UNIVERSITY OF DAR ES SALAAM

COLLEGE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATIONS

FINAL YEAR PROJECT

FINAL REPORT

TITLE: DESIGNING AND DEVELOPMENT OF THE PROJECT MANAGENENT SYSTEM (PMS)

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REG No: **2010-04-04315**

DEGREE PROGRAM: **B. Sc. TELECOMMUNICATIONS ENGINEERING**

SUPERVISOR'S NAME: **MR. NAIMAN, S.**

SUPERVISOR'S SIGNATURE:……………………..

SUBMISSION DATE: **12th JUNE, 2014**

CERTIFICATION

STATEMENT OF AUTHORSHIP AND ORIGINALITY

I declare that this report and the work described in it are my own work, with any contribution from others expressly acknowledged and/or cited.

I declare that the work in this report was carried out in accordance with the Regulations of the University of Dar es Salaam and has not been presented to any other University for examination either in Tanzania or overseas. Any views expressed in the report are those of the author and in no way represent those of the University of Dar es Salaam.

SIGNED: .... DATE: ....

This report may proceed for submission for assessment for the award of Bachelor of Science in Telecommunications Engineering at the University of Dar es Salaam.

Review Committee Signature: .... Date: ....

Supervisor Signature: .... Date: ....

ABSTRACT

Undergraduate science students are required to do a final year scientific project so as they can be awarded their bachelor degrees. The current system of final year projects involves a lot of manual movement of papers (such as title proposals, attendances and projects reports). There is a big risk of losing the papers, high cost of movements, missing the deadline for submission due to missing of the supervisor's signature, a lot of printing costs and unreliable way of keeping records of everything for future use; which in turn causes a lot of misunderstandings and complains among students and even supervisors.

Project Management System (PMS) is the web-based system for the modern way of managing undergraduates' final year projects. The system which can be accessed anywhere with the internet connection. This development of this system is based on computer programming and coding; using of different computer programming languages such as HTML, CSS, JavaScript, PHP, AJAX and MySQL database backend to obtain a web-based system.

The full designing and development of this system has been achieved and it has been added to the already developed electronic framework for the electronic and automated ways of managing different activities in the department of Electronics and Telecommunications Engineering (ETE) so as to provide an electronic way of managing the final year projects for all final year students in our department, ETE.

The system has the capabilities of keeping track and storing of all activities such as project title proposal form submissions, progress and final reports submission, and supervision and consultation attendances in a modern electronic way. The system also reduces delays, costs, complexity and connects everything in real time including tools for project training, help, project schedule and other activities. It enhances the real time communication between students, supervisors and coordinators.

ACKNOWLEDGEMENT

I would like to thank my God almighty for giving me this wonderful opportunity to implement this system by providing me with the right people and resources at the right time.

I express my deep gratitude to management of University of Dar es Salaam (UDSM), College of Information and Communication Technology (CoICT), in particular department of Electronics and Telecommunications (ETE) for giving me a chance and direction to do a final year project to complete my bachelor degree program in B. Sc. Telecommunications Engineering.

Next, I extend a special hand of gratitude showing my appreciation to my project supervisor, Mr. Shililiandumi Naiman for accepting me and let me do my project under his supervision. I greatly thank him for his time, guidance, editorial work, comments and remarks and patiently going on with me through my consultations and everything concerning this project.

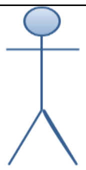
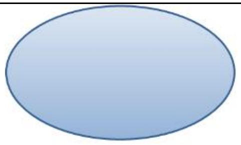
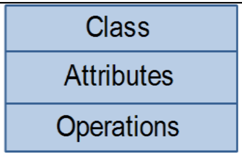
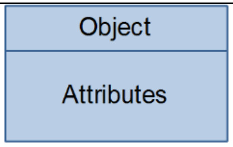
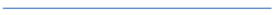
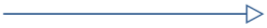
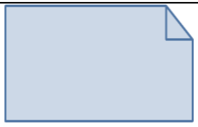
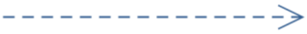
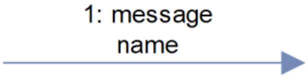
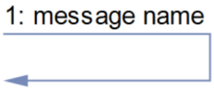
I won't forget other members of staff of department of Electronics and Telecommunications (ETE), for their participation in our project presentations and their challenges, comments, support and criticism where required, which gave me a new experience in professional presentations.

Lastly, it would not be fair if the following people will not be acknowledged for their help during different phases and problems associated to this project. Mr. Michael Hudson, Mr. Innocent Charles and Mr. Ephraim Swilla. I extend my thanks to my fellow classmates for their support and encouragement during the course of this project.

May our God blessings be with us all!

TABLE OF CONTENTS

LIST OF SYMBOLS

SYMBOL	DESCRIPTION
	Actor (i.e. user of the system)
	Use Case
	Class
	Object
	Direct (binary) Association
	Generalization
	Note
	Dependency
	Message Call
	Self-Delegation

LIST OF ABBREVIATIONS

ACRONYM	DEFINITION
CoET	College of Engineering and Technology
CoICT	College of Information and Communication Technologies
CoNAS	College of Natural and Applied Sciences
CSS	Cascading Styling Sheet
DBMS	Database Management System
DML	Data Manipulation Language
ETE	Electronics and Telecommunications Engineering
GUI	Graphical User Interface
HTML	Hyper-Text Makeup Language
MVC	Model-View-Controller
PC	Personal Computer
PHP	Hypertext Pre-Processor
PMS	Project Management System
RDBMS	Relational Database Management System
SQL	Structured Query Language
TE	Telecommunications Engineering
UDSM	University of Dar es Salaam
UI	User Interface
UML	Unified Modelling Language
XHTML	Extensible Hyper-Text Makeup Language

LIST OF FIGURES

LIST OF TABLES

CHAPTER ONE
INTRODUCTION

1.1 Background

University of Dar es Salaam requires all students who are taking degree programmes in Bachelor of Science in colleges such as CoET, CoICT and CoNAS to work on the individual final year projects. The final year project is a compulsory and it is regarded as a core course in the final year during the completion of the degree program [1].

The project course represents a complex process which involves the students and lecturers who supervise the students. The project course involves title forms submissions, progress and final report submissions, presentations and other recorded consultations; where by these kind of submissions and interactions go on for whole academic year.

The current system involves a lot of manual movement of papers such as title proposals, attendances and projects reports. There is a big risk of losing the papers, high cost of movements, missing the deadline for submission due to missing of the supervisor's signature, a lot of printing and transportation costs and unreliable way of keeping records of everything for future use; which in turn causes a lot of misunderstandings and complains among students and even supervisors.

In order to keep track of all activities such as project title form submissions, progress and final reports submission, and supervision and consultation attendances; there must be a system which will reduce delays, costs, complexity and connect everything in real time including tools for project training, help, project schedule and other activities.

The Project Management System (PMS) is the system which addresses and provides solutions for the shortcomings of the traditional/current final year project system. It enhances the overall final year project management through the modern electronic web-based Project Management System. It is the central system for the final year projects management.

1.2 Problem Statement

The current way of conducting final year project course is having a lot of shortcomings such as lack of reliable archive for keeping records on the past projects and their completion status. Another big problem is lack of an open information pool where the lectures and students can submit and share the project ideas. Further unreliable sharing of academic materials and information relating to the final year project matters through the use of removable devices and unsorted/scattered forms, e-mails and word of mouth which do not guarantee timely delivery of information to all the targeted parties which it is also very costly and a time consuming way of communication to a supervisor or a project coordinator. Moreover, lack of tracking system for submission and communication between student and supervisor to be used to prove if there was an interaction between them or not during the course of project.

1.3 Objectives

1.3.1 Main Objective

The main objective of this project is to design and implement a web-based system which will be used for management of the final year projects.

1.3.2 Specific Objectives

i. Design a final year project tracking system which will track the flow of all submitted academic information related to the final year project and maintaining the communication among all related parties.

ii. Design and develop the databases which will be used to store all academic information related to the final year projects.

iii. Design and develop the web-based interface/application software system.

1.4 Project Scope

The system currently covers the management of the final year projects within the ETE department, and once it is proven to be the success then it can be extended to be used by other departments and colleges within our university.

1.5 Significance of the System

Upon the successful completion and implementation of this system, the system will improve the project course and process by providing the following:

i. Store the previous projects as a project archive. It will help the coming students to have a look on the past projects and improve or complete the previously incomplete projects.
ii. Allow the lecturers/supervisor or project coordinator to openly provide the project title ideas which can be picked and being implemented by students.
iii. Help students to file in their project titles and make the project title confirmation.
iv. Help the project review panel to review the submitted titles, leaving the necessary recommendations and suggestions.
v. Help to provide the reliable communication and interaction among students, supervisors and coordinators.

1.6 Methodology

1.6.1 Literature Review

Different literatures relating to the project-based learning and the management systems have been reviewed and consulted in order to gain some techniques which have been used in development of this project.

1.6.2 Data Collection and Analysis

Primary data were collected by using the unstructured interview questions, where by different members of the department (i.e. ETE) such as students, supervisor and coordinator were asked so as to obtain the functional requirements of the system. These interviews were done through face-to-face interactions, over the telephone or through different social networks. Secondary data such as the project supervision and consultation schedules, presentations and assessments procedures and protocols will be collected directly from the department through project coordinator.

1.6.3 System Designing

i. System has been modelled depending on the analysis done on the data and requirements collected.
ii. Designing of a web-based PC application with GUI with all the defined characteristics
iii. Designing of database system using MySQL and designing its user interface.
iv. Interfacing the application interface with the database to make the complete system.

1.6.4 System Development and Implementation

This stage involves the programming (using different computer programming languages such as HTML, CSS, JavaScript, PHP, AJAX and MySQL database backend) to obtain a web-based system.

1.6.5 System Testing and Deployment

Lastly, a series of tests have been performed so as to verify that the system meets the user requirements as well as the stated specific objectives. The system gave the positive results on the testing, and it therefore can be deployed for usage in the department of ETE for the final year projects managements.

CHAPTER TWO
LITERATURE REVIEW

2.1 Final Year Project

A final year undergraduate project is an extended piece of an individual’s work. It does not necessarily involve original research or the study of unpublished or primary material. It however must involve the application of knowledge and skills in solving an engineering problem. It requires a student to spend some time working on a topic that appeals him/her, and have regular meetings with your supervisor to discuss your progress. It is a compulsory and it is regarded as a core course in the final year during the completion of the degree program [1].

2.2 Current System

The current system used for the final year project in ETE involves the manual movement of signed papers/forms (hard copies). The title proposal form, attendances, progress reports are all in hard copies. This means that the system used in the present system is paper based. There is no an automated system that handles the management of the final year project process, meaning that the whole process is being operated manually.

There is a big risk of losing the papers, high cost of movements, missing the deadline for submission due to missing of the supervisor’s signature, a lot of printing costs and unreliable way of keeping records of everything for future use; which in turn causes a lot of misunderstandings and complains among students and even supervisors. Further unreliable sharing of academic materials and information relating to the final year project matters through the use of removable devices and unsorted/scattered forms, e-mails and word of mouth which do not guarantee timely delivery of information to all the targeted parties which it is also very costly and a time consuming way of communication to a supervisor or a project coordinator.

2.3 Related Works

Different people had come out with different project management system suiting their environment of studies. Such systems have been used to provide some needed knowledge on how other people tried to tackle this problem. A 'Web-Based Environment for Managing Undergraduates Project-Based Learning' by Tsoi Wing Sze. It is a web-based system to facilitate the interaction between the students and their supervisors during the course of the project [2]. Another work is the 'A Web-based Approach to Senior Undergraduate Project Management' by Jack, H., & Pung, C. This work focused much on the usage of internet tools such as Google tools to facilitate and manage the Projects [3]. These works were so important to give some sort of direction on what other people did and what they achieved.

2.4 System Development Architectures

Systems development is the process of defining, designing, testing, and implementing a new software application or program. There are several systems development methods that have evolved overtime; the selection of an appropriate system development method is a crucial activity that can decide the fate of a project. Here are the two common systems development methods that exist which are prototyping and waterfalls models.

2.4.1 Prototyping

Software prototyping is an information system development methodology based on experimentally building of an operational model that includes some, but not all, of the features that the final system will have; for users to evaluate. By interacting with the prototype, users can get a better idea of their information requirements, and is meant to be only a preliminary model [4].

It can improve the quality of requirements and specifications provided to developers, it requires user involvement and allows them to see and interact with a prototype allowing them to provide better and more complete feedback. More visible results are produced earlier in the project.

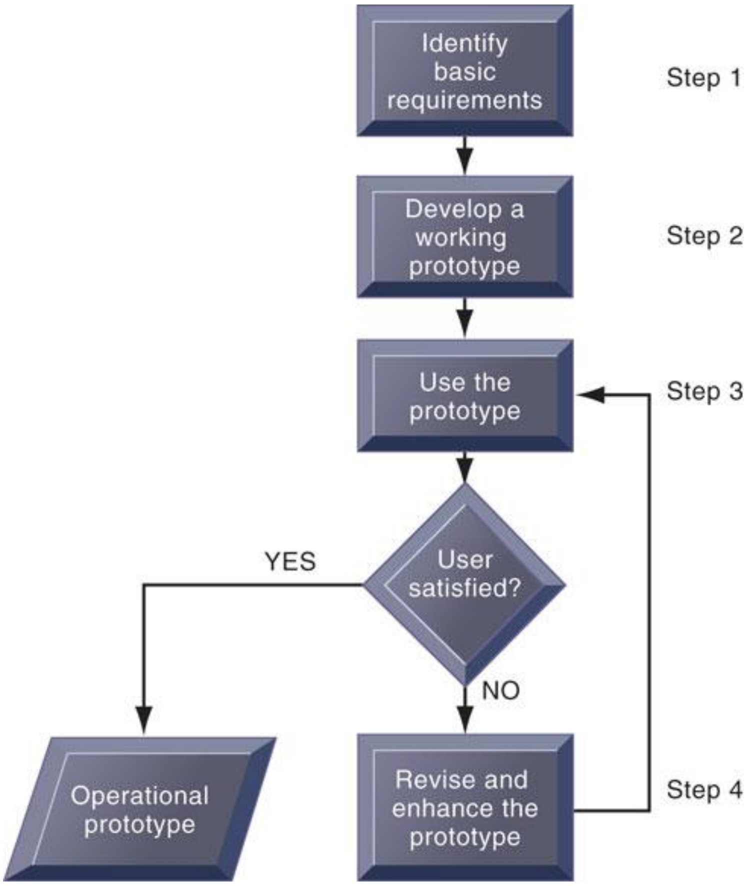

Identify basic requirements
Step 1
Develop a working prototype
Step 2
Use the prototype
Step 3
YES
User satisfied?
NO
Operational prototype
Revise and enhance the prototype
Step 4

Figure 2.1: Prototyping Development Steps

However, the focus on a limited prototype can distract developers from properly analysing the complete project. This can lead to overlooking better solutions. Moreover, it possesses a trap of overdesign whereby too much time can be spent on the development of the prototype ignoring other important aspects such as documentation and overall analysis of the system.

2.4.2 Waterfalls Model

The waterfall model is a sequential design process, often used in software development processes, in which progress is seen as flowing steadily downwards (like a waterfall) through the phases of Conception, Initiation, Analysis, Design, Construction, Testing and Maintenance [5].

The advantages of this model are: the client and project manager gets a feel that there is considerable progress as it is Easy to explain to the user. Also the stages and activities are well defined which in turn it helps to plan and schedule the project. The verification at each stage ensures early detection of errors or misunderstanding.

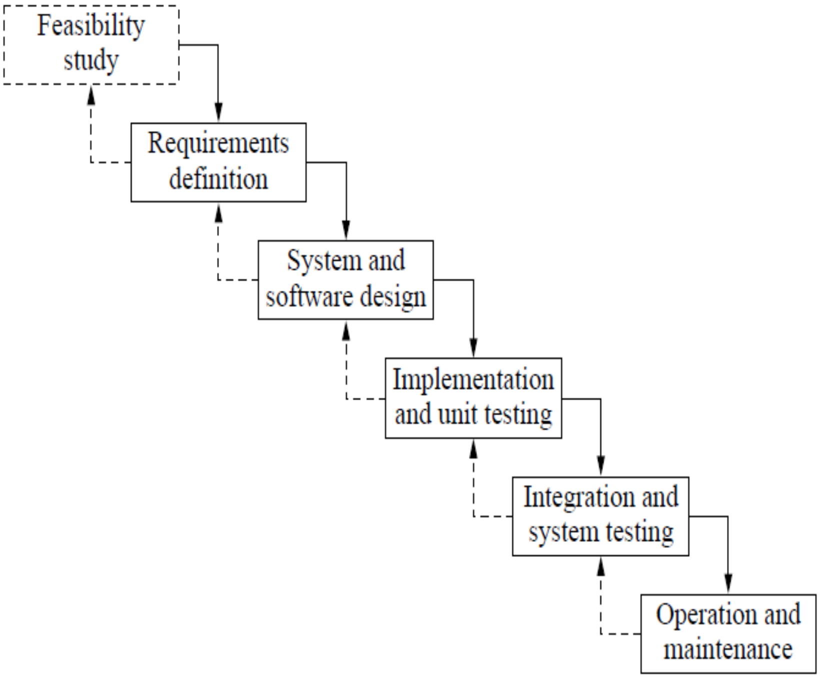

Feasibility study
Requirements definition
System and software design
Implementation and unit testing
Integration and system testing
Operation and maintenance

Figure 2.2: Waterfalls Development Steps

The main weakness of the Waterfall systems development methodology is its inflexibility/inability to cope with changing user requirements once the stage is passed. In this model a developer may never finish a stage to his/her satisfaction. An iterative and incremental model prevents the major drawback of a waterfall model so that to move the developer to the next stage while reviewing the past stage.

2.5 Logical Architecture

2.5.1 Two-Tier Architecture

It divides the model into parts which consists of a network of workstations (clients) and a server (central computer). The client runs the application whereas the server runs the DBMS and holds the database. Clients send requests to the server through the use of DML. This is the tradition model [6].

2.5.2 Three-Tier Architecture

The architecture has three layers, each running on a different platform. The presentation tier which presents data to the end user and it may allow entry and manipulation of end user data. The middle tier follows which handles data validation, business rules and task-specific behaviours. The last one is data tier which is the actual DBMS access layer. That can be accessed through the middle tier layer and on occasion through the presentation tier [6].

This model can be illustrated on the figure below, however it should be noted that these tiers do not necessarily correspond to physical locations on various computers on a network, but rather to logical layers of the application [7]

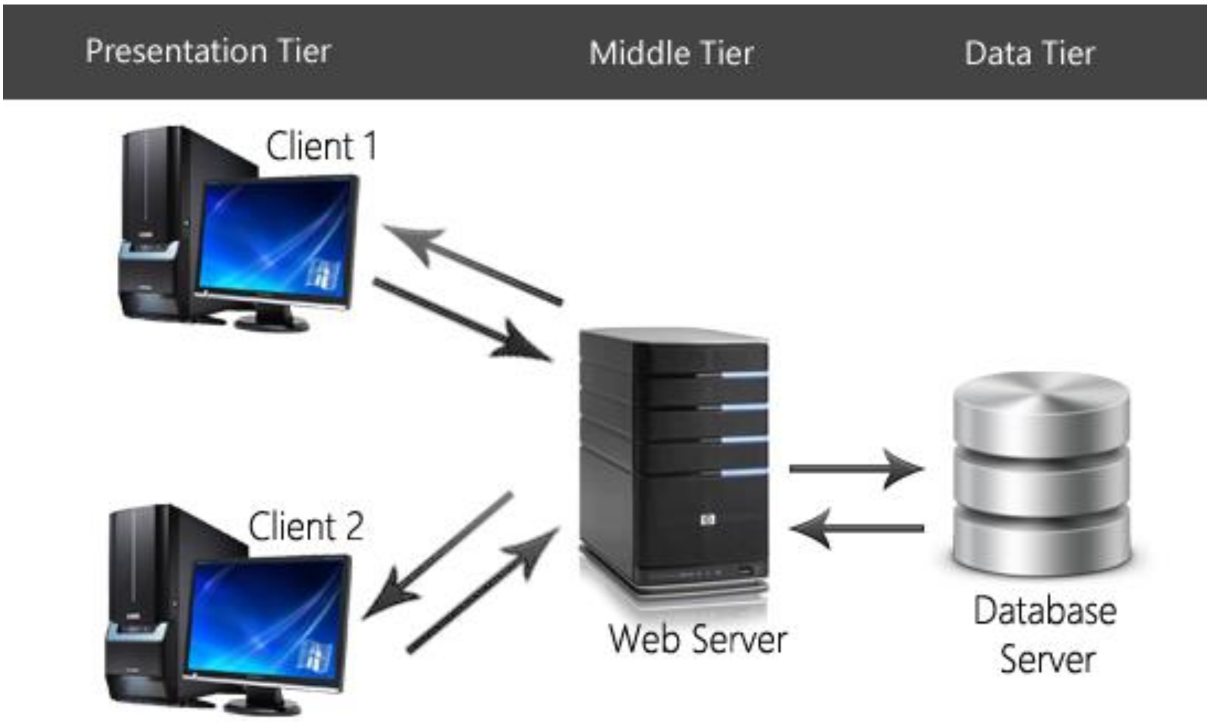


Figure 2.3: Three-Tier Architecture

The benefits of using this logical separation are; the developed system becomes reasonably scalable and flexible. It simplifies the overall maintainability of the developed system. Furthermore one tier can be modified without affecting the other tiers and World wide access is made possible in web based systems [6].

2.6 System Tools

Various languages and technologies such as HTML, CSS, JavaScript, PHP, AJAX and MySQL database backend are used into the development of the web-based system. Below are some descriptions of the technologies used.

- **UML:** Unified Modelling Language which is the graphical language for specifying, visualizing, constructing, documenting and communicating the artefacts of a software system. It contains artefacts such as use case diagrams, system sequence diagrams, class diagrams and others [8].
- **PHP**: It stands for Hypertext Pre-processor; it is a server side scripting language that is PHP scripts are executed on the server. It provides the dynamic functionality of the web application [9][10].
- **MySQL:** It is a relational database management system (RDBMS) and the most popular open-source database system. It also supports the standard SQL [6][9].
- **CSS:** It is used to describe the presentation of a document written in a mark-up language (HTML). CSS improves content accessibility, provide more flexibility and control in the specification of presentation characteristics and reduce complexity [10].
- **JavaScript:** JavaScript is a scripting language most often used for client-side web development. The language is mostly used in websites design. The primary use of JavaScript is to write functions that are embedded in HTML [10].
- **XAMPP:** XAMPPs are packages of independently created programs installed on computers with the following principal components: Apache, MySQL and PHP.

  Apache is a web server, which allows people with web browsers (like Internet Explorer) to connect to a computer and see information through web pages. **MySQL** is a database manager (keeps track of data in a highly organized way). **PHP** is used as a scripting language which can manipulate information held in a database and generate web pages [11].

2.7 Summary

In development of this system, the waterfalls model with iterative and increment model will be used over the prototyping; since the system is big and has to be completed in a very short limited time. The three-tier architecture has been chosen over the tradition two-tier architecture since it provides web-based systems with an easy world wide access. Furthermore, the system tools were reviewed and identified before starting the development of this system.

CHAPTER THREE
REQUIREMENTS CAPTURE AND ANALYSIS

3.1 Introduction

Requirements are description or statements of a function, features or conditions that a user seeks to have implemented in a system and so the developer has to implement into his/her system. Requirement engineering is a critical stage of software development cycles that defines the services that the system is to provide and its operational constraints.

3.2 Requirements Capture

In the designing and development of the PMS, different requirements were collected from small sample of different expected users of the system; using the primary and secondary ways of collecting data. The collected/captured system requirements were summarized in the two categories of the system requirements; Functional requirements and Non-functional requirements.

3.2.1 Functional Requirements

These are requirements/services that a system should provide to users and how the system should reacts to particular inputs from the users.

Table 3.1: Functional Requirements of the System

Ref.	**Description**		**Category**
F1	**System should allow users to login**		
	F1.1	User must login in using their Username and Password	Evident
	F1.2	Perform user authentication	Hidden
	F1.3	Grant access to the valid user and deny access to invalid user	Evident
	F1.4	Allow user to logout	Evident
F2	**System should provide some options to the Project-Coordinator/Administrator**		

	F2.1	Viewing (and downloading) students’ project titles, progress and final reports, assessment and attendances sheets	Evident
	F2.2	Uploading announcement, guidelines and other documents	Evident
	F2.3	Online communications with students and supervisors	Evident
F3	**System should provide some options to the Supervisor**		
	F3.1	Viewing (downloading) previous projects, announcements, guidelines, feedback of the submitted titles, list of students he/she supervises	Evident
	F3.2	Uploading project ideas, students’ weekly assessment and attendance forms; and evaluation of students’ projects (marking).	Evident
	F3.3	Online communications with coordinator and his/her students	Evident
F4	**System should provide some options to the Student**		
	F4.1	Viewing (downloading) previous projects, announcements, guidelines, feedback of the submitted titles and supervisor’s comments	Evident
	F4.2	Uploading project title forms/changes of title, progress and final reports	Evident
	F4.3	Online communications with coordinator and his/her supervisor	Evident

3.2.2 Non-Functional Requirements

The system is to have certain attributes which will be the characteristics of the system. These are the desired characteristics of the system.

Table 3.2: Non-Functional Requirements of the System

Ref	**Description**	
NF1	Security	The system should authenticate all users before allowing them to interact with the system functionalities.
NF2	Maintainability	The system should be easy maintained, i.e. the system should be able to add new functionality/features without any major redesign.

NF3	Responsiveness	Short response time is required by the system.
NF4	Scalability	The system should be easy scalable.
NF5	Robustness	The system should have ability to continue function accurately if the something wrong happens or multiple requests are received at the same time.
NF6	Operating System	The system should be cross-platform.
NF7	Language	The system should be implemented only in English.

3.2.3 Technical Tools Required

Table 3.3: The software needed for development of this system

SOFTWARE	**PURPOSE**
MySql Workbench	A Database administration tool which will be used in creation of databases, tables and building complex MySql queries.
XAMPP	A free and open source cross-platform web server solution stack package, consisting mainly of the Apache HTTP Server, MySQL database, and interpreters for scripts written in the PHP and Perl programming languages.
Acunetix WVS 8	A web vulnerability scanner used in auditing the security of web based applications.
Microsoft Office	An office suite of desktop applications used in creation of Presentations and word processing.
IE Tester	Software used in simulation and prediction of rendering of web pages in old web browsers such as Internet Explorer 6.
Notepad++	A simple open source text editor used to write PHP, HTML, CSS and JavaScript codes.
Adobe Dreamweaver CS5	A proprietary web development application used to write PHP, HTML, CSS and JavaScript codes.
Adobe Photoshop CS5	A photo editing tool used to create attractive user interface graphical elements.
Adobe Illustrator CS5	A vector graphics editing tool used to create attractive user interface graphical elements.
Adobe Reader	A commercial application software used for reading PDF documents

Table 3.4: The hardware needed for development of this system

HARDWARE	PURPOSE
Laptop	Used in the development of the proposed PMS and preparation of different documents
Web server	Used for hosting the PMS and assessing its performance in different environments.
Removable Storage Devices (e.g. External Hard Disks and Flash Disks)	Used as backups of the different system modules and reports created during the system development process.

3.3 Requirements Analysis

The captured requirements were analysed using graphical languages based on the UML (Unified Modelling Language) rules and artefacts.

3.3.1 Use Case

Use cases give descriptions of the functionality of the system from the user's perspective. Use case diagrams shows how a user communicates with the system.

Use Cases Identification

Table 3.5: Identified Use Case Descriptions

Use Case	**Description**
Login	User must login and authenticated/validated to operate/use the system.
Manage Information	The users should be able to manage the information flow such as uploading files, viewing and downloading them.
Logout	The users should be able to logout and exit system to protect their accounts from intrusion by other people.

Actors Identification

Table 3.6: Identified Actors Descriptions

Actor	Description
Coordinator/Administrator	He/she manage user's accounts (create and removes), collects titles, title submission forms, reports and assessments. He/she also uploads different information (announcements, title review feedback, past titles)
Supervisor	He/she manages his/her own account. He/she manages all the information he/she should receive or send to other actors such us uploading student assessment form.
Student	He/she manages his/her own account. He/she manages all the information he/she should receive or send to other actors such us uploading the project reports.

Use Case Diagrams

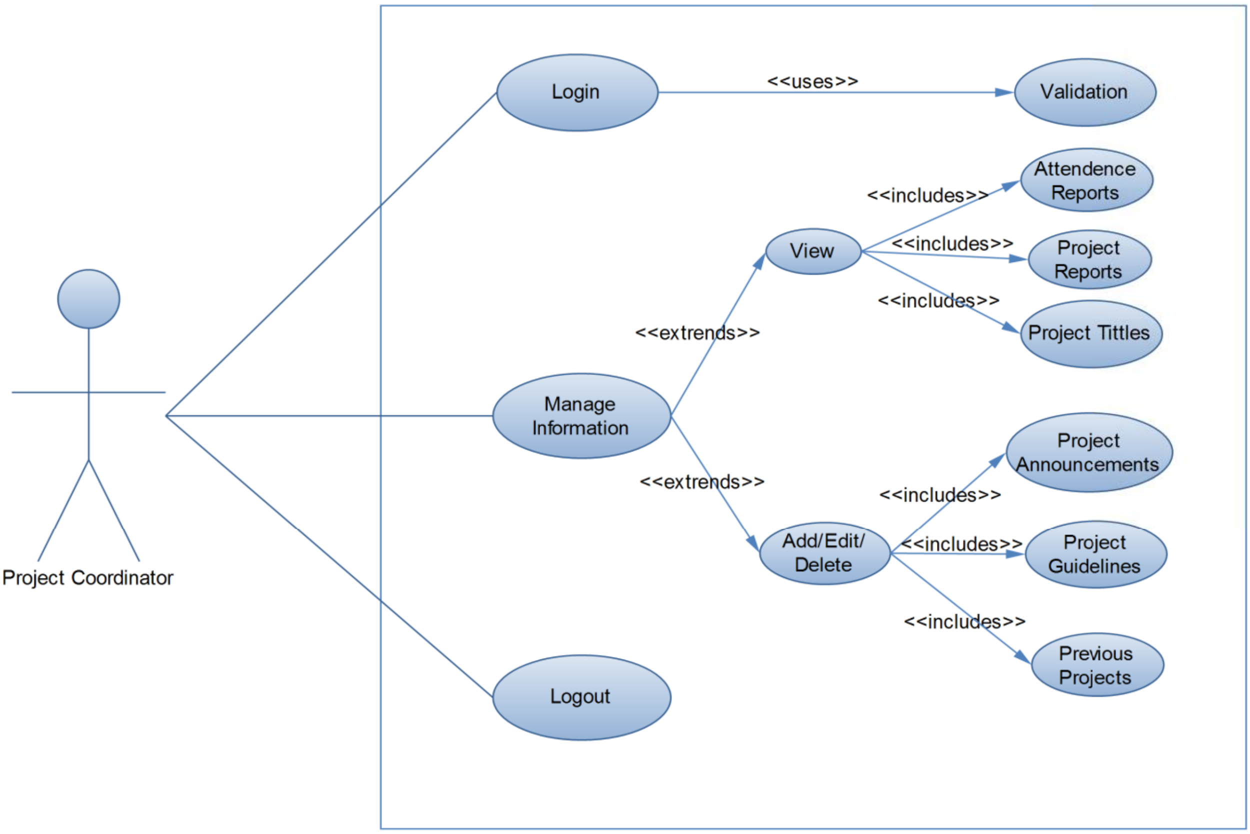


Figure 3.1: Use Case Diagram for Coordinator

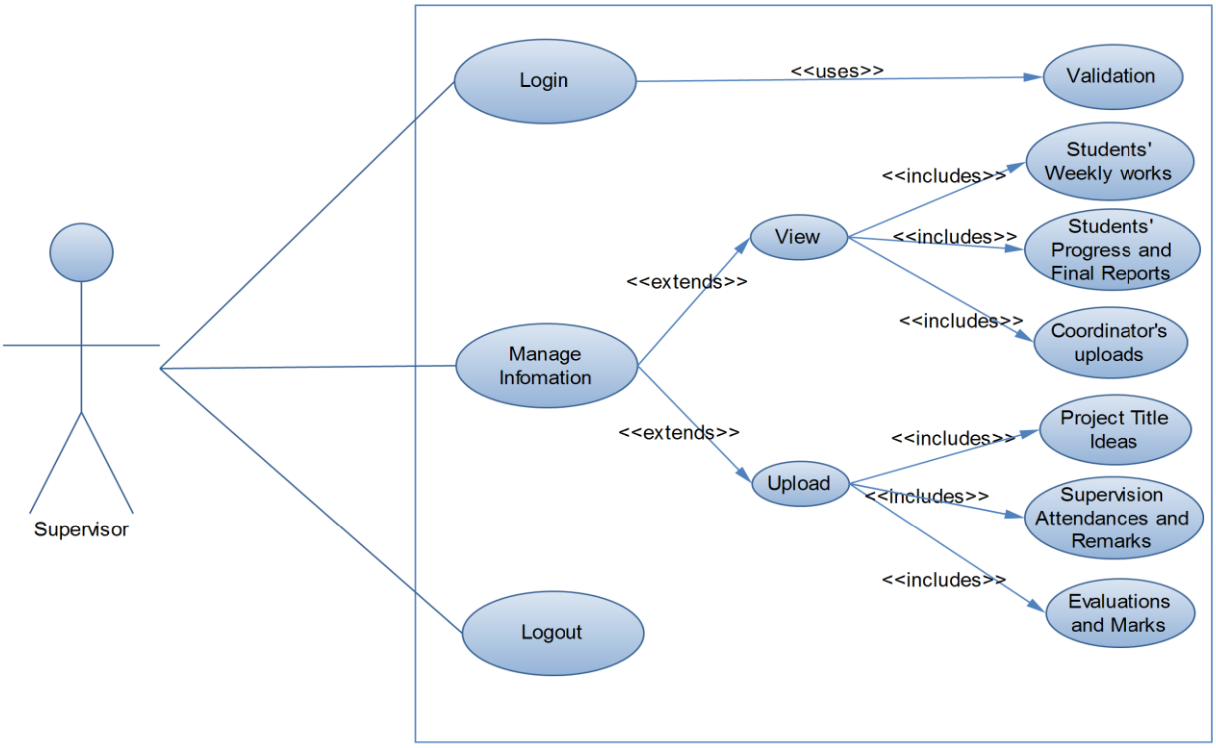


Figure 3.2: Use Case Diagram for Supervisor

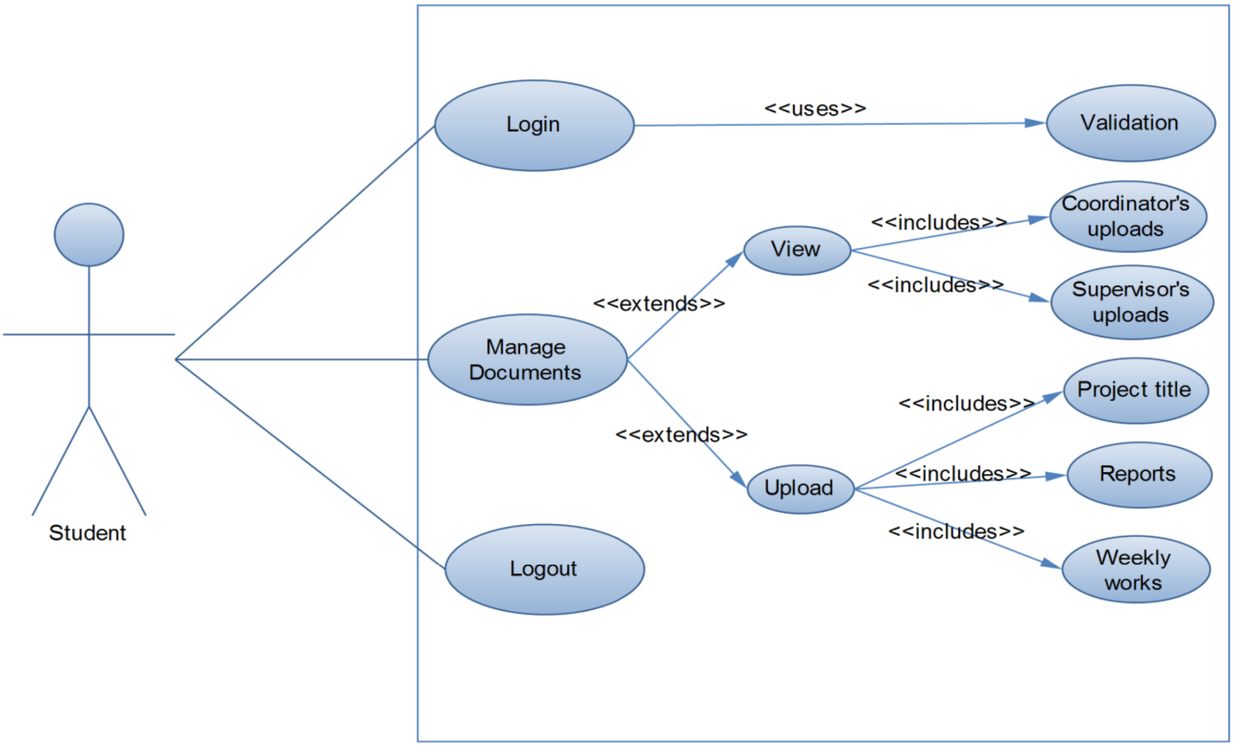


Figure 3.3: Use Case Diagram for Student

Use Case Description

This gives more details of the use cases in the system. The following are some important use case descriptions.

Table 3.7: Use Case 'Login' Description

Field	**Description**
Use-Case Name	Login
Actors(s)	Coordinator, Supervisor, Student
Description	Verify password and username to authenticate user
Assumptions	Every user has a unique password and username set to the system
Pre-conditions	All system expected users have been registered into the system database
Post-conditions	System retains user identification information (either identified user or not)
Main flow of events	i. User request to logon ii. System prompt user to enter username and password iii. User will enter the information that will be validated. iv. The system will make comparison with the user's information in the database for validation. v. If they match the system allows the user an entry
Exceptional flow of events	If the user enters invalid information, the use case restarts
Reference	F1

Table 3.8: Use Case 'Upload' Description

Field	**Description**
Use-Case Name	Upload
Actors(s)	Coordinator, Supervisor, Student
Description	Allows users to upload/send information to an intended person
Assumptions	They are some important information to be sent/uploaded
Pre-conditions	i. User has successfully logged in

	ii. User has chosen the destination of the information to be sent
Post-conditions	Information to be saved into the database, and sent to the intended destination
Main flow of events	i. Login to the system ii. Select the intended destination to send information to iii. Upload the file into the system iv. Confirm uploading (submit file)
Exceptional flow of events	
Reference	F2.2, F3.2, F4.2

Table 3.9: Use Case ‘View’ Description

Field	**Description**
Use-Case Name	View
Actors(s)	Coordinator, Supervisor, Student
Description	Allows users to download all the information posted or sent to him/her
Assumptions	They are some important information he/she has to download
Pre-conditions	i. User has successfully logged in ii. User has successful viewed the information
Post-conditions	The original information remains in the system’s database
Main flow of events	i. Login to the system ii. View information iii. Select the file he/she wants to download (if necessary) iv. Download the file
Exceptional flow of events	
Reference	F2.1, F3.1, F4.1

3.3.2 System Sequence Diagram

Sequence diagram is an artefact of the UML which is used to identify the operations that the system has to perform and the order of which it needs to perform such operations and the effect of such an operation on the system. The figures 3.4 to 3.6 are some examples of the sequence diagrams for some sequence operations;

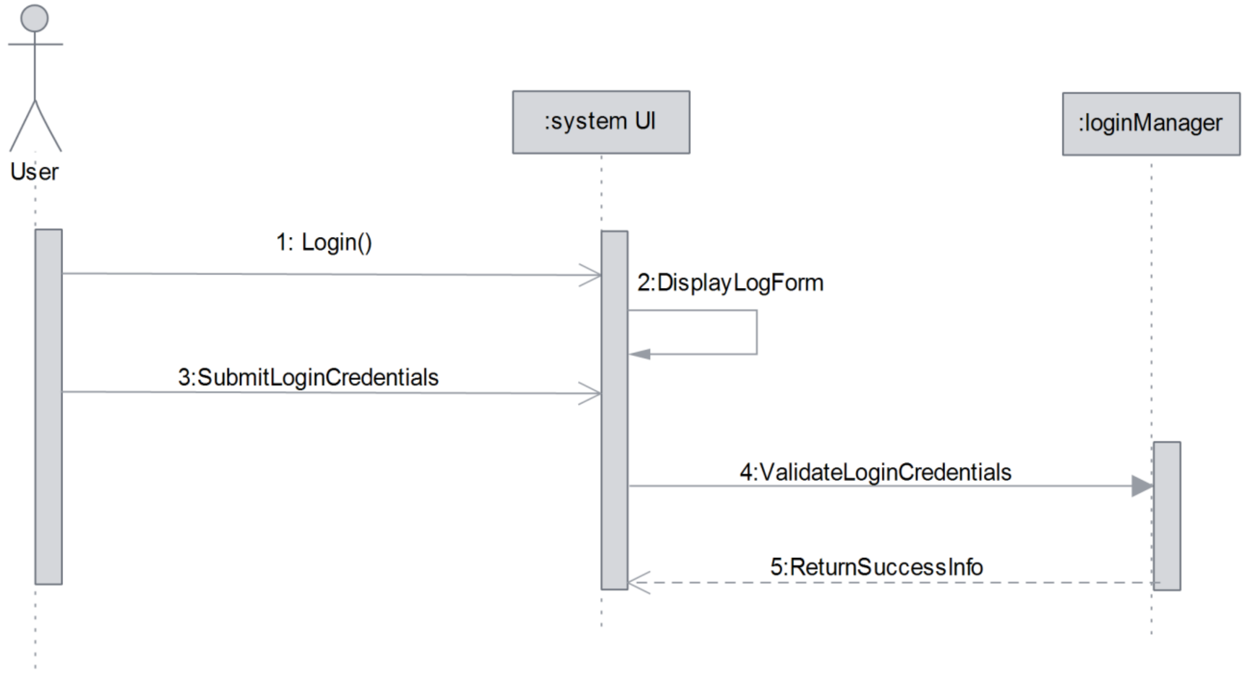


Figure 3.4: Sequence Diagram for Login

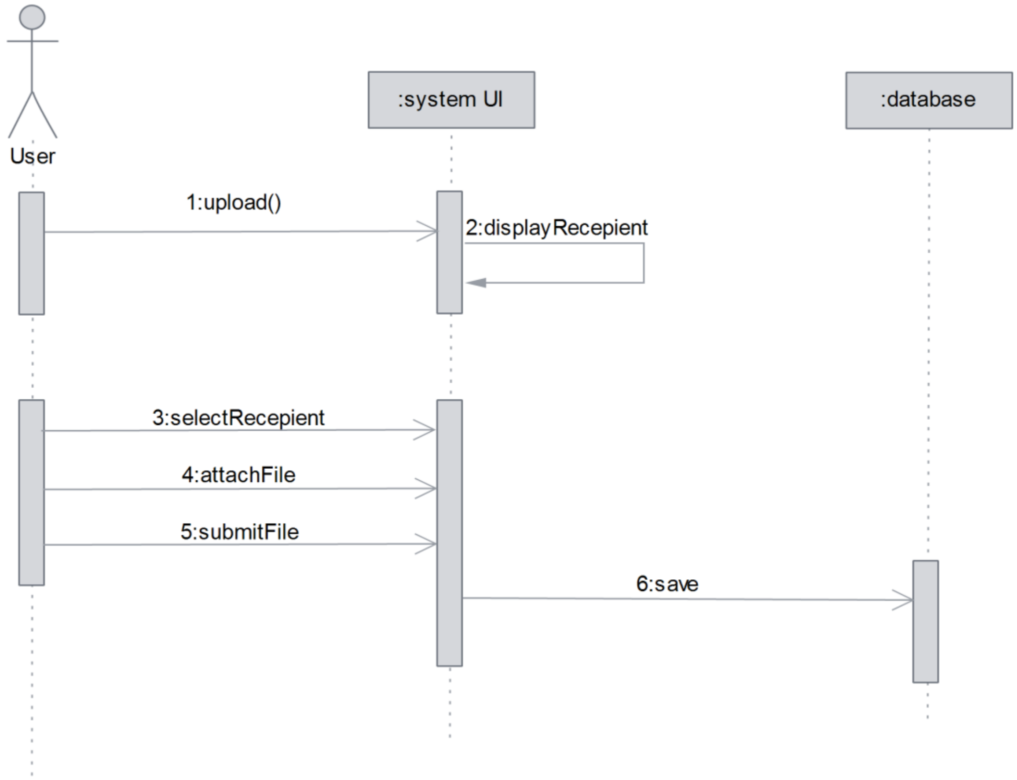


Figure 3.5: Sequence Diagram for Upload

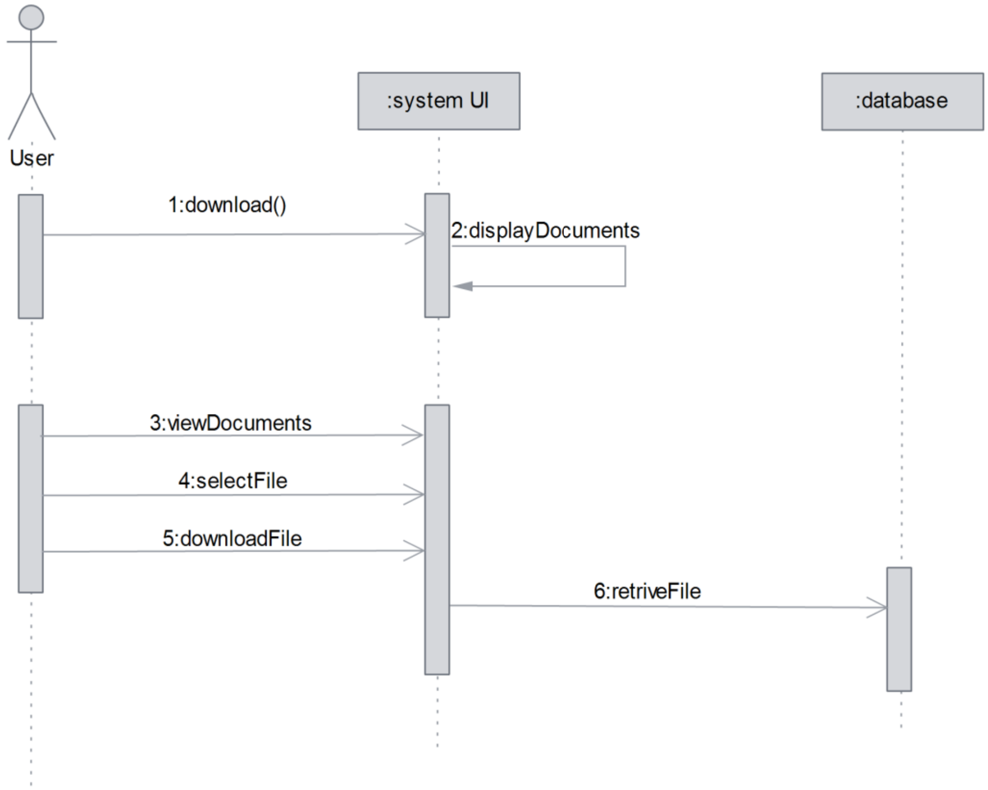


Figure 3.6: Sequence Diagram for Download

3.4 Summary

The collected requirements were grouped into Functional and Non-functional requirements. The data/requirements were analysed by using use case diagrams so as to get the clear view of how the users interact with the system, and what type of user performs what kind of task. To support the use case analysis, the system sequence diagrams were also used so as to give the clear picture of how a user will be interacting with the system. Furthermore, the technical required tools which are essential for the development of this system were also analysed and identified.

CHAPTER FOUR
SYSTEM DESIGNING

4.1 Object-Oriented Modelling

Object-oriented systems focus on capturing the structure and behaviour of information systems in little modules/classes that encompass both data and process. The analysed requirements by use cases in chapter three can be modelled into classes as shown in the Figure 4.1.

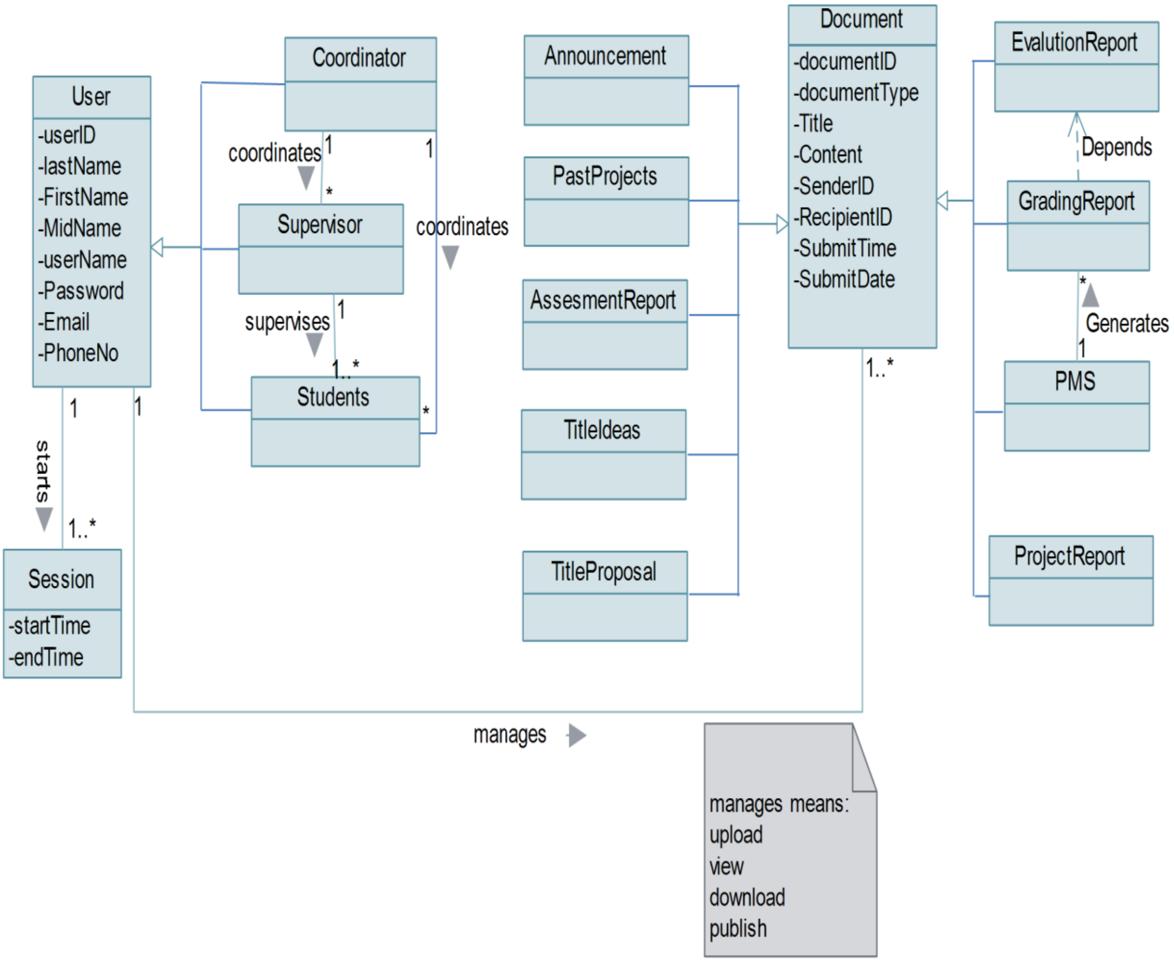


Figure 4.1: Conceptual/Class Diagram

4.2 Design Class Diagram

Design class diagram is the extension of the conceptual diagram in Figure 4.1, with the addition of the methods. These classes with methods are now software classes of the objects which make the system. The Figure 4.2 shows the designing class diagram of this system as extended from the conceptual diagram, Figure 4.1

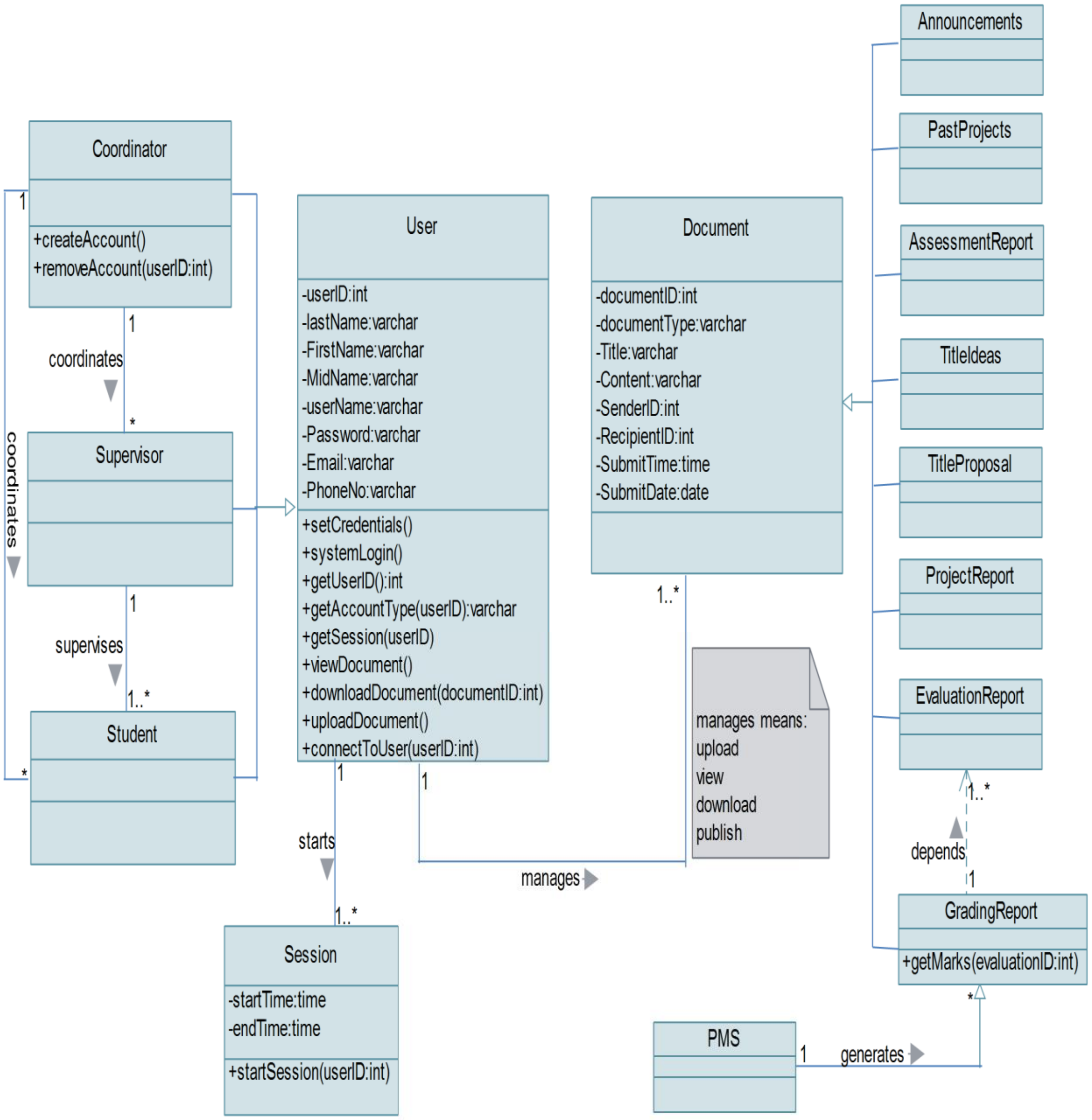


Figure 4.2: Designing Class diagram

4.3 Database Designing

Database is a shared collection of logically related data, and their descriptions, designed to meet the information needs of an organization. In this system, all the data are logically related and logically move from one user or class to another. The Entity-Relationship Diagram will be used to show how the tables logically relate to each other.

4.3.1 Entity Relationship Diagram

The ERD contains the following entities (tables); each with its attributes (with the primary key is underlined and foreign key in italics. The attributes are as follows:

- **announcement** (announcementID, title, content, publishTime, publishDate, *coordnatorID*)
- **assessment** (assessmentID, *supervisorID, studentID*, marks, comments, assessmentTime)
- **coordinator** (coordinatorID, lastName, firstName, middleName, password, email, phoneNo, lastAction)
- **coordsupervisor** (documentID, content, senderID, receiverID, sentTime, sentDate)
- **pastprojects** (projectID, title, content, studentName, supervisorName, submissionYear)
- **projectreport** (reportID, reportType, *studentID*, *supervisorID*, title, content, submissionTime, SubmissionDate, supervisorApproval, approvalTime)
- **students** (studentID, regNo, lastName, firstName, middleName, password, email, phoneNo, lastAction, *supervisorID*)
- **studentevaluation** (evalutionID, *supervisorID*, *studentID*, marks, grade)
- **studentsupervisor** (documentID, content, *senderID*, *receiverID*, sentTime, sentDate)
- **supervisors** (supervisorID, lastName, firstName, middleName, password, email, phoneNo, lastAction)
- **titleideas** (titleID, *supervisorID*, title, content, publishTime)
- **titleproposal** (proposalID, *studentID*, *supervisorID*, title, content, submissionTime, submissionDate, supervisorApproval,, pannelApproval)

The ER-Diagram, Figure 4.3 has been drawn using the MySQL workbench. The yellow keys represent the primary keys for each entity, and the red diamonds are the foreign keys relating the two connected entities.

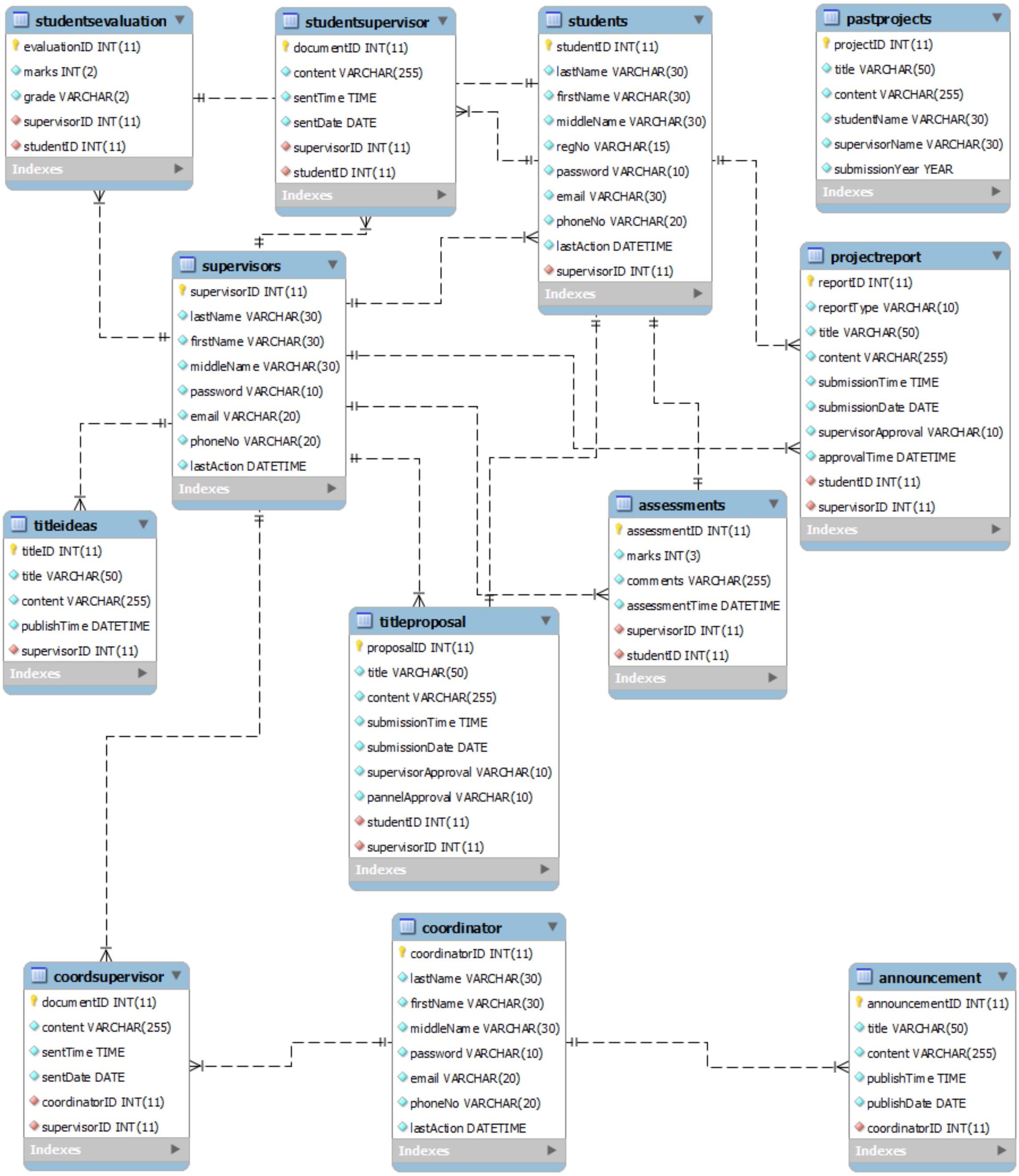


Figure 4.3: Entity-Relationship Diagram

4.4 Summary

The designing of this system started with the modelling of the analysed requirements which was done in chapter three. The modelling was done using the conceptual diagram and the design class diagram. The modelled requirements into classes led into the designing of the database where the ER Diagram was used to describe the logical relationship between the classes or attributes. All the modelling diagrams were achieved.

CHAPTER FIVE

SYSTEM DEVELOPMENT

5.1 Introduction

System development is the process of turning the designed model (in chapter four) into the really tangible system. In the development of user interface of this system CSS, XHTML and JavaScript have been extensively used. The development of this system has been divided into five phases which are Physical Database creation, Module addition phase, General home page, User-specific functionalities and Chatting phase.

5.2 Development Phases

5.2.1 Physical Database Creation

The ERD in figure 4.3 (in previous chapter) has been converted into the physical database using the XAMPP platform. XAMPP has also been used as local-host for this database. Figure 5.1 shows the physical database as it is seen from the XAMPP local server.

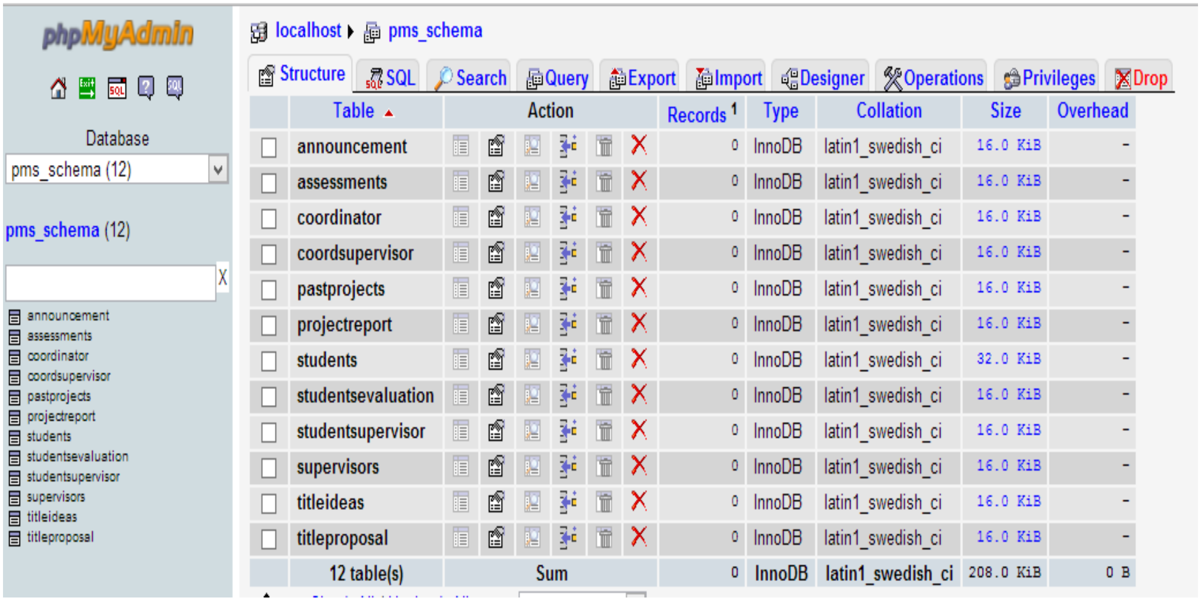


	Table ▲	Action	Records [1]	Type	Collation	Size	Overhead
□	announcement		0	InnoDB	latin1_swedish_ci	16.0 KiB	-
□	assessments		0	InnoDB	latin1_swedish_ci	16.0 KiB	-
□	coordinator		0	InnoDB	latin1_swedish_ci	16.0 KiB	-
□	coordsupervisor		0	InnoDB	latin1_swedish_ci	16.0 KiB	-
□	pastprojects		0	InnoDB	latin1_swedish_ci	16.0 KiB	-
□	projectreport		0	InnoDB	latin1_swedish_ci	16.0 KiB	-
□	students		0	InnoDB	latin1_swedish_ci	32.0 KiB	-
□	studentsevaluation		0	InnoDB	latin1_swedish_ci	16.0 KiB	-
□	studentsupervisor		0	InnoDB	latin1_swedish_ci	16.0 KiB	-
□	supervisors		0	InnoDB	latin1_swedish_ci	16.0 KiB	-
□	titleideas		0	InnoDB	latin1_swedish_ci	16.0 KiB	-
□	titleproposal		0	InnoDB	latin1_swedish_ci	16.0 KiB	-
	12 table(s)	Sum	0	InnoDB	latin1_swedish_ci	208.0 KiB	0 B

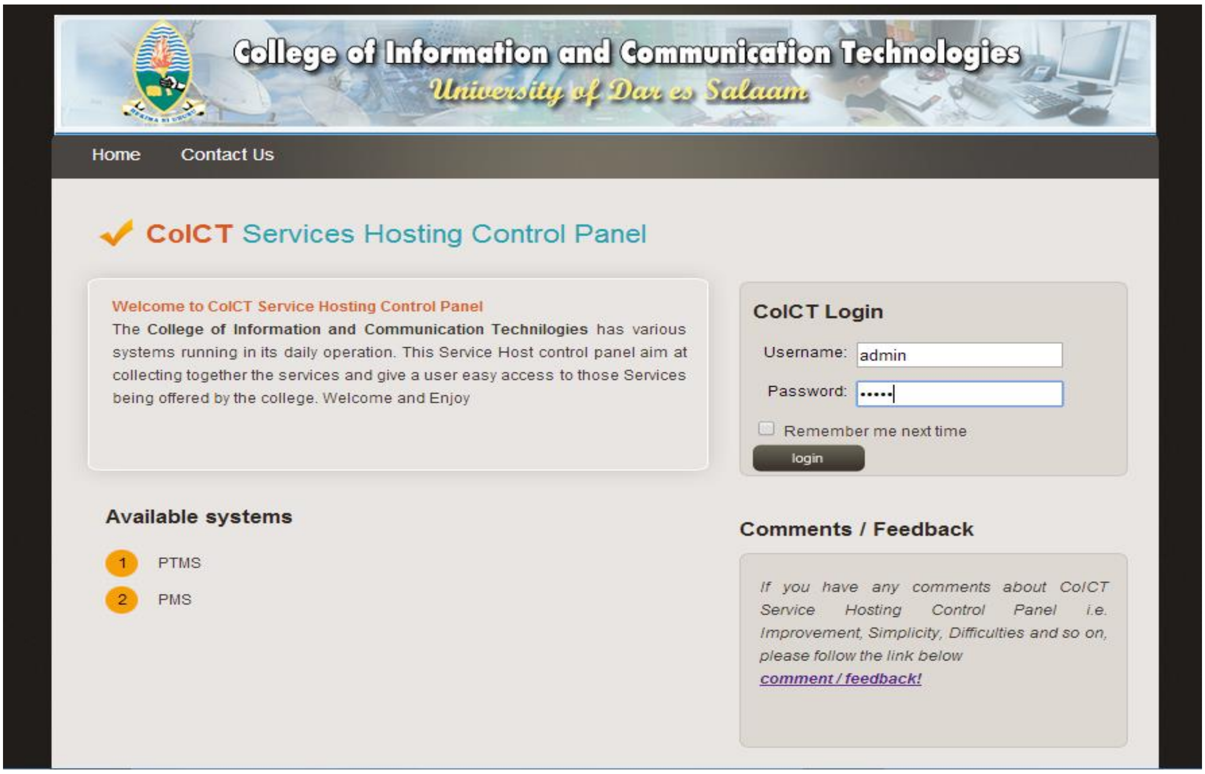
Figure 5.1: Physical Database

5.2.2 Module Addition

PMS is an added module to the already developed ETE framework. The users can only access the PMS through logging into ETE framework; therefore PMS must be integrated and developed within the main framework. The main framework was developed by using the yii-framework; hence the PMS must also be developed within the yii-framework rules.

The PMS module folder is added to the main framework as a zipped file by the super-admin of the framework. Super-admin logs into the framework as shown in Figure 5.2 below, selects ‘Add New Subsystem’ and uploads the zipped folder of the new module (i.e. PMS) as shown in Figures 5.3 and 5.4 below.

In order for the PMS to work within the main framework, it must also be developed using the same rules as those which ware used in the development of the framework. Therefore the PMS is developed by using the yii-framework rules such as dividing the system into three parts namely modules, views and controllers (MVC), with controllers containing the main configuration file which integrates the sub-system to the main system (ETE framework).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CoICT Services Hosting Control Panel

Welcome to CoICT Service Hosting Control Panel

The **College of Information and Communication Technilogies** has various systems running in its daily operation. This Service Host control panel aim at collecting together the services and give a user easy access to those Services being offered by the college. Welcome and Enjoy

CoICT Login

Username: admin

Password: •••••

□ Remember me next time

Available systems

1 PTMS

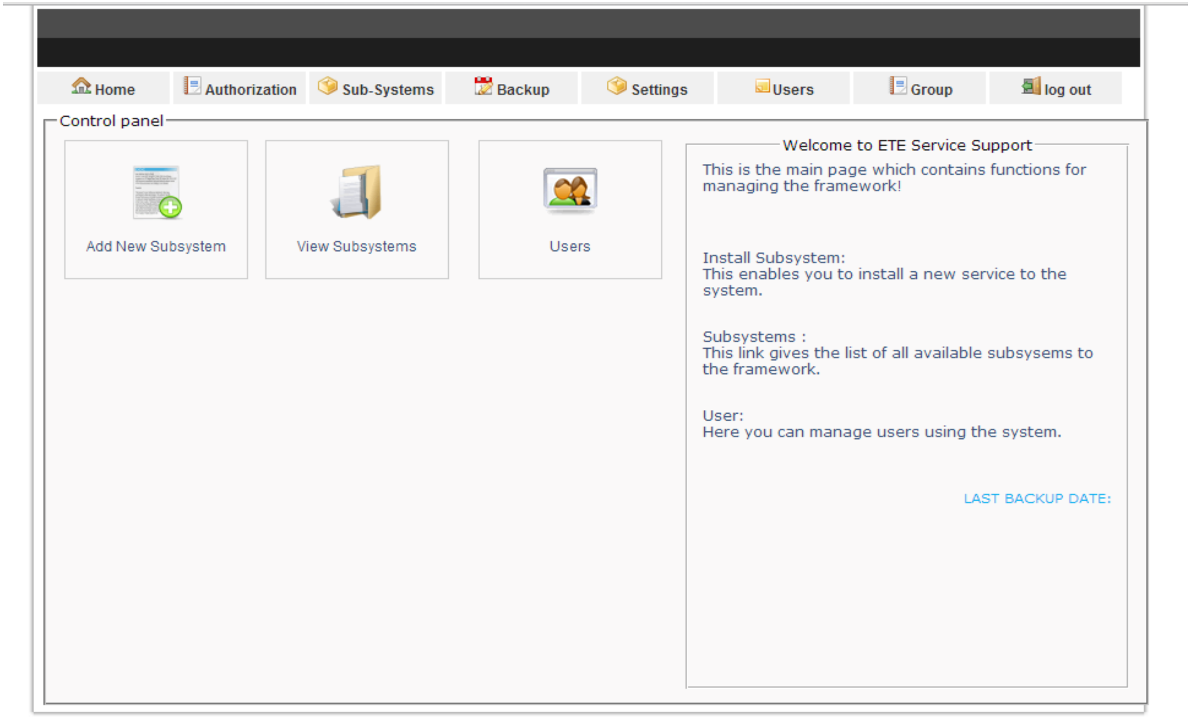
2 PMS

Comments / Feedback

If you have any comments about CoICT Service Hosting Control Panel i.e. Improvement, Simplicity, Difficulties and so on, please follow the link below

comment / feedback!

Figure 5.2: Login Panel of the Main Framework



Welcome to ETE Service Support

This is the main page which contains functions for managing the framework!

Install Subsystem:
This enables you to install a new service to the system.

Subsystems :
This link gives the list of all available subsysems to the framework.

User:
Here you can manage users using the system.

LAST BACKUP DATE:

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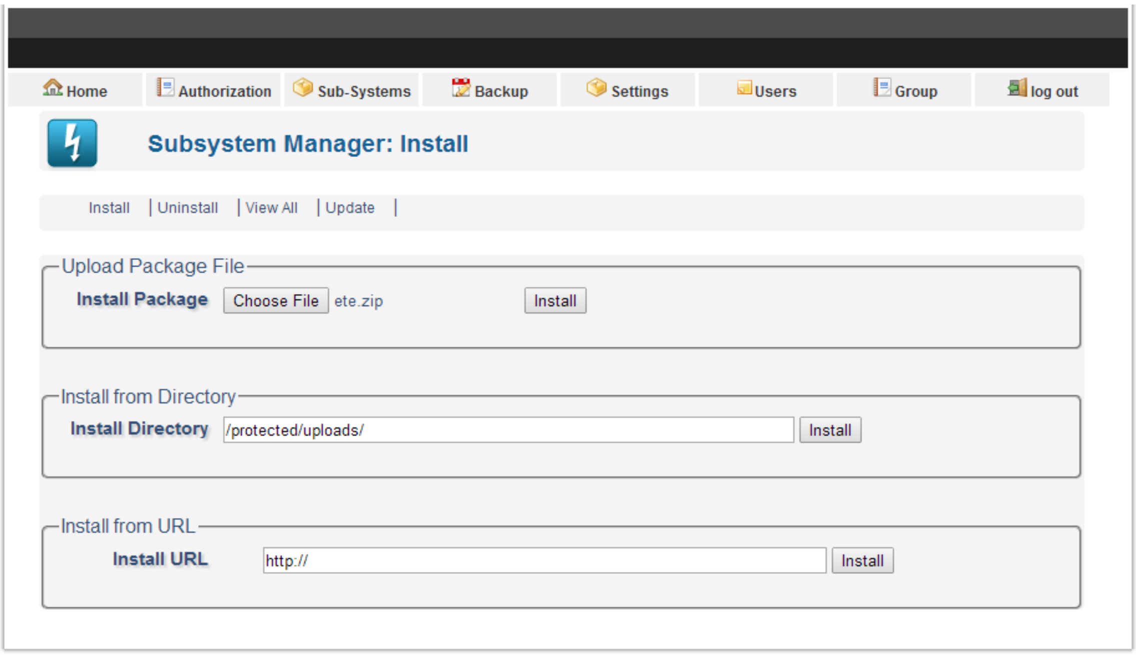
Figure 5.3: Administrator Control Panel (used to add a new Sub-system)



Install Package: ete.zip

Install Directory: /protected/uploads/

Install URL: http://

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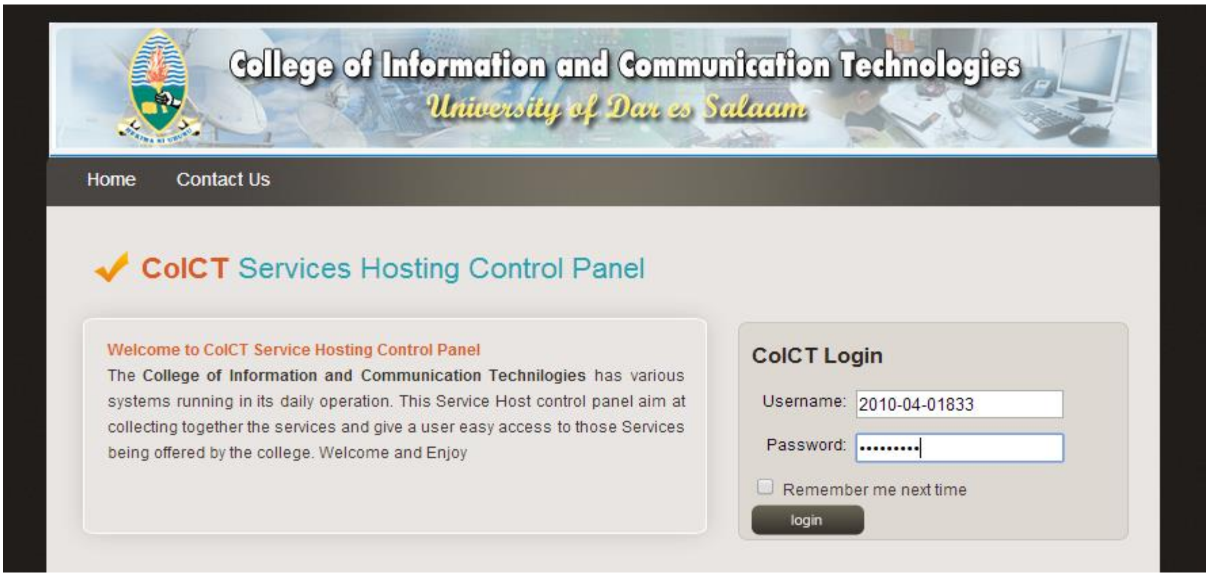
Figure 5.4: Uploading of a new Sub-system File

5.2.3 General Home Page

Before accessing the system’s home page, users are provided with the front interface which is built in the ETE framework which has the login form on which username and password must be provided correctly in order to access the sub-systems shown in Figure 5.5. Once the user has the correctly provided the username and password, he/she can proceed by selecting the PMS from the Available Systems as shown in Figure 5.6 which provides the PMS home page.

Home page provides the user with the dashboard which shows the groups of Announcements, Past Projects, and Project Ideas from different supervisors and Currently Approved Projects as shown in Figure 5.7. To access the more related details on the related field, the user has to click *more*. Once clicked, the tabular view is seen as in the Figure 5.8 after the clicking *more* announcements. The records can be clicked as links to obtain further information and links to downloads if there is any.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Home
Contact Us
login

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Welcome to ColCT Service Hosting Control Panel

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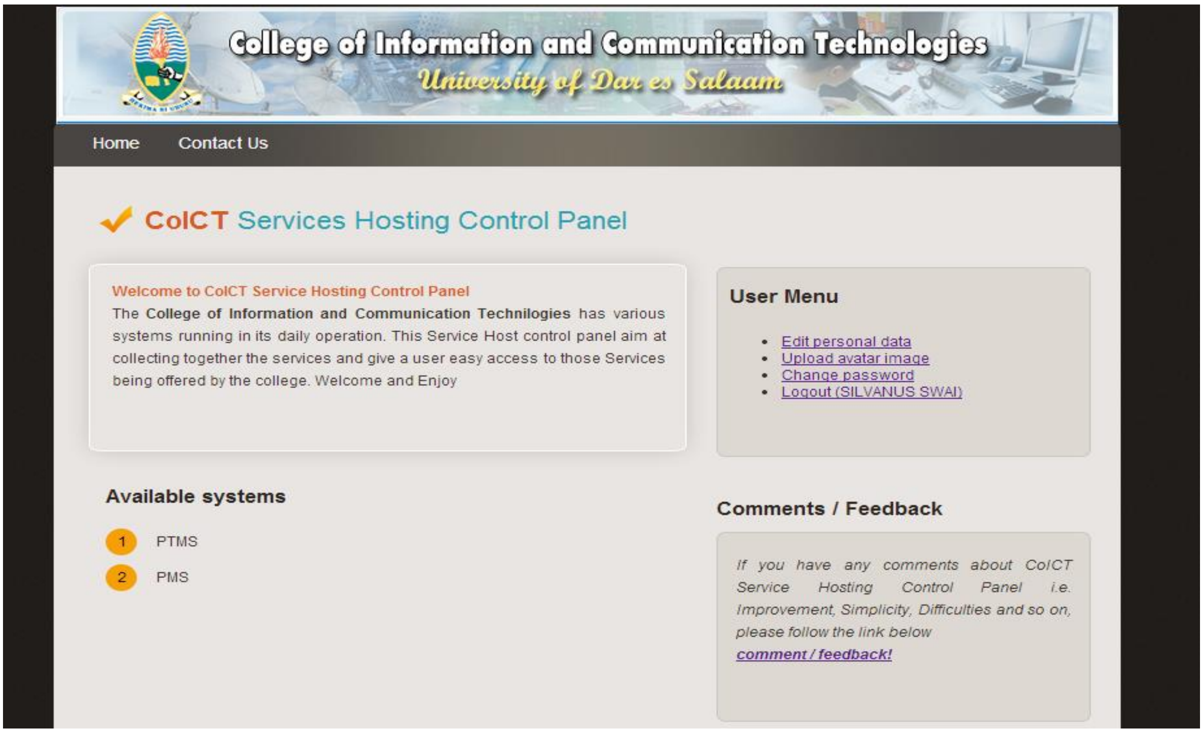
ColCT Login

Username: 2010-04-01833

Password: •••••••••

□ Remember me next time

Figure 5.5: User Logging into the System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Home
Contact Us

✓ CoICT Services Hosting Control Panel

Welcome to CoICT Service Hosting Control Panel

The **College of Information and Communication Technologies** has various systems running in its daily operation. This Service Host control panel aim at collecting together the services and give a user easy access to those Services being offered by the college. Welcome and Enjoy

User Menu

- Edit personal data
- Upload avatar image
- Change password
- Logout (SILVANUS SWAI)

Available systems

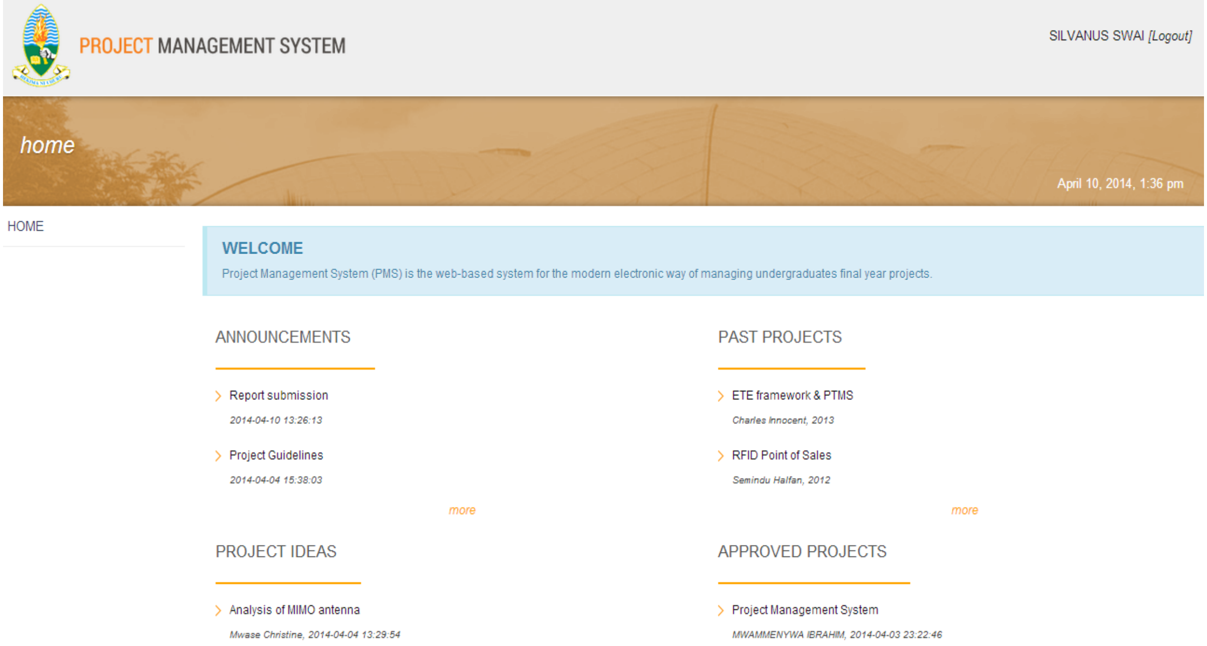
1 PTMS

2 PMS

Comments / Feedback

If you have any comments about CoICT Service Hosting Control Panel i.e. Improvement, Simplicity, Difficulties and so on, please follow the link below
comment / feedback!

Figure 5.6: ETE Main Framework Window



April 10, 2014, 1:36 pm

WELCOME

Project Management System (PMS) is the web-based system for the modern electronic way of managing undergraduates final year projects.

ANNOUNCEMENTS

- Report submission
  2014-04-10 13:26:13
- Project Guidelines
  2014-04-04 15:38:03

PAST PROJECTS

- ETE framework & PTMS
  Charles Innocent, 2013
- RFID Point of Sales
  Semindu Halfan, 2012

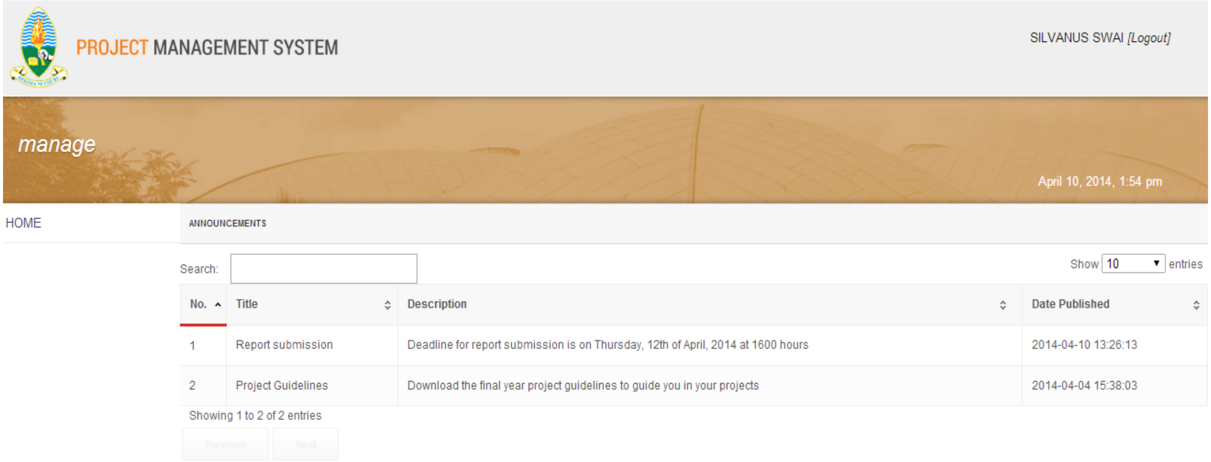
PROJECT IDEAS

- Analysis of MIMO antenna
  Mwase Christine, 2014-04-04 13:29:54

APPROVED PROJECTS

- Project Management System
  MWAMMENYWA IBRAHIM, 2014-04-03 23:22:46

Figure 5.7: PMS Home Page



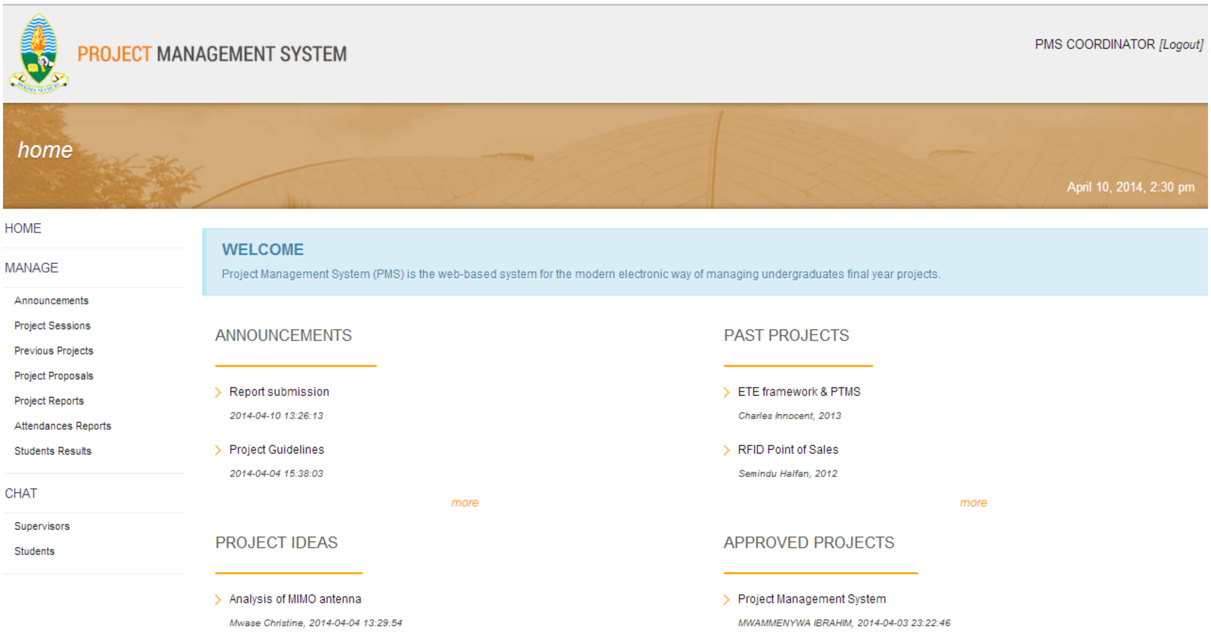
No.	Title	Description	Date Published
1	Report submission	Deadline for report submission is on Thursday, 12th of April, 2014 at 1600 hours	2014-04-10 13:26:13
2	Project Guidelines	Download the final year project guidelines to guide you in your projects	2014-04-04 15:38:03

Showing 1 to 2 of 2 entries

Figure 5.8: Tabular Presentation of Related Information

5.2.4 Specific Functionalities

The users of this system are classified into five different groups depending on their roles. These groups are differentiated using their side menus which are found on the left side of their screen such as for a PMS coordinators in Figure 5.9, supervisors in Figure 5.10, fourth-year students in Figure 5.11, third-year students in Figure 5.12 and other students in Figure 5.13. Each group is presented with a menu of specific functionalities he/she can perform depending on his/her role.



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- Report submission
  2014-04-10 13:26:13
- Project Guidelines
  2014-04-04 15:38:03

more

PAST PROJECTS

- ETE framework & PTMS
  Charles Innocent, 2013
- RFID Point of Sales
  Semindu Halfan, 2012

more

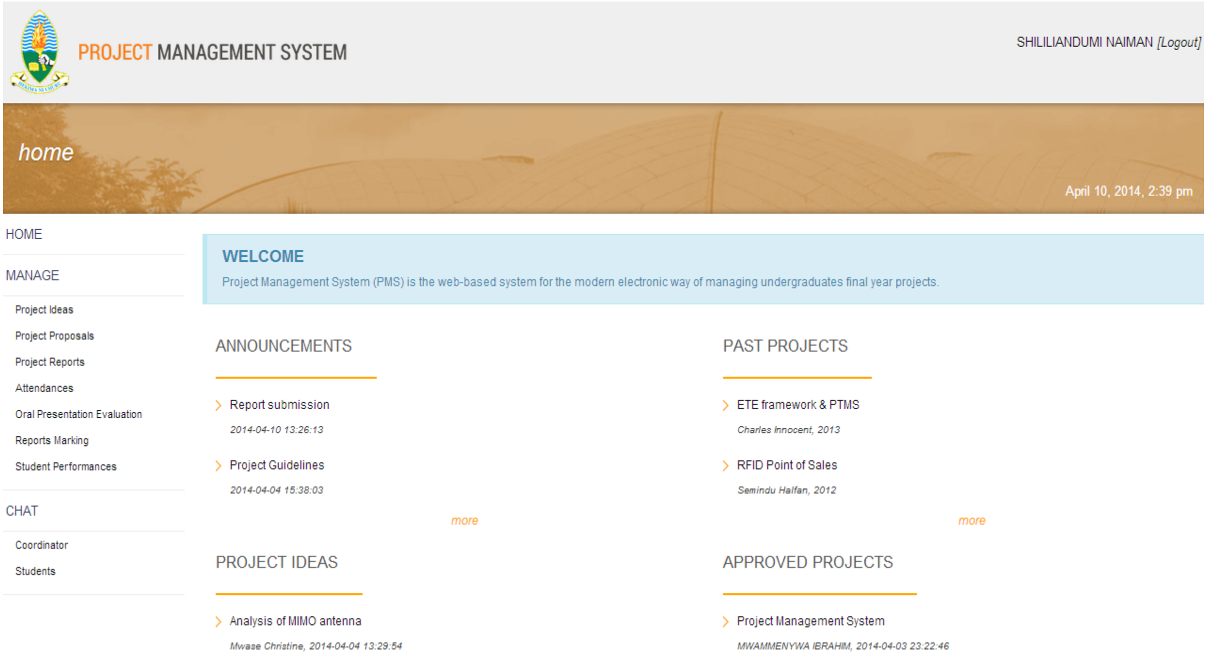
PROJECT IDEAS

- Analysis of MIMO antenna
  Mwase Christine, 2014-04-04 13:29:54

APPROVED PROJECTS

- Project Management System
  MWAMMENYWA IBRAHIM, 2014-04-03 23:22:46

Figure 5.9: PMS-coordinator Home Page



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  2014-04-04 15:38:03

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- RFID Point of Sales
  Semindu Halfan, 2012

PROJECT IDEAS

- Analysis of MIMO antenna
  Mwase Christine, 2014-04-04 13:29:54

APPROVED PROJECTS

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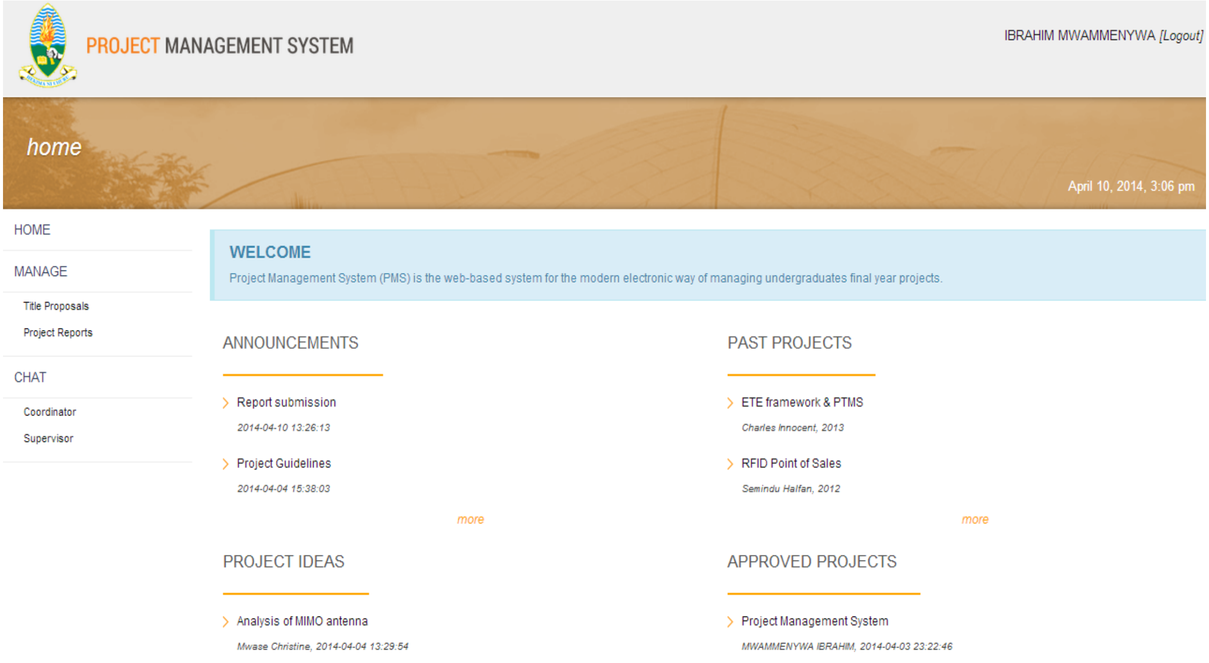
  MWAMMENYWA IBRAHIM, 2014-04-03 23:22:46

Figure 5.10: Supervisor Home Page



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  2014-04-10 13:26:13
- Project Guidelines
  2014-04-04 15:38:03

PAST PROJECTS

- ETE framework & PTMS
  Charles Innocent, 2013
- RFID Point of Sales
  Semindu Halfan, 2012

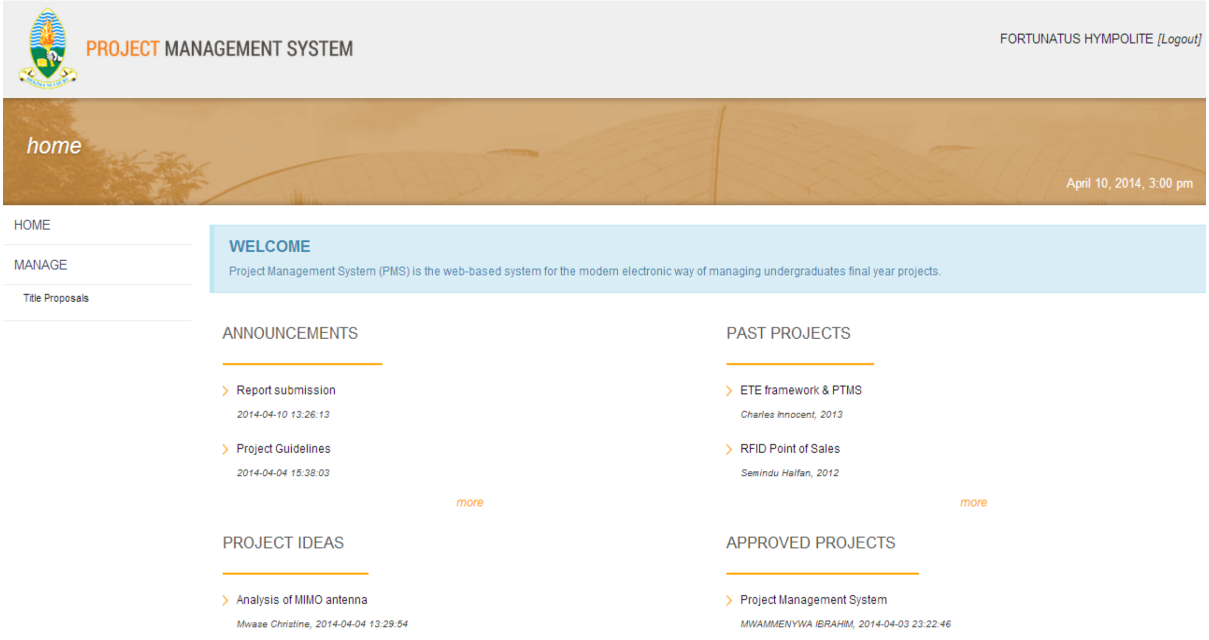
PROJECT IDEAS

- Analysis of MIMO antenna
  Mwase Christine, 2014-04-04 13:29:54

APPROVED PROJECTS

- Project Management System
  MWAMMENYWA IBRAHIM, 2014-04-03 23:22:46

Figure 5.11: Fourth-year Student Home Page



WELCOME

Project Management System (PMS) is the web-based system for the modern electronic way of managing undergraduates final year projects.

ANNOUNCEMENTS

- Report submission
  2014-04-10 13:26:13
- Project Guidelines
  2014-04-04 15:38:03

more

PAST PROJECTS

- ETE framework & PTMS
  Charles Innocent, 2013
- RFID Point of Sales
  Semindu Halfan, 2012

more

PROJECT IDEAS

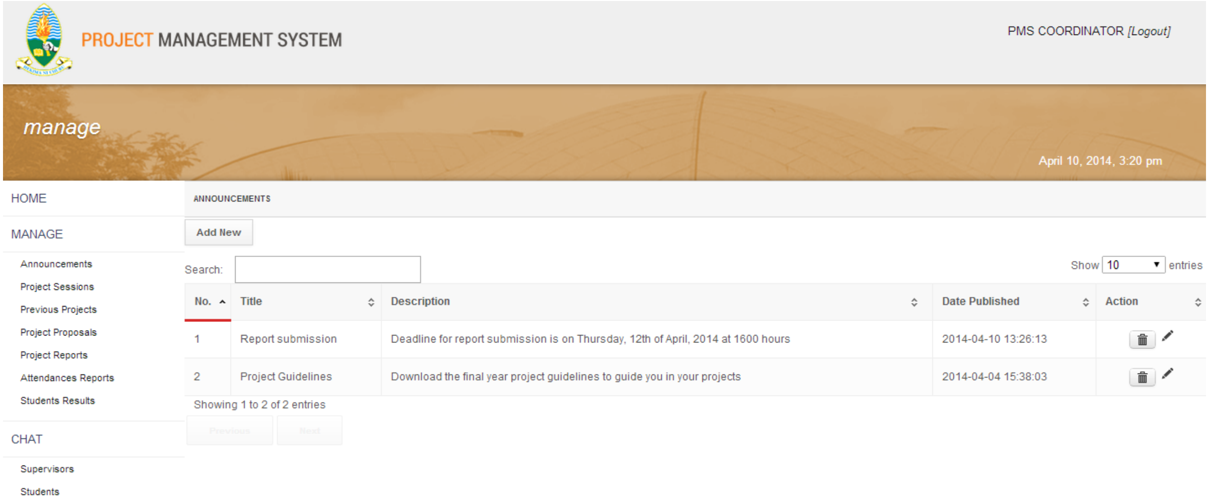
- Analysis of MIMO antenna
  Mwase Christine, 2014-04-04 13:29:54

APPROVED PROJECTS

- Project Management System
  MWAMMENYWA IBRAHIM, 2014-04-03 23:22:46

Figure 5.12: Third-year Student Home Page

On clicking the particular sub-menu in the side menu, the system gives an access to view information in the particular clicked and the functions such as delete, edit and add; which a user can perform depending on his/her privilege. Figure 5.13 as an example shows the action buttons add new which is found at the top of the table), edit and delete which is found in last column, action column in the table while viewing the ‘announcements’ on a sub-menu of PMS coordinator page.



No.	Title	Description	Date Published	Action
1	Report submission	Deadline for report submission is on Thursday, 12th of April, 2014 at 1600 hours	2014-04-10 13:26:13	🗑 ✎
2	Project Guidelines	Download the final year project guidelines to guide you in your projects	2014-04-04 15:38:03	🗑 ✎

Showing 1 to 2 of 2 entries

Figure 5.13: Information Viewing in a Particular Sub-Menu

Adding/Editing Information

In order to add and submit any new information to the system, the user is required to click the add button, and feed the new information in the form given before submitting it. Editing is similar to the adding of new information except when editing the form fields are filled with the previous information to enable the user to know what he/she is editing. While adding/editing new information, form cannot be submitted without filling the ‘must’ fields which is indicated by a star sign. Adding/editing forms can also enable and/or require the uploading of files. Figure 5.14 below shows an example of a form for adding new information to the system.

User can delete the information by clicking the delete icon in action column as shown in Figure 5.13; once clicked, the system will ask the user to confirm the deleting action.

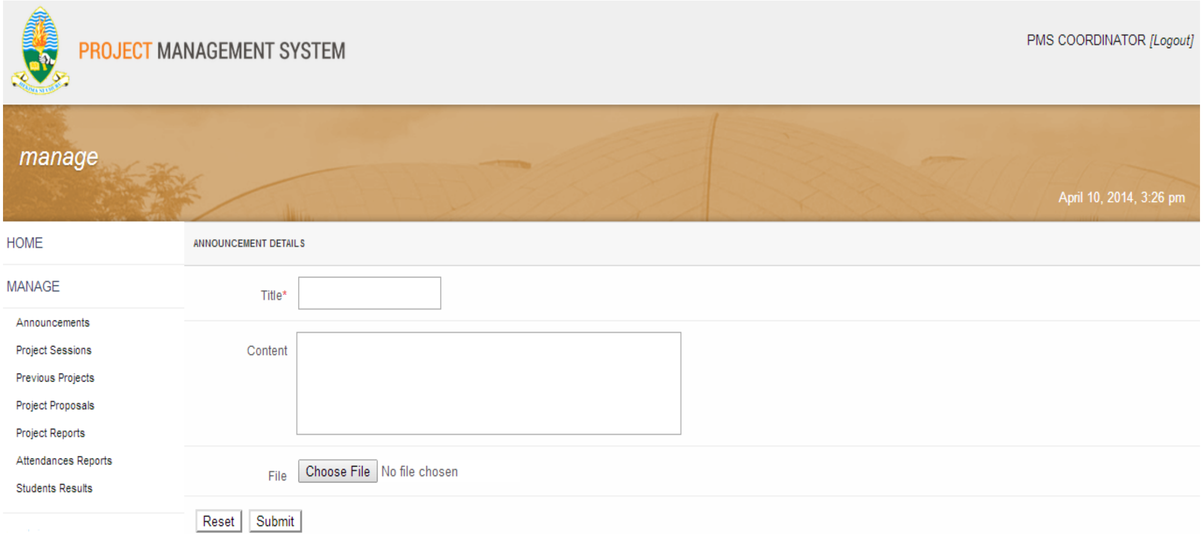
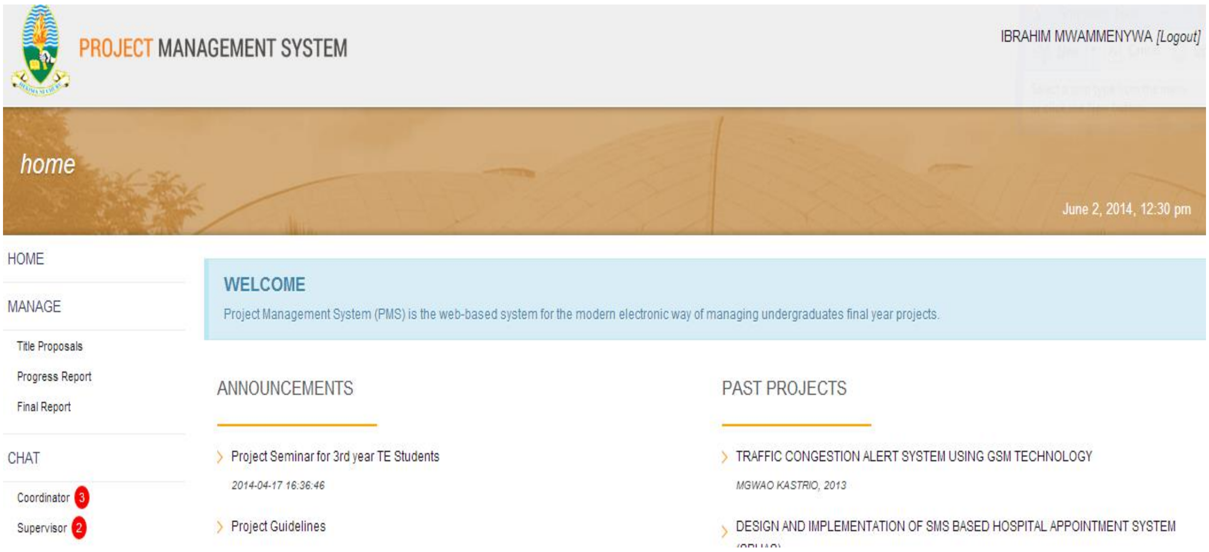


Figure 5.14: Form to Add Information

5.2.5 Chatting Phase

Here is the place where the user can send or read the messages he/she has received. By navigating the menu side to the chat, user can see the red notification if there are some new messages sent to him/her as seen in Figure 5.15 indicating the count of new messages; and he/she can proceed to chat with the recipient of his/her choice depending on his/her role. User is presented with chatting window as shown in Figure 5.16, which displays the previous messages where user can go on with the chat.



WELCOME

Project Management System (PMS) is the web-based system for the modern electronic way of managing undergraduates final year projects.

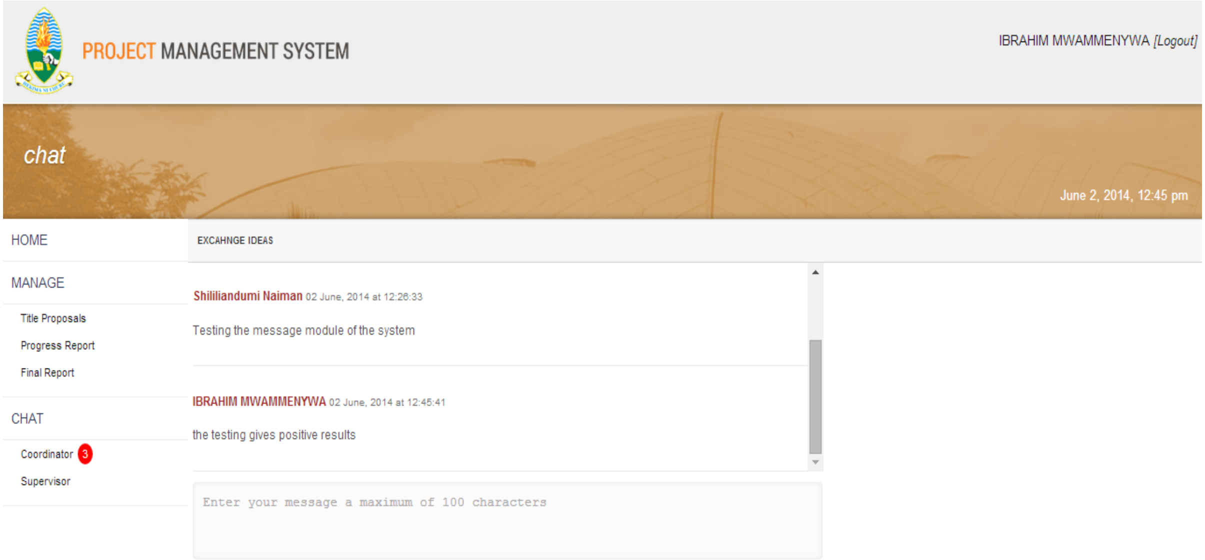
ANNOUNCEMENTS

- Project Seminar for 3rd year TE Students
  2014-04-17 16:36:46
- Project Guidelines

PAST PROJECTS

- TRAFFIC CONGESTION ALERT SYSTEM USING GSM TECHNOLOGY
  MGWAO KASTRIO, 2013
- DESIGN AND IMPLEMENTATION OF SMS BASED HOSPITAL APPOINTMENT SYSTEM

Figure 5.15: Red-circles Showing New Messages Notification



Shililiandumi Naiman 02 June, 2014 at 12:26:33

Testing the message module of the system

IBRAHIM MWAMMENYWA 02 June, 2014 at 12:45:41

the testing gives positive results

Enter your message a maximum of 100 characters

Figure 5.16: Chatting Windows

5.3 Summary

The development of this system is divided into five phases; with each phase being successfully implemented as explained above. During the implementation of each phase, the unit testing is carried out to spot and remove the bugs/errors in a small system unit before it affects the whole system as explained in chapter six. Each phase was not integrated to the system until it was tested and gave the expected performance.

CHAPTER SIX
SYSTEM TESTING

6.1 Introduction

In order to implement the system correctly and to eliminate bugs and to ensure that the final developed system satisfies the original specifications as well as to be of a top quality, series of testing are carried out. System development testing starts from unit testing, integration testing to full system testing. Practically speaking, testing goes on throughout the development of the system.

6.2 Unit Testing

Unit testing is the process of breaking down a big system into small parts that can be tested in isolation from the rest of the system. This type of testing is done during the development of each system feature. It is tough and impractical to conduct testing of a full user-driven web application, but a single unit testing enables to eliminate bugs at the low level with easy. During the development of the system each part of the system was tested separately to uncover errors within its boundaries; different tests were implemented in order to test the correctness of individual unit. Table 6.1 shows some conducted unit tests conducted during the system development.

Table 6.1: Particulars Tested During the Unit Testing

TEST OBJECTIVE	TEST CASE(INPUT)	EXPECTATIONS	RESULTS NOW
Navigation through different pages	Clicking on the links of this system to see whether they respond.	The links will provide and allows the navigation from one page to another.	All the links are successfully navigated.
Posting/adding new information using forms	Loading a blank input form and to input some required information	User should successfully input the information; when submit, it navigates	The new information is successfully

	(e.g. text) and then to submit or reset the form fields.	to the destination page and when reset, it empties the form fields (to blank fields).	added or posted to the defined destination.
Editing information	Selecting the particular record (which has a permission to be edited) and edit it.	User should successfully select a record to edit and system navigates to the editng form and be able to update/edit the information.	The selected record is successfully edited and the new record is seen in the system.
Deleting information	Selecting the particular record (which has a permission to be deleted) and delete it.	User should successfully select a record to delete and once deleted, it should disappear completely from the system.	The selected record is successfully deleted out of the system.
File uploading	Uploading a file of an acceptable pre-defined format/file extension.	User should successfully select a file from his/her storage device and upload it to the system.	The file (with an acceptable extension) is successfully uploaded to the system while unaccepted files are denied.
File downloading	Dowloading a file from the system server	User should successfully download a file by clicking an indicated link	The file is successfully downloaded from the system server.
Message sending	Sending a message to the selected recepient	User should successfully select the recepient and send the message to him/her via the system.	Messages are successfully sent to different recepients

Receiving messages	The selected receipient receives every messages directed to him/her.	User should successfully see the new message notification, and he/she should be able to view the new received messages.	New messages are successfully received, user sees the notification and he/she is able to read the messages

6.3 Integration Testing

Integration testing is a systematic technique for conducting tests to uncover errors associated with interfacing a single system unit to another. The objective of doing this is to take unit-tested unit and build a program structure that has been dictated by the design of the sytem.

Table 6.2: Particulars Tested During the Integration Testing

TEST OBJETIVE	TEST CASE(INPUT)	EXPECTATIONS	RESULTS NOW
Database connection	Adding, uploading, editing, deleting and viewing of information through the user interface.	Inserting of the added information, updating of the edited information, viewing of the selected information and deleting of the deleted information from the database. Also, saving the file path to the database during the file uploading.	Inserting, updating and deleting of information in the database are successfully done.
User identification	Identification of the user from the login panel (which was developed within the main-framework).	The system should successfully identify the user (when he/she starts a session) and record his/her ID number	The user is successfully identified from his/her login credentials; and

		wherever he/she commands the system to do something along with the action done.	his/her actions are attached with his/her user ID.

6.4 System Testing

After testing of different individual modules/units, and the integration between them; the fully intergrated system as one operational system is then tested as a whole. This is done to eliminate all the conflicts or unexpected errors within the system. Different users of different roles are used to test the system. During this testing, the sytem is uploaded to an online server so as it can be reached by many users in different environment. The system was tested in the cloud for gobally testing so it can be accessed by different users for the testing.

The system development proved to be the success as each and every functionality performs in the manner it was suppose to perform. The system is ready to be deployed and used for the final year management.

6.5 Summary

The system development testing (such as unit and integration testing) was successfully carried out, and the bugs observed were worked on to give an error-free and a user-friend system. The whole system was also test by different users and it performs superbly. The system development proved to be the success as each and every functionality performs in the manner it was suppose to perform. The system is ready to be deployed and used for the final year management for ETE department.

CHAPTER SEVEN
CONCLUSION AND RECOMMENDATION

7.1 Conclusion

The project has been a success and has been covered in the allocated proposed time. During that time the data/requirements collected and analysed successfully. The analysed requirements were modelled to obtain the designing classes. The designing progressed into the ER Diagram consideration and the Database design and creation.

The designs gave the platform for the system development. The development was successful done in allocated time even though it was marred with some difficulties during the integration to the ETE framework (which was developed using yii framework).

The system was tested as in units, and as the whole system. The system was tested globally but the testing server was later on crushed due to server configuration problem (on the hosting side).

The PMS is complete and is ready for usage for the final year projects management for ETE department. It has the capabilities of keeping track and storing of all activities such as project title proposal form submissions, progress and final reports submission, and supervision and consultation attendances in a modern electronic way. The system also reduces delays, costs, complexity and connects everything in real time including tools for project training, help, project schedule and other activities. It enhances the real time communication between students, supervisors and coordinators.

7.2 Recommendation

The system design and development have been completed, and then the addition of the system to the hosted ETE framework is the recommended work. Once it is hosted and being used, the system should be under the technical support so as to spot and correct any rising ambiguities.

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APPENDICES

Appendix A: Budget

The Project-work budget for both semesters.

No	Item description	Unit cost in TShs and number of items	Cost per item in TShs.	Total cost in TShs
1.	Stationary costs.	Material and equipment's 12,000/=	12,000/=	12,000/=
2.	Internet costs and communication costs (in bundles).	3,500/= per week(for 30 weeks)	105,000/=	105,000/=
3.	Printing and copies and binding (Title proposal, Attendance sheet, Progress reports and final reports printing and copies) costs.	100/= per page printing (180 pages)	18,000/=	33,000/=
		50/= per page copy (180 pages)	9,000/=	
		1500/= per item binding (4 reports)	6,000/=	
4.	Transportation costs.	2000/= per week (for 30 weeks)	60,000/=	60,000/=
5.	Miscellaneous.			20,000/=
			TOTAL IN TSH	230,000/=

Appendix B: Project Schedule

This is the project schedule (timeline) for the first semester.

No	Activities	Week number																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.	Title refinement and approval	■	■	■														
2.	Literature review	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3.	Requirements gathering				■	■	■	■										
4.	Progress report preparation and submission				■	■	■											
5.	Progress oral presentation preparation and presenting						■	■										
6.	Requirements analysis								■	■	■	■	■	■				
7.	System modelling									■	■	■	■	■				
8.	System designing										■	■	■	■				
9.	Final report preparation and submission				■	■	■	■	■	■	■	■	■	■	■			
10.	Final oral presentation preparation and presenting															■	■	■

This is the project schedule (timeline) for the second semester.

No	Activities	Week number																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.	System Implementation	🟦	🟦	🟦	🟦	🟦			🟦	🟦	🟦	🟦	🟦	🟦				
2.	Progress report preparation and submission				🟦	🟦	🟦											
3.	Progress oral presentation preparation and presenting						🟦	🟦										
4.	Unit, Integration and System testing	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦				
5.	Final report preparation and submission				🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦	🟦			
6.	Final oral presentation preparation and presenting															🟦	🟦	🟦