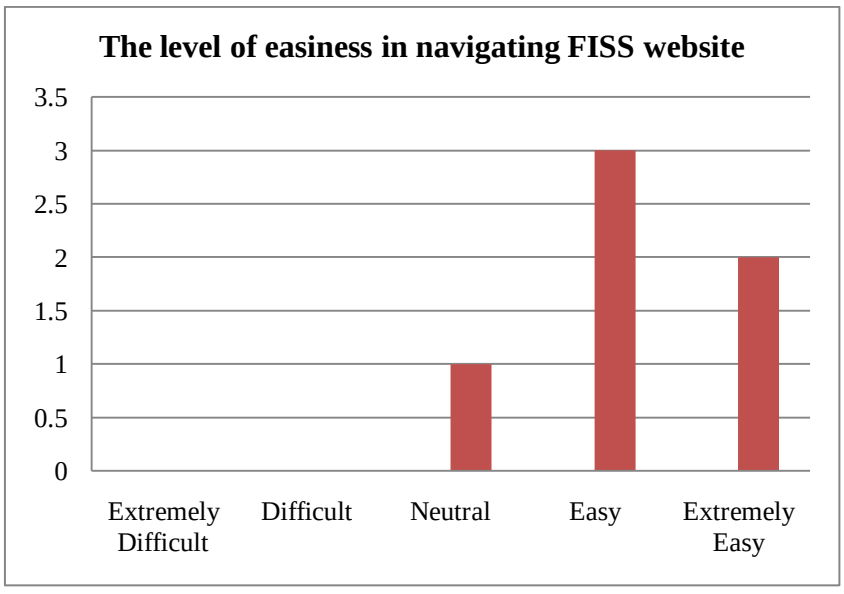

Figure 24: Results for the level of easiness in navigating FISS website

From the question “How easy it is to navigate through the website?” it is found that the mod of responses is under the *Extremely Easy* group while *Easy* hold the second most answered responses and *Neutral* received the lowest responses. Based on this information, it can be said that the web application is generally extremely easy to navigate, and this helps in deciding whether or not to make enhancement or changes on the web application.

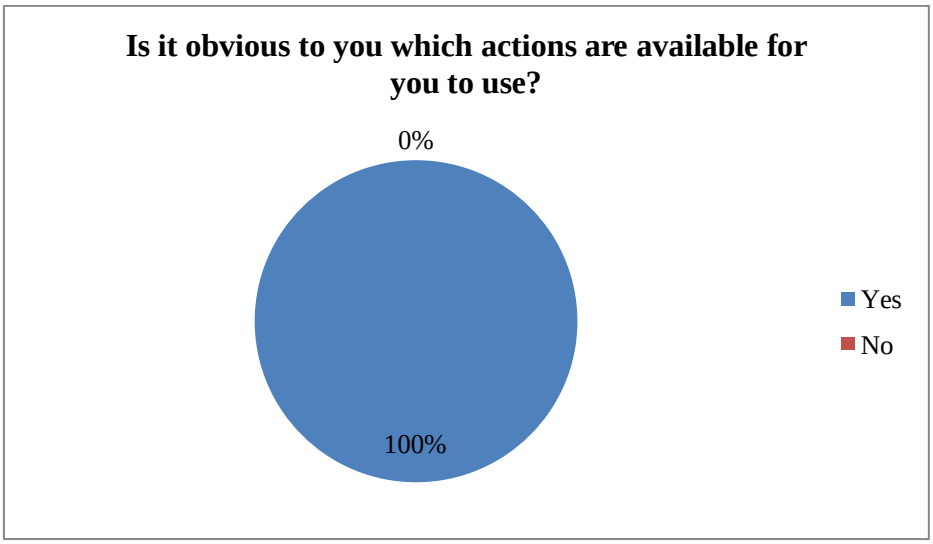

Figure 25: Results for is it obvious for you which actions to use.

Based on the responses received, 100% of the respondents agree that the icon used is suitable for the whole web application. Based on this information, it can be said that the user can understand the icon used easily.

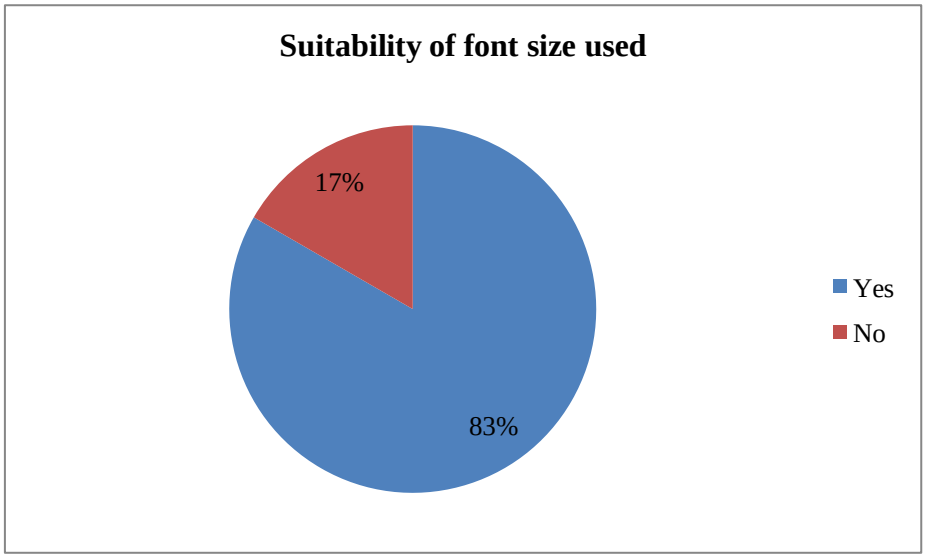

Figure 26: Results for suitability of font size used.

Based on the responses received, 83% of the respondents agree that the font size used is suitable for the whole web application meanwhile only 17% respondents think that the font size is unsuitable due to his/her short-sightedness. Based on this information, the web application will continue with the font face, but the size used will be enhanced by only 0.5em in order to cater to the 17% respondent's problem.

Questions	Rating Average (minus 1 or 5 minus the rating average)
1. I think it is easy to understand the flow of the module	4.2 – 1 = 3.2
2. I found the module to be unnecessarily complex	5 - 1.3 = 3.7
3. I think I would like to use this module frequently	4.3 -1 = 3.3
4. I thought there was too much inconsistency in this module	5 - 0.6 = 4.4
5. I found the various module in this web application were well integrated	4.2 – 1 = 3.2
6. I think that I need the support of a technical person to be able to use this module	5 - 1.9 = 3.1
7. I would imagine that most people would learn to use this module very quickly	4.0 – 1 = 3
8. I found the module is very cumbersome to use	5 - 1.7 = 3.3
9. I felt very confident in using this module	3.8 – 1 = 2.8
10. I needed to learn a lot of things before I could get going using the module	5 - 1.9 = 3.1
Total	32.9

Figure 27: Results for 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 and each question has its own rating. This value obtain can be used to calculate the SUS score. First, sum the score contributions from each question. Each question 's score contribution will range from 0 to 4. 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. 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 32.9. Next, the sum will be multiplied with 2.5; 32.9 x 2.5 = 82.25. Based on this, the result is more that 50% which makes the FISS web application's level of usability is high.

CHAPTER 5

CONCLUSION AND RECOMENDATIONS

5.1 Conclusion

This project will serve the need of a reliable FYP Intelligent Scheduling System for FYP coordinator to refer to in order to schedule the presentations for both FYP1 and FYP2 courses. This FISS web is successfully built to be used by all the users; administrators, lecturers and students. The system is aiming to help the coordinator to schedule the presentations way much easier than the manual system. In other words, it enables the coordinators to manage the presentation schedule through this centralized web application system. Though, the web application is not for public use. It will only be used by certain users consists of; FYP coordinator, lecturers, students and also the lab administrator.

5.2 Recommendations

FISS web application can be upgraded to the next version which is version 2.0 in order to improve and to add more functionality, such as statistic graph, individual progress lecturer's background and also according to the specific major; Multimedia, Knowledge Management, Software Engineering and E-Business. Besides, list of FYP's topic could be added in order to allow the admin for further analysis.

Furthermore, advance login function might be considered as additional features in order to enhance the security features. Thus, it will be safe for user to login and store the vital data. Besides, notification system should be applied to notify the administrator regards to the updated data. Therefore, it will help them to aware that there is an update on user information and admin can verify the updated information.

In addition, with the technology advancement in mobile where people can surf internet through mobile phones, it is possible to upgrade FISS system so that it can be accessed and viewed in the mobile version.

Last of all, the 1st version of FISS system takes some time to develop because there is no present of database. Hence, when the 1st version already implement, to upgrade to the 2nd version would be much easier since the database is already developed.

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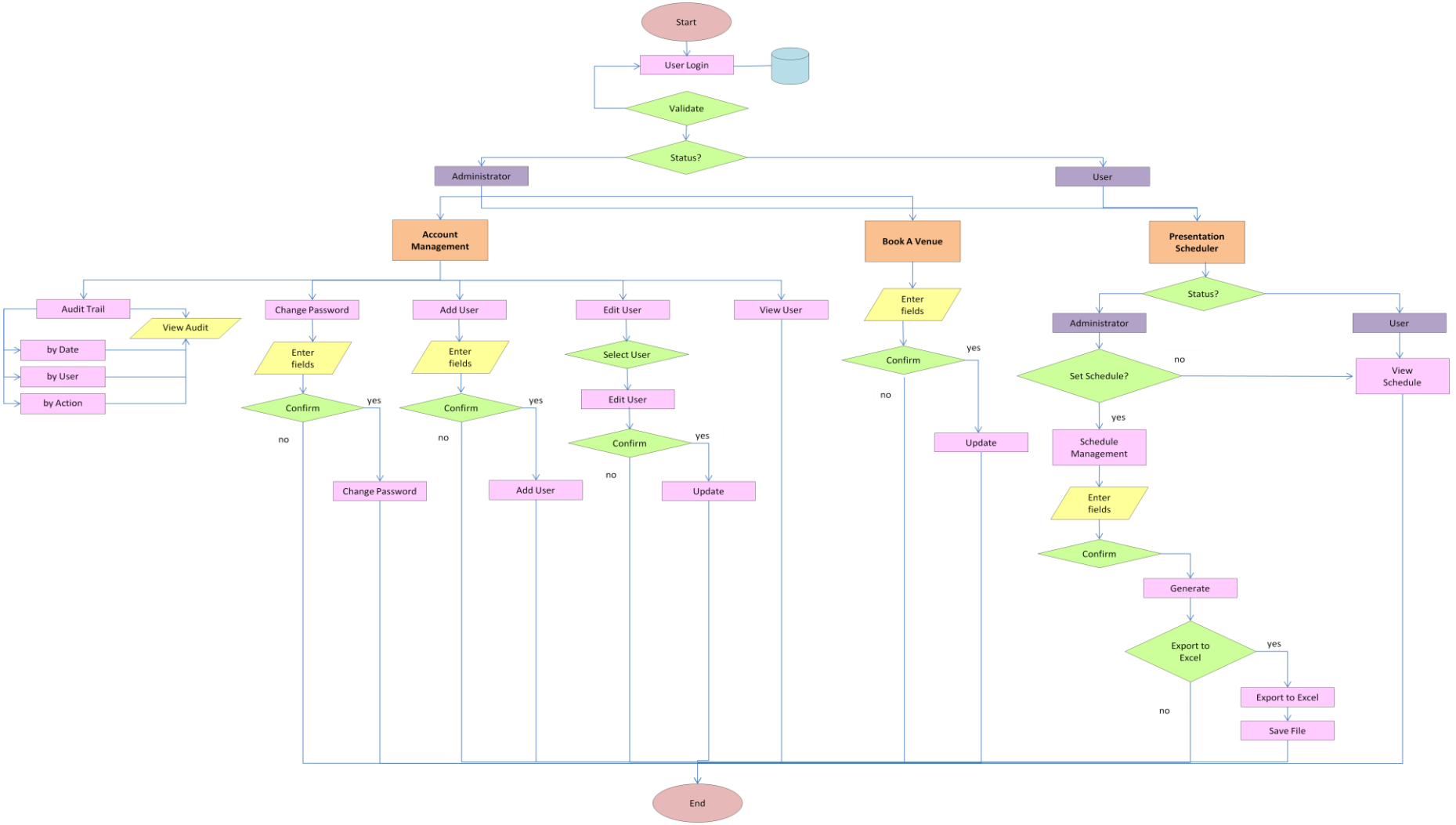
APPENDIX

Appendix 1

FISS Main Flow Chart



Appendix2

Gantt Chart and Milestone

		FYP 1																FYP2													
NO	PROCEDURE	FEBRUARY				MARCH				APRIL				MAY				JUNE				JULY				AUGUST				SEPTEMBER			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	Title selection																																
2	Submit proposal																																
3	Meeting with supervisor																																
4	Preliminary research work																																
5	Extended Proposal																																
6	Proposal Defense																																
7	Project work proceeds																																
8	Interim Report																																
9	Project work proceeds																																
10	Technical report																																
11	Development phase																																
12	Testing																																
13	Implementation																																
14	System Delivery																																

Appendix 3

Project Key Milestone

√ - Research on the technical aspect (.net framework)

√ - Interview with CIS FYP Coordinator (get the requirement)

√ - Preliminary Report

√ - Progress Report

√ - Update the Gantt Chart

√ - Develop the Use Case Diagram

√ - Present quarter of the project to the supervisor

√ - Develop the database in SQL (sqlyog)

√ - Revise the class diagram and use case diagram

√ - Build and develop the web application function

√ - Debugging

√ - Dissertation

√	Completed
o	Underway

Appendix 4

Interview Outline

<table>
<tr><th colspan="2">Interview Outline</th></tr>
<tr><td>Interviewer:
Norhiqmah Abdul Rani</td><td>Interviewee:</td></tr>
<tr><td colspan="2">Appointment Details</td></tr>
<tr><td colspan="2">Date:
Start time: End time:
Venue:
Department:</td></tr>
<tr><td colspan="2">Objectives & Reminders</td></tr>
<tr><td colspan="2">• To gather user's background information (job scope, daily tasks, system relevancy)
• To gather information on the current scheduling system
• To gather any documents to be reviewed</td></tr>
<tr><td colspan="2">Agenda & Estimated Time</td></tr>
<tr><td>Introduction
Background on the project research objectives
Background on the proposed new method
• Topic 1: Questions on user
• Topic 2: Questions on existing system and challenges faced
General question:</td><td>1 min
5 min
2 min
7 min
10 min
5 min</td></tr>
<tr><td colspan="2">General Observations:</td></tr>
<tr><td colspan="2">Questions:
1) Can you briefly explain on your task of scheduling the FYP timeline?
2) Can you tell me the average time taken to create one complete presentation schedule?
3) With the existing system in mind, can you tell me how do you make quick changes on the scheduling if there are any? (on what basis)
4)</td></tr>
<tr><td colspan="2">Relevant questions/Unresolved issues:</td></tr>
</table>

Appendix 5

FISS Web Application Usability Test

FISS Web Application Usability Test

This survey is conducted to find out the level of usability of the web application FYP Intelligent Scheduling System (FISS). You are given 5 minutes to go through the whole website. Your answers will be much appreciated and will be used to improve the usability of the web application. Thank you.

General Observation

1. How easy it is to navigate through the website?

1	2	3	4	5
Extremely Difficult	Difficult	Neutral	Easy	Extremely Easy

2. Is it obvious to you which actions are available for you to use?

☐ Yes ☐ No

3. Look and Feel
   a. Is the website consistent from pages to pages?

☐ Yes ☐ No

   b. Do you find the font size used suitable?

☐ Yes ☐ No(Please specify why)_____

   c. Are the colors chosen suitable for the web application?

☐ Yes ☐ No(Please specify why)_____

   d. Do you find the sizes of the buttons available suits the web application?

☐ Yes ☐ No(Please specify why)_____

   e. Do you think the whole website look neat?

☐ Yes ☐ No(Please specify why)_____

FISS System Usability Scale (SUS)

(Rate the level of usability)

1. I think it is easy to understand the flow of the module

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. I found the module to be unnecessarily complex

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3. I think I would like to use this module frequently

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

4. I thought there was too much inconsistency in this module

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

5. I found the various modules in this web application were well integrated

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

6. I think that I would need the support of a technical person to be able to use this module

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

7. I would imagine that most people would learn to use this module very quickly

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

8. I found the module is very cumbersome to use

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

9. I felt very confident in using the module

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

10. I needed to learn a lot of things before I could get going using the module

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Final Year Project Intelligent Scheduling System (FISS)

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***Abstract* — This research is encompassing the Final Year Project presentation and Scheduling Management, which utilizes the web application of Final Year Project Intelligent Scheduling System (FISS). FISS is an online web-based system that has been develops to ease and help the coordinator to schedule the presentation. It focused more on the Final Year Project Presentation in Universiti Teknologi PETRONAS. Besides, it provides one stop centre for the FYP coordinators, lecturers, examiners as well as the students to have an access to the system from office or home or anywhere else as long as there is an internet connection. FISS is able the lecture to arrange the presentation schedule in a shorter time as all the data required has been stored inside the system database. It have been developed using ASP.Net language and having MySQL as the database. This paper also touches on the system flow, mechanism and tools used to develop and use the web application. A survey was conducted to gather information on the web application general look and feel in order to know the level of the usability of the FISS. The result shows that the system is perceived as convenience and useful in completing daily tasks of the users and the SUS is 82.25%, which is high in usability. Above all, this system makes the presentation's scheduling task way much easier than the manual way**.

Keywords - Scheduling Management; Web Based System

I. INTRODUCTION

The system in this project; FISS is specifically focused on the presentation schedule of the FYP's presentation. This is crucial for the students and lecturers in order to keep track on their presentation's date, time and venue. Therefore, FISS is developed to ease and help the coordinator to schedule the presentations. Hence, there is no need to do the manual analysis and comparison anymore. Possibly, a web-based system like FISS can solve the coordinator problem as this system provides feature of storing information and data of the peoples involve in scheduling the presentation. The purpose of using this system is to increase productivity, reduce scheduling time, simplify the coordinator's task and manage resource scheduling efficiently. Furthermore, the entire task will be accomplished by the system after particular data needed was inserted.

According to the research done based on the manual ways of scheduling the presentation. Below are the lists of identified problem that might occur when the nature of manual ways been implemented in developing a scheduling system;

i) Manual preparation of a new FYP presentation schedule is time consuming and tedious especially when it involved a lot of other timetable ranging from student timetable, lab timetable, examiners timetable and utilities and devices available.
ii) Problem to identify a quick solution for a sudden request to change timetable schedule of FYP presentation which involve students and examiners. The FYP's coordinators need to refer back to all the timetable of each person to rearrange the schedule manually.
iii) No FYP database for students currently exist that enable fast searching of a particular data when requested.
iv) A lot of data redundancy

The objectives of the system that needs to be implemented are; to create a system that can expedite FYP presentation scheduling data creation much faster and reliable and to reduce the paper usage in order to reduce cost as the current way all the data relates to scheduling matter are in a paper-based.

This system will be focus on the development of a web-based system for FYP presentation scheduling process. It will help and ease the coordinator works in arranging the schedule for all the presentations in this course. The author will be focusing on storing the data for CIS department to smaller the scale of study and also it will be easy for her to get all the resources from the respective person. Besides, it will also focus on developing a system that is online and available for the user to access the system in order to view the presentation schedule.

Emphasis on what action should be taken next will be given to knowledge acquisition to develop the knowledge base and inference methods in order to deduce the solution. Besides, the scope of this project will evolve around the learning of the website development; VB.net and My SQL in developing this system. This will also include the creation of necessary database for the users, interface in building the application and its implementation.

II. LITERATURE REVIEW

A. Scheduling: Definition and Concepts

Scheduling is a broad term that refers to a wide range of processes. For example, rostering, booking appointments, timetabling, planning, and meetings and allocating resources, are all forms of scheduling. Timetabling is a particular form of scheduling that involves placing groups of people or objects into a predefined set of times according to some set of criteria. Timetabling features on the grouped to be scheduled. A good example of timetabling, which most people can relate to, is the school timetable. For example, classes "Mathematics",

"Literature", "Science", "History", "Geography" must all be scheduled 10 periods each week.[i]

The field of scheduling has attracted a lot of attention and one of the most prominent works on scheduling was by Henry Laurence Gantt, who introduced the Gantt Chart in 1917 (Schwalbe,2002).[ii] Besides, Brucker (2001) mentioned in his book that "A schedule is for each job an allocation of one or more time intervals to one or more machines."[iii] Meanwhile Pinedo said "Scheduling concerns the allocation of limited resources to tasks over time. It is decision-making process that has goal of optimization of one or more objectives."[iv] Therefore, it can be summarized that the scheduling involves dedicating one or more limited resources towards completing one or more objectives, by spreading the tasks over time intervals in such a way that efficiency can be achieved. In addition, clashing occurs when a person has been scheduled to be in two places at one time where the actual facts is a person cannot be in two different places at one time. [v]

B. *Current State of the Art*

Currently the coordinators use spreadsheets such as Microsoft Excel to store and analyse all the information related to the student FYP's presentation. However, eventually a spreadsheet becomes too cumbersome to store records and it might become inconvenient to search for individual spreadsheet; different level of examiners information, students with different supervisors and the supervisors themselves. Consequently, this will lead to a lot of data redundancy which will lead to data anomalies and corruption.

C. *Existing System Related to Scheduling*

The existed system found is CELCAT scheduling tool. It is popular and flexible scheduling tool used extensively in Colleges and other teaching centers. CELCAT timetabler allows the users to turn off active clash checking so that they can quickly construct a timetable without interferences from the clash checker. CELCAT has been proven to reduce time spent on scheduling by more than 65 percent" which means for every thirty (30) hours spent on creating a scheduling manually, this system can save almost twenty (20) hours.[vi]

TimeTabler is one of the examples of existing system. It is a fast and friendly computer program that is carefully designed to help schedule the user timetable quickly and accurately.[vii] Besides, TimeTabler requires no knowledge of computers which is designed very straightforward to use even for the inexperienced computer user. It is designed and allows the user to sit at the keyboard controls and drive their way through the timetable. This system is totally self-checking, as it will never allow the users to allocate by mistake one teacher to two classes at the same time

D. *Online Web Based System*

The benefit of web-based system is the fact that access to the content is easy and requires no distribution of physical materials. A research by Dr.Suzana from University of Malaya (2003), she pointed out that using online based system as an assessment and reporting tool will indirectly save the environment.[viii] The statement is reliable because all the data and documents are in the electronic or softcopy form compared to the hardcopy which use paper and need more trees being cut down.

E. *Scheduling Methods*

In order to schedule jobs there are several scheduling methods that can be followed such as;

i) First Come First Serve - FCFS is a non-pre-emptive technique where a single queue of ready process is maintained and the dispatcher always picks the first one. It does not emphasize throughput.[ix] In addition "It is very simple algorithm to implement because it uses FIFO type of queue". It is suitable for most of batch system as the interactive users normally expect quick response time.

ii) Round Robin - RR is a pre-emptive technique where a single queue of ready process is maintained and a fixed time quantum assigned to each of the running process. After the quantum expires, the process will be blocked and put at the end of the queue then the next process is executed.

iii) Shortest Process Next - SPN is a non-preemptive technique where the execution time of a program can be accurately estimated in advance. A suitable selection criterion is to always pick-up the shortest process.

iv) Shortest Remaining Time Next - SRTN is a pre-emptive technique in which the scheduler always dispatched those ready processes which has the shortest expected remaining time to completion. When a new process is submitted, the currently running process is dispatched when it has obviously a smaller remaining time that all other ready ones.

III. METHODOLOGY

A. *Research Methodology*

This section focuses on giving the insights on how the research is carried out. This includes the mode of data collection, how the data is analyzed and the research tool design. Vital information for this research work are collected through primary and secondary sources with the combination of:

i) Interview with the FYP coordinator of Computer Information Science (CIS) department, UTP.

ii) Observation of the current scheduling management in order to have more understanding on the manual presentation scheduling management flow.

iii) FISS Web Application Usability Test will be conducted on selected population, which consists of the system's related users.

B. *System Methodology*

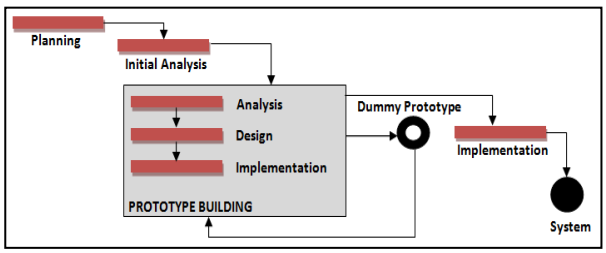

Figure 3B-1: Throwaway Prototyping Model

Based on the fact-finding activities findings, it can be said that the proposed system should be developed in a throwaway

prototype environment, which requires the developer to always analyze and design the current prototype state with the user to ensure the developer meet the user requirements, as user requirements tend to change from time to time.

C. *Tools and Equipments*

The hardware and software specifications of this project include:

i. Regular PC or Laptop
ii. Internet browser
iii. SQLyog

In this context, COMPAQ Presario v3000 was used to do the testing of FISS. The device has an installed SQLyog as MySQL database platform and Internet Explorer (IE) as the browser. The system is developed using Active Server Page (ASP.Net) language and Visual Studio 2005 Ultimate as the developer tool.

D. *System Architecture*

The FISS web application was built by asp.net 3.5 scripting and architecture. Hence, it requires internet information services (IIS) 7 architecture to integrate the request processing from IIS and ASP.net (Templin, 2010). The core functionality of IIS is to configure the server. For example, managing the web and FTP sites and configure setting in the web sites or enable or disable sites, services and applications. Besides, IIS 7 components are protocol listener (HTTP.sys) and services World Wide Web Publishing Service (WWW) and Windows Process Activation Service (WAS).

The HTTP request was passes through several sets of modules in the web server core. In each module, it will process the request and native modules will create an AppDomain. Then, after the request finished all the process, it will return a response to HTTP.sys and client will received the response. When user send request to web server, HTTP.sys will get the request and send to WAS. Next, WAS will request configuration to process the client request and WWW service will start the worker process in order to process and authenticate the request before submit back to HTTP.sys and to the client's computer.

IV. RESULT AND DISCUSSION

A. *Data and Requirement Gathering*

Interview is the most common and direct method to gather information. The session has been conducted twice, which the initial interview was conducted through personal meeting with the Computer Information System (CIS) Department. Both interviews have been conducted to understand the current flow of presentation schedule has been made and requirement needed for the system. From the interviews and meetings with the CIS department FYP's coordinator; Madam Rozana Kasbon, the process flow have been identified to guide the project development and database design for marks function.

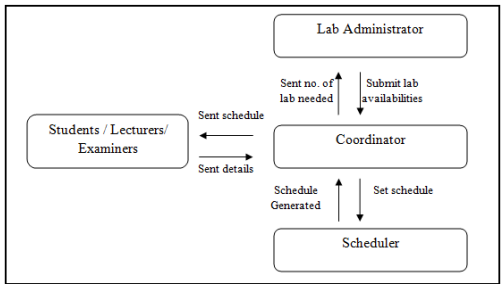

Figure 4A-1: Flow of Current System

B. *Data and Requirement Analysis*

The analysis phase involves taking into consideration all the objectives outlined earlier in the planning phase and gather all the information in order to further proceed with the project. Basically there are three (3) main functions in FISS which are the "Account Management" function where the administrator or coordinators need to enter the details of the students, lecturers and examiners. Next, is "Book A Venue" function, where the coordinator can booked the lab according to their preferred date depends on the availability of the lab. Lastly, "Presentation Scheduler" functions where the coordinator can arrange the presentation schedule at this function. In this function there are two sub-functions; schedule management (which can only be viewed by administrator) and view schedule (accessible by administrator and normal user)

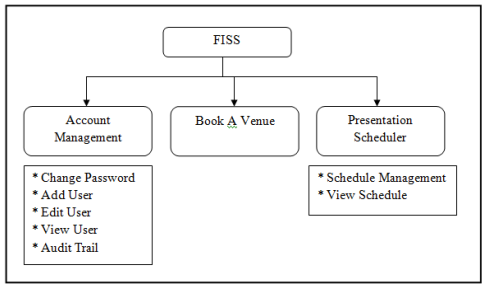

Figure 4B-1: FISS Main Function

In addition, there are two (2) main users involved in FISS, which are the actual user and also the administrator of the system. For a front end user, there are three (3) main activities that can be access, edit the user information, view supervisor and supervisee and view generated schedule. On the other hand, the administrator has four (4) different accesses to the system, manage all the user information, set and manage the schedule, view generated schedule and manage and edit their details.

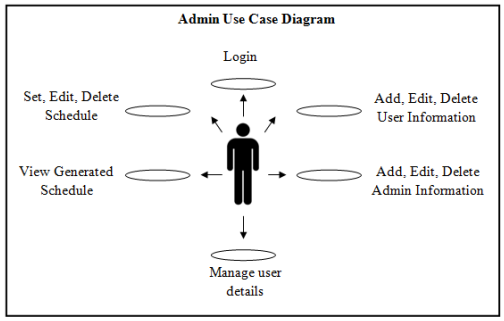

Figure 3D-1: Administrator Use Case Diagram

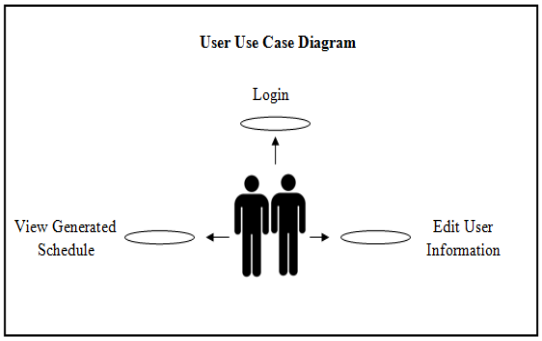

Figure 3D-2: Normal User Use Case Diagram

C. *Web Application Usability Test*

A test has been conducted to 6 respondents using a COMPAQ Presario V3000 with IE as the internet browser, with time constraint of 5 minutes per person in order to have a general browsing experience and to evaluate the general look and feel of the web application. Another 5 to 10 minutes was given to the respondents to go through FISS users' module.

The survey which consists of 17 questions altogether, was divided into two sections, which (1) is the General Observation and (2) the System Usability Scale (SUS).

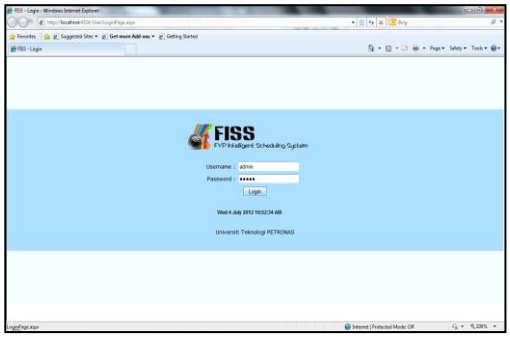

Figure 4C-1: FISS Login Page

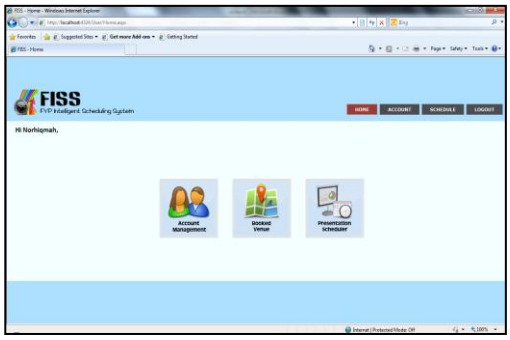

Figure 4C-2: FISS Homepage

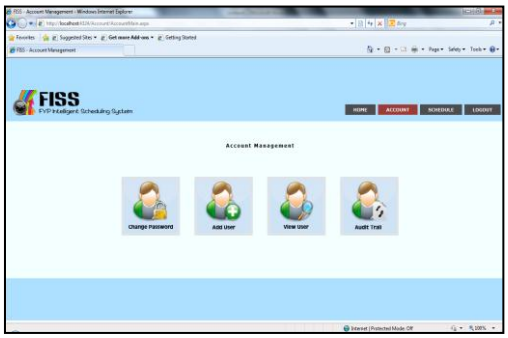

Figure 4C-3: FISS Account Management Main

Figure 4C-4: FISS Presentation Scheduler Main

D. *FISS Web Application Usability Test: General Observation Results*

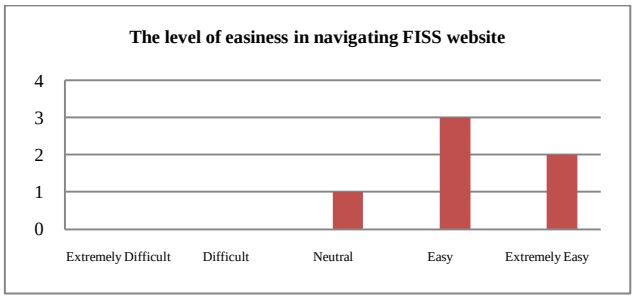

Figure 4D-1: Results for the level of easiness in navigating website

From the question "How easy it is to navigate through the website?" it is found that the mod of responses is under the *Extremely Easy* group while *Easy* hold the second most answered responses and *Neutral* received the lowest responses. Based on this information, it can be said that the web application is generally extremely easy to navigate, and this helps in deciding whether or not to make enhancement or changes on the web application.

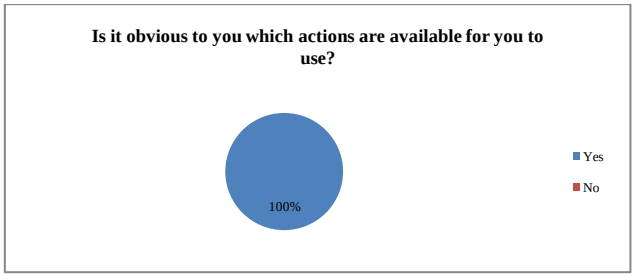

Figure 4D-2: Results for User Awareness of Available Actions

Based on the responses received, 100% of the respondents agree that the icon used is suitable for the whole web application. Based on this information, it can be said that the user can understand the icon used easily.

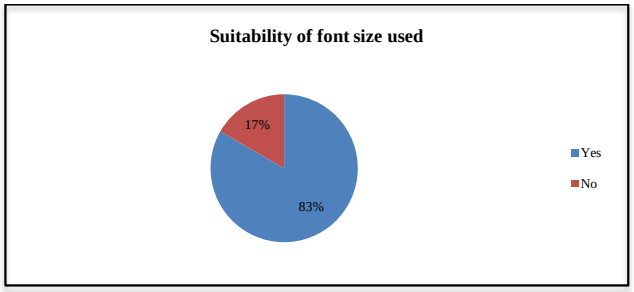

Figure 4D-2: Results for suitability of font size used.

Based on the responses received, 83% of the respondents agree that the font size used is suitable for the whole web application meanwhile only 17% respondents think that the font size is unsuitable due to his/her short-sightedness. Based on this information, the web application will continue with the font face, but the size used will be enhanced by only 0.5em in order to cater to the 17% respondent's problem.

E. *FISS Web Application Usability Test: System Usability Scale (SUS)*

Questions	Rating Average (minus 1 or 5 minus the rating average)
1. I think it is easy to understand the flow of the module	4.2 – 1 = 3.2
2. I found the module to be unnecessarily complex	5 - 1.3 = 3.7
3. I think I would like to use this module frequently	4.3 -1 = 3.3
4. I thought there was too much inconsistency in this module	5 - 0.6 = 4.4
5. I found the various module in this web application were well integrated	4.2 – 1 = 3.2
6. I think that I need the support of a technical person to be able to use this module	5 - 1.9 = 3.1
7. I would imagine that most people would learn to use this module very quickly	4.0 – 1 = 3
8. I found the module is very cumbersome to use	5 - 1.7 = 3.3
9. I felt very confident in using this module	3.8 – 1 = 2.8
10. I needed to learn a lot of things before I could get going using the module	5 - 1.9 = 3.1
Total	32.9

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. First, sum the score contributions from each question. Each question's score contribution will range from 0 to 4. 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. 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 32.9. Next, the sum will be multiplied with 2.5; 32.9 x 2.5 = 82.25. Based on this, the result is more that 50% which makes the FISS web application's level of usability is high.

V. CONCLUSION AND FUTURE WORK

This project will serve the need of a reliable FYP Intelligent Scheduling System for FYP coordinator to refer to in order to schedule the presentations for both FYP1 and FYP2 courses. This FISS web is successfully built to be used by all the users; administrators, lecturers and students. The system is aiming to help the coordinator to schedule the presentations way much easier than the manual system. In other words, it enables the coordinators to manage the presentation schedule through this centralized web application system. Though, the web application is not for public use. It will only be used by certain users consists of; FYP coordinator, lecturers, students and also the lab administrator.

FISS web application can be upgraded to the next version which is version 2.0 in order to improve and to add more functionality, such as statistic graph, individual progress lecturer's background and also according to the specific major; Multimedia, Knowledge Management, Software Engineering and E-Business. Besides, list of FYP's topic could be added in order to allow the admin for further analysis.

Furthermore, advance login function might be considered as additional features in order to enhance the security features. Thus, it will be safe for user to login and store the vital data. Besides, notification system should be applied to notify the administrator regards to the updated data. Therefore, it will help them to aware that there is an update on user information and admin can verify the updated information. In addition, with the technology advancement in mobile where people can surf internet through mobile phones, it is possible to upgrade FISS system so that it can be accessed and viewed in the mobile version.

Last of all, the 1st version of FISS system takes some time to develop because there is no present of database. Hence, when the 1st version already implement, to upgrade to the 2nd version would be much easier since the database is already developed.

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