ADVENTIST UNIVERSITY OF CENTRAL AFRICA

ONLINE MANAGEMENT OF CIVIL ENGINEERS ACTIVITIES FOR INSTITUTION OF ENGINEERS RWANDA

A project

presented in partial fulfillment

of the requirements for the degree

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

Major in

INFORMATION MANAGEMENT

By

INGABIRE Moise

June, 2017

PROJECT ABSTRACT

Project for Bachelor Degree in Information Technology

Emphasis in Information Management

Adventist University of Central Africa

TITLE: ONLINE MANAGEMENT OF CIVIL ENGINEERS ACTIVITIES FOR INSTITUTION OF ENGINEERS RWANDA

Name of the researcher**: INGABIRE Moise.**

Name and degree of faculty Advisor: **Mr. NTEZIRYAYO Déogratias, Msc.**

Date Completed: **June, 2017**

This project focuses on the design and implementing an Online Management of Civil Engineers Activities web based application which will improve the Institution of Engineers Rwanda daily work especially members registration and activities management.

The system is implemented using a 3-tier approach, with a backend database (MySQL database), a middle tier of Glassfish server and JSP, and a front end (any web browser).

This project also discusses each of the underlying technologies used to design and implement the application. For instance, UML was used for analysis whereas, documentation, observation and interview contributed to collect data. Furthermore, MySQL 5.5 was used for database, JSP, HTML and CSS were used for the design and development of web pages.

DECLARATION

I, **INGABIRE Moise** hereby declare that this work entitled "**Online Management of Civil Engineers Activities for Institution of Engineers Rwanda"** to the best of my knowledge, it has been done by me and has not received any previous academic credit at this or any other University or institution of high education in Rwanda.

Student	**Supervisor**
Mr. INGABIRE Moise	**Mr. NTEZIRYAYO Deogratias**
Signature……	**.....**

DEDICATION

To the Almighty God,

To my lovely family

To all my friends and relatives

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AUCA	- Adventist University of Central Africa
IER	-Institution of Engineers Rwanda
OMCEA	-Online Management of Civil Engineers Activities
CSS	- Cascading Style Sheet
FK	- Foreign Key
HTML	- Hyper Text Markup Language
XHTML	-Extensible Hyper Text Markup Language
PK	- Primary Key
DBMS	- Database Management System
RDBMS	-Relational Database Management System
UML	- Unified Modeling Language
XML	- Extensible Mark-up Language
RDB	-Rwanda Development Board
CV	-Curriculum Vitae
JSP	- Java Server Page
IDE	- Integrated Development Environment
PDF	-Portable Document Format
JAR	-Java Archive
JDBC	-Java Database Connectivity
GT BANK	-Guaranty Trust Bank

ACKNOWLEDGEMENT

First of all I want to thank God for his protection, blessings of health and financial means that I have graciously received while doing various activities of my project.

For realization of this project, I have been lucky to have help, support and encouragement from many people. I would like to acknowledge them for their cooperation.

I would also like to thank all AUCA lecturers, especially to the academic staff of the Department of Information Technology for the knowledge that I acquired helped me to conduct this project, and I take this opportunity to thank the whole AUCA staffs.

Very special thanks go to **Mr. NTEZIRYAYO Deogratias,** my project advisor, who accepted to supervise this work for guiding me through each and every step of the project process. Thank you for your advice, guidance and assistance.

Also, I would like to thank the Administration for Institution of Engineers Rwanda, for giving me the opportunity to access the necessary data to conduct this research project within their organization.

Finally, and most importantly, I would like to thank my wife **SHEMA Diane UWAYO.** Her support, encouragement and quit patience for years spent in my studies.

May God bless you all!!

INGABIRE Moise

CHAPTER 1 GENERAL INTRODUCTION

Currently, the use of technology becomes more dominating (very useful) over our world, where the information management system occupies a significant place in our everyday life. Most companies, organizations, associations, clubs and institutions use the information technology as the key component to ensure the success of their routine activities. The Institution of Engineers Rwanda as an Institution has to improve the management of its routine activities using a computerized working system through a web-based application.

Most especially in our case, we are interested in computerizing the management system using Web-based application. The system will allow the system users to access the information easily and quickly. The key advantage of the web-based application is its availability, as it can be accessed by any authorized user connected to the Internet and multiple users can access it at the same time so that services become faster and more efficient.

The web-application can be designed as a three-tier architecture, which includes a web client, network servers, and a back-end information system supported by a suite of databases. The goal of this project is to develop a user-friendly web-based application that automates the routine activities for Institution of Engineers Rwanda.

Background of the study

The IER started in 2008 as learned society of engineering profession with an aim to promote and develop engineering services and best practice for sustainable development of our country. This was in line with government's commitment to promote science and technology for the national development, while promoting the engineering profession leading to improved quality and efficiency of services.

All these proved difficult to be achieved without appropriate legal framework until 2012 when the law No. 26/2012 of 29th June 2012 was established and enacted by the Parliament.

The IER will not only be used as a tool to achieve the targeted goals but also will be a forum to harmonize engineering services and activities within the country, the East African Community and the world at large.

Based on how the current system works, the applicant deposits at the IER's office the membership request application documents, after being approved as a member a file is created in which the basic information is kept. When a membership's information is needed, they have to go through all those member files and find the data.

This movement somehow is unnecessary, the archaic process causes information to be lost easily and give bad reputation to the IER.

IER aims to maintain standards, ethics and high level of professional competence in the engineering field. IER As the national society of engineers for the advancement of engineering in Rwanda, our mission is to advance, promote and develop engineering profession by providing all the expertise necessary for the socio-economic needs of mankind (IER strategic plan 2014-2020, 2014).

Statement of the Problem

Managing an institution like (IER) is not easy. Sometimes several problems are encountered during the activities which results the delayed of reports, redundancy and inconsistency of data and the loss of information. The following are the main problems:

- **Problem of time and money consumption:** Many members spend a lot of time and money (ticket) for moving to their Institution of Engineers Rwanda while they need some service.
- **Problem of profiling:** it may take long time for staffs to find and reach exactly the information needed from previous periods (archives).
- **Problem of data loss:** The document received or sent are conceived in disorganized manner, on the card paper or on the note books, if the information is not in classification order can be lost;
- **The problem of reports compilation:** Difficult to establish the reports containing all information is takes a long time since the information is kept separately; also annual reports are not easy to establish.

Choice and motivation in the study

Working on this project, we are interested in finding the solution to the above problems encountered so that many people will be motivated by this new system **"Online Management of Civil Engineers Activities" Case Study: Institution of Engineers Rwanda.**

The system will be used to reduce problems specified in the problem statement and will increase the performance of their activities.

The following people are interested in this work:

To Members (engineers), the application will help them to register, prepare and submit their documents online without having to spend their time and money to travel to the IER's office.

To Institution of Engineers Rwanda, as an institution, this application will change the traditional way of working. The application will help also this institution to reduce the money spent in buying ream of paper and ink used for printing out the reports and forms. Also the system will allow to the institution to store information in centralized database so that they are more secured.

To myself, it is an opportunity to put in practice the knowledge and skills acquired for different domains (software development, databases management system and web technology), and to be familiar with the new technology for solving different problems encountered in society.

Objectives of the Study

Our study is conducted for two objectives: general objective and specific objectives.

General Objective

The main objective of this research project is to develop a system that will help institution of engineers Rwanda and members in preparing, submitting and receiving documents.

Specific Objectives

A deep analysis of the activities of IER, a task was given to me for achieving the following objectives:

- Analyze the current working system of Institution of Engineers Rwanda for finding out the common reason which causes the redundancy and inconsistency of data and the loss of information.
- Create a database where information will be stored.
- Develop web-based application which will automate the IER activities.

Scope of the study

Developing a web-based application for big or small institution is not a simple task. To achieve the above objectives demands to be very attentive and having sufficient time and experience and some financial resources in order to meet all customers' needs.

Some of the difficulties that we faced in finding the accurate solution to the management system for IER were the insufficient time allocated to the work completion, the accessibility of data and internet connection, and the insufficient experience to develop such system.

This work will be limited on the activities concerning the management of Engineers registration, send and receive the document and reporting system at Institution of Engineers Rwanda.

Methodology and Techniques Used in the Study

A research project will be conducted in good way, when data are collected carefully. Depending on research that you want to conduct, many methods and techniques to collect data are used namely: mailing of questionnaires, documentation, personal or phone interview, survey and observation. The following are the method and techniques that we have used to collect data when analyzing the existing system: observations, interview and documentation.

Observation

Observation is a method collecting data in which the researcher him/herself must to visit or collects the subjects and watches them operate. This technique is more objective and reliable due to the fact that it can be used directly, but then very few researchers can afford to use it. This is considered as disadvantageous because it is both expensive and time consuming for meaningful results to be obtained from it. Several times we went to the IER's office and some engineer's offices to observe, how operate their activities and the technique has been helpful for collecting data related to our research.

Documentation

We have used documentation from various articles, books, reports, journals and websites we have obtained the appropriate definitions and more specific information on the technical terms used in our research.

This method was used when collecting data from reports, files and official documents of IER relevant to this research project. The documentation allows us to familiarize ourselves with the various tools and models that we used to develop the application.

Interview

The interview is defined as a one of method used to collect data where conversation between two or more people (interviewee and interviewer) is conducted by asking questions.

In this technique the researcher face to face obtains verbal responses to questions asked and records replies himself/herself.

In order to attain highly personalized information data about the operation of the existing system and to better understand the management system at IER and what problems are encountered, we had an interview with different members and staffs of IER.

The technique of interview has been and is still used to collect large amount of information in all kinds of research so that it becomes more popular, because of its flexibility.

Expected Results

At the end of our research project entitled "**Online Management of Civil Engineers Activities for Institution of Engineers Rwanda"** the following results are expected to be achieved:

- Make a database that will help to centralize data, and this database will provide an order or organized data and it will avoid the disorder.
- This system will allow a member (engineer) to register online.
- This application will be able to retrieve any needed information at a needed time.
- This application will allow a member (engineer) to send his/her documents, and be sure that they are received online and get a feedback message informing him/her that his/her documents have been received.
- This application will save a time for both sides: receiver and sender of documents: Engineers and IER staffs. Without spending long time they can submit the documents and receiver feedback.
- The system will help members for checking his/her status and request online and give feedback on email before coming to see his/her issue is resolved
- This application will reduce the printing cost because no need to print out the documents, also the application will reduce the amount of money spent by institution, members for transport when traveling from home to the IER offices to present their documents.

Organization of Report

This study is organized in five chapters:

In Chapter one, we introduced the basic information for the design and implementation of Online management of civil engineers for Institution of Engineers Rwanda where some points will be discussed concerning why and for what we have chosen this topic (problematic, Objectives, motivation of the topic, challenges, delimitation of the work and the expected results for the system).

The second Chapter will emphasis on description of Institution of Engineers Rwanda, requirements collection techniques, explains some concepts and terminologies used in this project, analysis of the existing system, identified problems and proposed solutions to those problems.

Chapter three will describe deeply the logical conception of the new system as solution proposed to resolve problem of the existing problem. It will portray the conceptual process of the solutions proposed to solve the problems of the existing system.

Then, the fourth chapter will focus on the technical realization of the application. For this we will explain how the new system has been conceived, the technologies used to build the application, presentation of project's forms and reports as well as different tests used in order to make sure that our system is well validated.

Finally, chapter five will come with the conclusion and recommendations related to results of the project.

CHAPTER 2 ANALYSIS OF CURRENT SYSTEM

Introduction

A detailed description of the existing system is very important get the complete picture of the new system in order to conceive it. The existing system is analyzed to understand deeply the context in which the proposed new system will be limited to achieve the customer needs.

Through this chapter we will describe in a clear way the organizational environment in which the new system will be implemented. After we will explain the specific terms used in this project and we will also describe the organizational structure of Institution of Engineers Rwanda as well as its mission and vision, objectives, roles and core values and plan action the current system of management in IER, and finally we will identify the problem faced by the use of that current system as well as the proposed solution.

Description of Current System Environment

The IER started in 2008 as a learned society of engineering profession with an aim to promote and develop engineering services and best practices for sustainable development of our country. This was in line with the government commitment to promote science and technology for the national development, while promoting the engineering profession leading to improved quality and efficiency of services.

In June 2012, the law No.26/2012 of 29/06/2012 governing the profession of Engineering and establishing the Institution of Engineers Rwanda was enacted by the parliament.
On the 17th April 2013, the Hon. Minister, Ministry of Infrastructure Hon. Prof. RWAKABAMBA Silas officially launched the Institution. (IER Strategic Plan , 2014).

Mission

To advance, promote and develop engineering profession to provide all the expertise necessary for the socio-economic needs of mankind.

Vision

IER aims to maintain standards, ethics and high level for professional competence in the engineering field.

Core values

In archiving our vision and roles, we will embrace the following core values:

- **Integrity –** embracing professionalism and honesty in discharging our responsibilities.
- **Professionalism –** the institution will uphold professionalism in all its activities.
- **Innovation –** encouraging and rewarding creativity and positive risk taking.
- **Accountability –** being transparent and accountable in the use of institutional resources.
- **Passion –**a strong teamwork is required for the institution to realize its objectives.
- **Social Responsibility –** being sensitive to the needs of the stakeholders and pro-actively addressing their needs.
- **Stewardship –** for ownership and sustainable development.

Aims and Objectives

1. To provide information and leadership to the engineering profession on issues of concern to the public and the profession.
2. To facilitate relationships between government organizations, business firms and the people, collaborating with discussions aimed to improve the benefits of policies and investments related to the engineering competence.
3. To promote professional engineering practices, standards and ethics.
4. To Strengthen Institutional Capacity of IER.
5. To promote training and development of Engineers.
6. To promote the status, Rights and welfare of Engineers.
7. To promote culture of Creativity, innovation and application of research finding.
8. To foster research and development of the engineering field.
9. To enhance the character and status and to advance the interest of the Profession of engineering and those engaged therein.
10. To provide quality service to its members and the nation.

Roles

- Represent the engineers nationally and internationally;
- Advance the knowledge and expertise of engineers;
- Uphold the status and image of engineers; and
- Provide a platform where engineers gather for social, business, professional and career development.

Organizational structure of IER

The Institution of Engineers Rwanda is composed of two elected executive committees namely the governing council and the board of the institution of engineers. The two organs have different responsibilities. The organizational structure of the institution is composed of the following:

i. The General Assembly
ii. The Governing Council
iii. The Board of Institution of Engineers

The General Assembly shall be constituted by all members on the roll of the Institution or registered on the list of interns. Decisions taken by the General Assembly in accordance with the low establishing the Institution and the internal rules and regulations of the institution shall be binding on all its members.

The Governing council is composed of Chairperson, Vice Chairperson, Secretary, and 4 Members. The Governing council shall be responsible for the regulation of engineering profession services, setting of standards, development, and general practice of engineering to ensure that members of the institution demonstrate good conduct and integrity in the practice of their profession. The council shall decide and update the role of the institution by examining and deciding the applications for admission and control access to the practice of the profession.

The Governing council arranges national conferences, seminars and representation of IER members in various committees formed in the country and internationally.
The Board of Institution of Engineers has the following responsibilities:

1. To control access to the practice of the profession and set admission requirements to practice;
2. To train its members on a regular basis;
3. To monitor the practice and professional conduct of its members;
4. To make sure that only its members carry out acts reserved for authorized persons;
5. To monitor the practice of its members and exercise disciplinary action over the members;
6. To resolve conflicts and contribute to the settlement of disputes that may arise between a member and his/her client;
7. To promote the practice of the engineering profession;

8. To train recent graduates to practice the profession;
9. To intervene in cases requiring the expertise of engineers as the case may be.

Description of the Current System

Entry Requirements

For a civil engineer or a civil engineering consulting firm to practice engineering profession in Rwanda, he/she must be a registered member of the IER.

Here we are going to describe what is required to become a member and how IER works to reach its goals.

Membership of IER is classified into two categories:

- Engineers and
- Engineering consulting firms.

To apply for membership, he/she must present or send an email to the office of IER a filled membership application form obtained at the office or online and submit all required documents.

Here is the list of requirement details depending on the category:

For engineers:

1. Application form.
2. Presentation of bank pay slip of non-refundable fee of **10,000 rwf** as Application fee
3. Notified Degree certificates
4. CV
5. Photocopy of national Identity card
6. Two passport photos
7. Technical report in any professional involvement (if any).

For engineering consulting firms:

- Have a certificate of business registration name or a certificate of corporation issued by RDB.
- Have at least (one principle share holder or managing director or technical director) who is registered as corporate engineer with valid practicing certificate in certified discipline.
- Have established office with at least one permanent engineer.
- Provide curriculum vitae for the managing director and curriculum vitae for a registered corporate engineer said above if managing director is not a registered engineer.
- Provide two passport photos of managing director.

The council may require the applicant to furnish such further information or evidence of eligibility for registration as it may consider necessary and may require the applicant to appear in the person for an interview before the council.

- Application fee: **20,000 rwf**

  N.B: All payments are made on institution's account **N^{o} 011 13011 24** opened in **G.T BANK**

The received applications are kept by the executive secretary until the Governing council arranges the meeting where the membership decisions are taken. The Governing council, based on the application information will decide if the applicant is accepted or rejected. Based on the decision made on the application the applicant will be communicated about it through phone.

Registered Members

If application is accepted, the applicant will be issued his membership certificate after presenting a bank slip of annual membership fee of 200,000Rwf for fellow members, 150,000Rwf for corporate members and 50,000Rwf for graduate members.

The accepted member has the following duties:

- To attend the meetings of the general assembly of the institute;
- To participate in programs organized by the institute;
- To pay contributions set by the general assembly.
- To participate in the training sessions organized by the institute.

The Institution organizes various activities for members including visits to industry and engineering projects. It undertakes from time to time, training courses on various topics geared towards advancement of engineers. It organizes cocktail lectures from distinguished personalities and professionals; it prepares reports/statements on topical issues, which have bearing to the engineering profession and the society. It holds conferences annually based on various themes and holds breakfast meetings for dialogues between members (IER Strategic Plan , 2014).

Sources of funding for operations of IER

The Institution funds its operations through the following sources:

- Membership entrance fees and annual subscriptions,
- Surplus from conferences and training.

Modeling the Current System

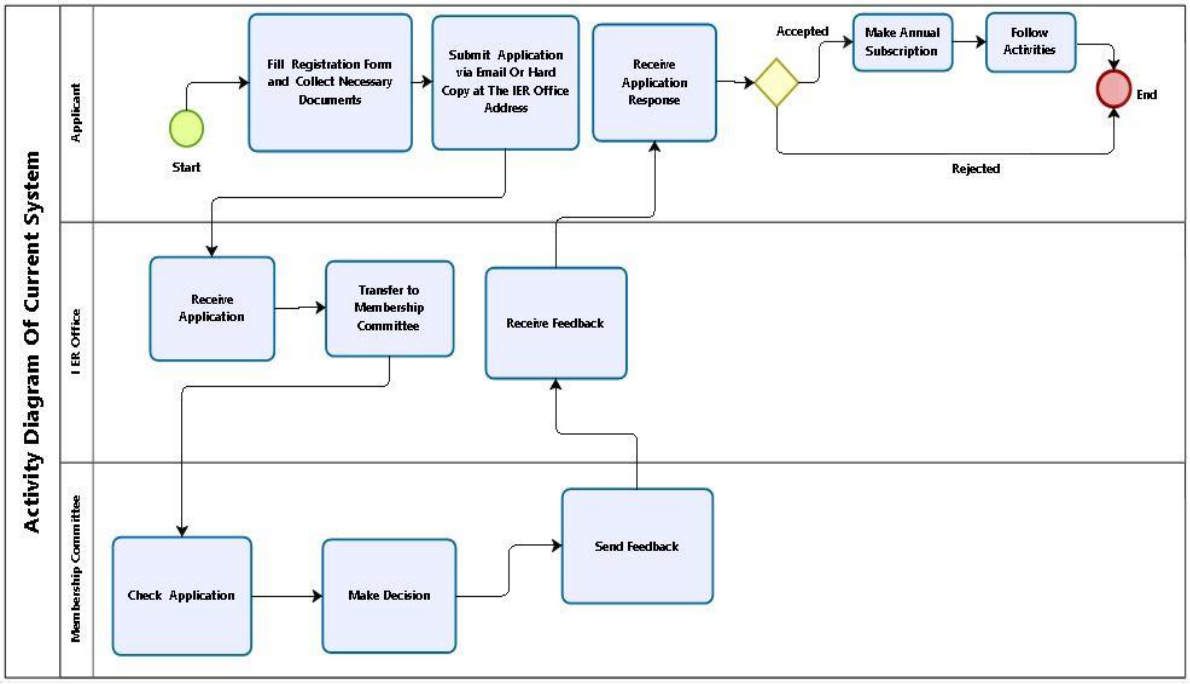


Figure 1: Modeling the existing system

Problems of the Current System

Analyzing the existing system of management of IER, we have identified the following weaknesses in that system:

To members, it becomes had to prepare and submit the documents timely because they spend a lot of time and money (ticket) for moving to their Institution of Engineers Rwanda while they need some service. And also it becomes had to receive the feedback of the documents sent.

To the staffs, it becomes had to classify the received document because the documents received or sent are conceived in disorganized manner, on the card paper or on the note books; if the information is not in classification order can be lost.

To IER as institution, manual system cause to lose completely the data in case of war, fire accident etc. Difficult to establish the reports containing all information is takes a long time since the information is kept separately; also annual reports are not easy to establish.

Currently at Institution of Engineers Rwanda, there is no computerized system of all activities. Consequently, operations are made in word and excel documents and communication is about sending emails or making phone calls, which will cause several problems of management if they continue to use this routine system for managing their daily activities.

Proposed Solutions

Functional Requirements

The new system (OMCEA) will provide the following tasks to improve the old one:

- The new system will help members to prepare and submit their document easily, at real time and quickly online without spending more time (save time). Because entering all needed data, the system will automatically send those data to the appropriate staff.
- Provide online access to the authorized users to access their activities. Because the system is a web based application so that anywhere the authorized user is located will have an access to the needed information using internet connection.
- The new system also will help the institution to store and maintain all information securely in centralized database of information (in the same data base on server) where a backup will be done on regular basis, in order to keep information safely in separate and safe locations.
- The new system also will avoid any loss, inconsistency and redundancy of information. Where no integrity constraint violation, because the primary key will control the entered data (no duplication.
- This application will reduce the cost for printing (buying ream of papers, ink, printer maintenance...) because no need to print out every document.

Non-Functional Requirements

- The new system (OMCEA) will allow users to access the system from the internet using web browser as an interface. Since all users are familiar with the general usage of browsers, no special training is required.
- The system is available for the user and is used 24 hours a day and 365 days a year.
- The system shall respond to the user in a very short time from the time of the request submittal. The system shall be allowed to take more time when doing large processing jobs.
- The system should provide real time information taking into consideration various concurrency issues.
- The system will display validation messages for invalid data entry.
- The system should provide automatically notification to the member by short message about the registration process, trainings available, conference date and etc.

CHAPTER 3 REQUIREMENTS ANALYSIS AND DESIGN OF NEW SYSTEM

Introduction

The development of a new system is a work which requires a full attention in order to conceive a trusted system which has capabilities to solve problems and satisfy customer's need. After analyzing the existing system in chapter two, it is the time now to design the new system which overcomes most of the problems encountered in the existing system of institution of engineers Rwanda.

In this chapter we describe the process used to reach the conception of the database in order to design and to implement this new system entitled **"Online Management of Civil Engineers Activities for Institution of Engineers Rwanda"** This practical part deals with the creation of the website application accessible via the internet. They are two components which are mostly important for developing a system: the system analysis and the system design.

System analysis is a process of gathering and interpreting facts, diagnosing problems and using the information to recommend improvements of system. System analysis help analyst to understand how the existing system works and what it does. Our analysis involved studying the management of IER and seeing how the institution staffs interact with the current system. Then we come out with detailed specifications of what the new system will have to accomplish.

System design is a process of planning a new system by defining its architecture, components, modules, interfaces, and data so that specified requirements are satisfied. In system design we took the requirements and analysis into consideration and come out with a design that will form the blue print to the actual solution to the problem in hand.
In this chapter we have to analyze deeply the existing system by identifying problems that users encountered and to design the new system in order to solve those problems.
To achieve that we will use UML (Unified Modeling Language) that is a language using different diagrams or models, it is based on object-oriented methodology.

Object-Oriented Methodology

We have used the Object-oriented programming to develop our System to design and build the applications. This methodology was preferred because the proper use of objects makes it easier to build, maintain, and upgrade an application in order to increases the reliability of the application.

Unified Modeling Language (UML)

Developing and designing the model of our system we have used Unified Modeling Language (UML) also known as graphic notation techniques, this has helped us to create visual models of system architectural via data modeling (entity relationship diagrams), business modeling (work flow) and components modeling (logic).

Notation of Some UML Concepts

Based on customer's requirements we have to analyze them, doing so different models or diagrams are used. To describe the some concepts of UML we have some notations and definition in order to explain the conceptual work like classes, tables, attributes, relationships, etc. (ARIADNE TRAINING, 2001)

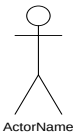
Design of the New System

Use Case Diagram

Symbols used in the design of the Use Case Diagram

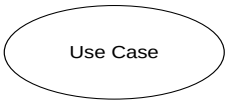
- **An actor:**

Is a Human being or system that derives benefit from and is external to the subject.



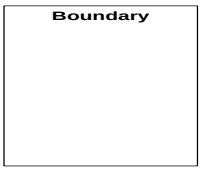
- **A use case:**

A set of scenarios that describing an interaction between a user and a system, including alternatives.



- **A system boundary:**

A rectangle diagram representing the boundary between the actors and the system.



- **An Association relationship:**

A kind of relationship which Links two things.

At this particular point we have to focus on use case diagram to identify, clarify, and organize system requirements. Use case diagram describes the functionality provided by a system (model view) in terms of actors, their goals represented as use cases, and relationships between actors and use cases. The Figure below illustrates describes the operations of new system and the stakeholders through the use case diagram.

Use Case Diagram Design

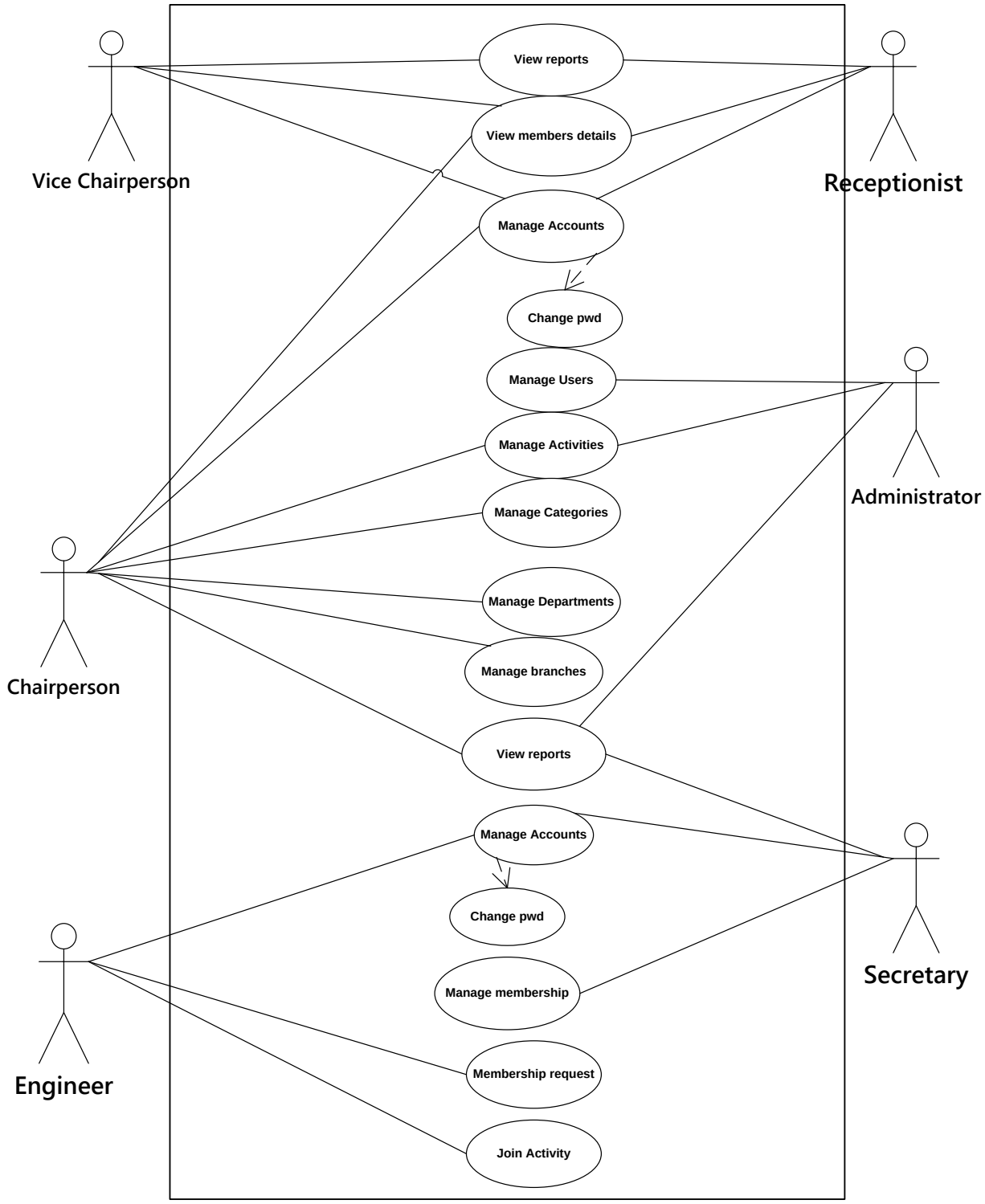


Figure 2: Use Case Diagram

Use case Diagram Description

Use Case description details what a use case do, and what it requests in order to be well executed.

- **Title:** a name of a use case
- **Actor:** the actor involved in the use case
- **Goal:** what a system intends to do
- **Pre-condition(s):** the system state before the use case can begin
- **Post- condition(s):** the system state when the use case is over
- **Main normal flow:** the actual steps of the use case
- **Alternative flow:** steps which may happen in case a normal flow fail

Manage Users Use Case Description

Title: Manage Users
Actor: Administrator
Goal: allows to the administrator of the system to create and edit the Users
Pre-condition(s): the Administrator has to login into the system as the administrator
Post-condition(s): a well come page is displayed by the system
Main normal flow: 1. The administrator requests the system the form for creating new User. 2. The system displays the requested form. 3. The administrator fills the information needed. 4. The administrator confirms the operation. 5. The system record information in the database. 6. The system displays a success message.
Alternative flow: 3.a If the information provided by administrator is wrong, the system displays validation messages. 3.b If the user exists already, the system displays the message that the user already exists.

Table 1: Creating Users Use Case Description

Change password Use Case Description

Use case: Change password
Title : To allow users to change passwords according to their choices
Actor: Any authorized user
Precondition(s): Having access to the system and old password of the user
Post condition(s): Password is changed
Main normal flow: 1. User logs into the system. 2. User chooses the option of changing the password. 3. The system requests the user to provide the old password, the new one and confirm it. 4. The system saves the new password. 5. The system displays successful message.
Alternative flow: 3.a. if a user fills the incorrect old password. The system asks to provide the correct one. b. if a user fills the different new passwords. The system asks to provide two match new passwords.

Table 2: Change Password Use Case Description

Membership Registration Use Case Description

Use case: Membership Registration
Title : To allow users to Manage Membership **a**ccording to membership requirements
Actor: new member
Precondition(s): have to visit the website click on Engineers drop down menu list. Choose your type of registration.
Post condition(s): system displays Registration page
Main normal flow: 1. New member fills basic personal information include Login information 2. The system saves the information 3. The new member Logs into the system by the provided login information 4. New member fills other registration information 5. The system saves the information 6. The system displays successful message
Alternative flow: **1.** If the information provided is incorrect the system displays validation messages.

Table 3: Membership Registration Use Case Description

Manage Membership Use Case Description

Use case: Manage Membership
Title : To allow users to Manage Membership **a**ccording to membership requirements
Actor: Executive Secretary
Precondition(s): have to log into the system as the authorized user
Post condition(s): system displays welcome page
Main normal flow: 1. The system gives many types of member's status. 2. User chooses the category. 3. The system displays the members of that status. 4. User chooses to view details. 5. The system allow the user to make decisions 6. The system saves the information 7. The user will send email informing the member about the decision.

Table 4: Manage Membership Use Case Description

Manage Activities Use Case Description

Use case: Manage Activities
Title : To allow users to manage activities
Actor: Chairperson and Administrator
Precondition(s): have to log into the system as the authorized user
Post condition(s): system displays welcome page
Main normal flow: 1. User chooses the needed menu of the activities 2. The system allow the user to record or close activity 3. The system saves the information 4. The system displays successful message
Alternative flow: 2. If the information provided is wrong, the system displays validation messages.

Table 5: Manage Activities Use Case Description

Department registration Use Case Description

Use case: Department registration
Title : To allow users to create new department
Actor: Chairperson
Precondition(s): have to log into the system as the authorized user
Post condition(s): system displays welcome page
Main normal flow: 1. The user requests the system the form for department registration 2. The system displays the requested form 3. The user to record information. 4. The system saves the information 5. The system displays successful message
Alternative flow: 3. If the information provided is wrong, the system displays validation messages.

Table 6: Department registration Use Case Description

Category Registration Use Case Description

Use case: Category registration
Title : To allow users to create new category
Actor: Chairperson
Precondition(s): have to log into the system as the authorized user
Post condition(s): system displays welcome page
Main normal flow: 1. The user requests the system the form for category registration 2. The system displays the requested form 3. The user to record information. 4. The system saves the information 5. The system displays successful message
Alternative flow: 3. If the information provided is wrong, the system displays validation messages

Table 7: Category registration Use Case Description

Branch Registration Use Case Description

Use case: Branch registration
Title : To allow users to create new branch
Actor: Chairperson
Precondition(s): have to log into the system as the authorized user
Post condition(s): system displays welcome page
Main normal flow: 1. The user requests the system the form for branch registration 2. The system displays the requested form 3. The user to record information. 4. The system saves the information 5. The system displays successful message
Alternative flow: 3. If the information provided is wrong, the system displays validation messages

Table 8: Branch registration Use Case Description

View Report (s) Use Case Description

Title: View Report (s)
Goal: allow the user to view report
Actor: Authorized users
Pre-condition(s): the user has access to the system by login
Post-condition(s): report (s) is (are) viewed
Main normal flow: 1. The user request for report to view 2. The user chooses the parameters 3. The system opens it
Alternative flow: 3. a. The user chooses another page to view

Table 9: View report (s) Use Case Description

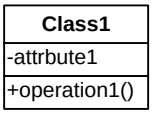
Join Activity Use Case Description

Title: Join Activity
Goal: allow the user to join activity
Actor: Authorized users
Pre-condition(s): the user has access to the system by login
Post-condition(s): Activity is joined
Main normal flow: 1. The user request to view the list of open activities 2. The user chooses to join 3. The user chooses to confirm 4. The successful message is displayed
Alternative flow: 4. The user chooses another Activity to join

Table 10: Join Activity Use Case Description

Class Diagram

A Class: this was to define and create objects in our system. Every object is associated with a class. For example, all the objects that capture information about users could fall into a class called User, because there are attributes (e.g., firstName, lastName, email, phone, status...) and methods (e.g., view report, generate report,…). In class, information is stored and managed as follow:



An Association relationship:

A kind of relationship which Links two things (class, entity or use case)

An Composition relationship:

This is a form of relationship, with strong ownership and coincident lifetime as part of the whole.

A Dependence relationship:

Dependence is a weaker form of relationship which indicates that one class depends on another

A generalization or inheritance relationship:

We have used it to link a general kind of thing (called the super class or parent) and a more specific kind of thing (called the subclass or child).

A class diagram is defined as a static model that illustrates the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. The illustration below presents the elements of the class diagram of the new system.

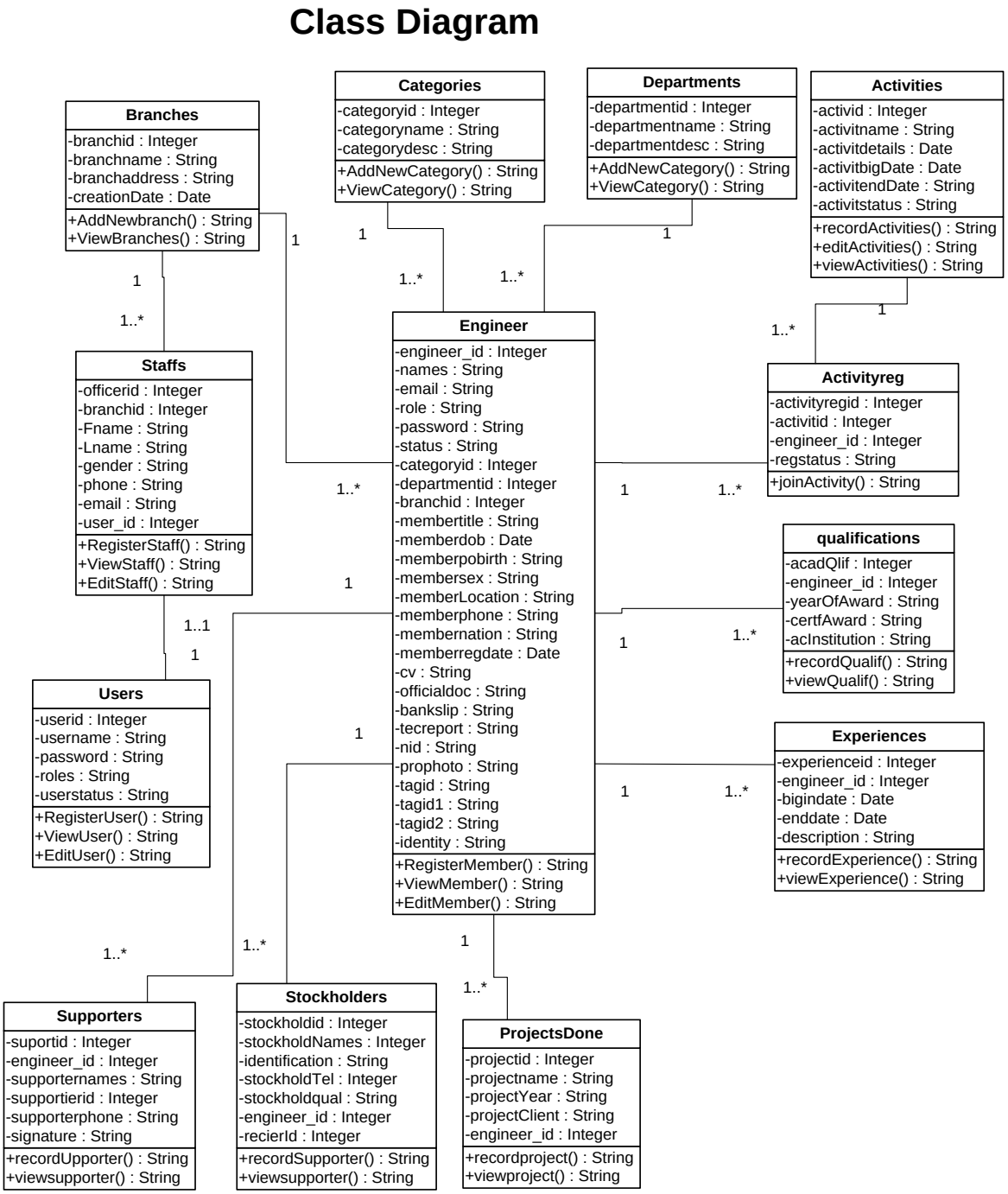
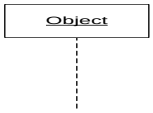
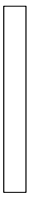
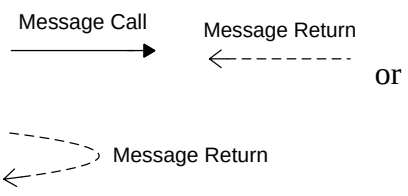


Figure 3: Class Diagram

Sequence Diagrams

Sequence diagrams are the most common kinds of interaction diagrams. They illustrate different objects that participate in a use case and the messages that pass between them over time for one use case. A sequence diagram is a dynamic model that shows the explicit sequence of messages that are passed between objects in a defined interaction. Because sequence diagrams emphasize the time-based ordering of the activity that takes place among a set of objects, they are very helpful for understanding real-time specifications and complex use cases.

The Elements of Sequence Diagram

Term and definition	**Symbol**
An actor: ❖ It can be a person or system that derives benefit from and is external to the system. ❖ It participates in a sequence by sending and/or receiving messages. ❖ It is placed across the top of the diagram.	
An object lifeline: ❖ It participates in a sequence by sending and/or receiving messages. ❖ It is placed across the top of the diagram.	
An activation box: ❖ It is a box on a lifeline on top of a lifeline. indicating the period of time during which an object is actively performing work ❖ It denotes when an object is sending or receiving messages	
A message: ❖ An operation call is labeled with the message being sent and a solid arrow, a return is labeled with the value being returned and shown as a dashed arrow.	

Create New User Sequence Diagram

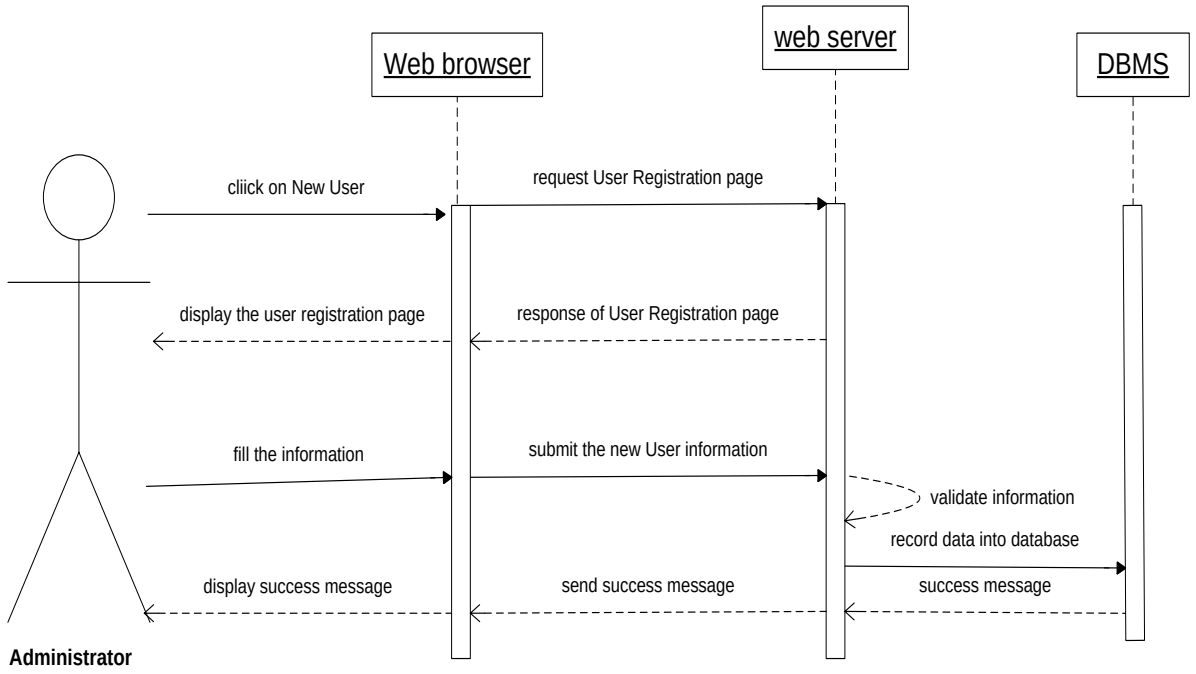


Figure 4: Creating User Sequence Diagram

Staff Login into the system sequence diagram

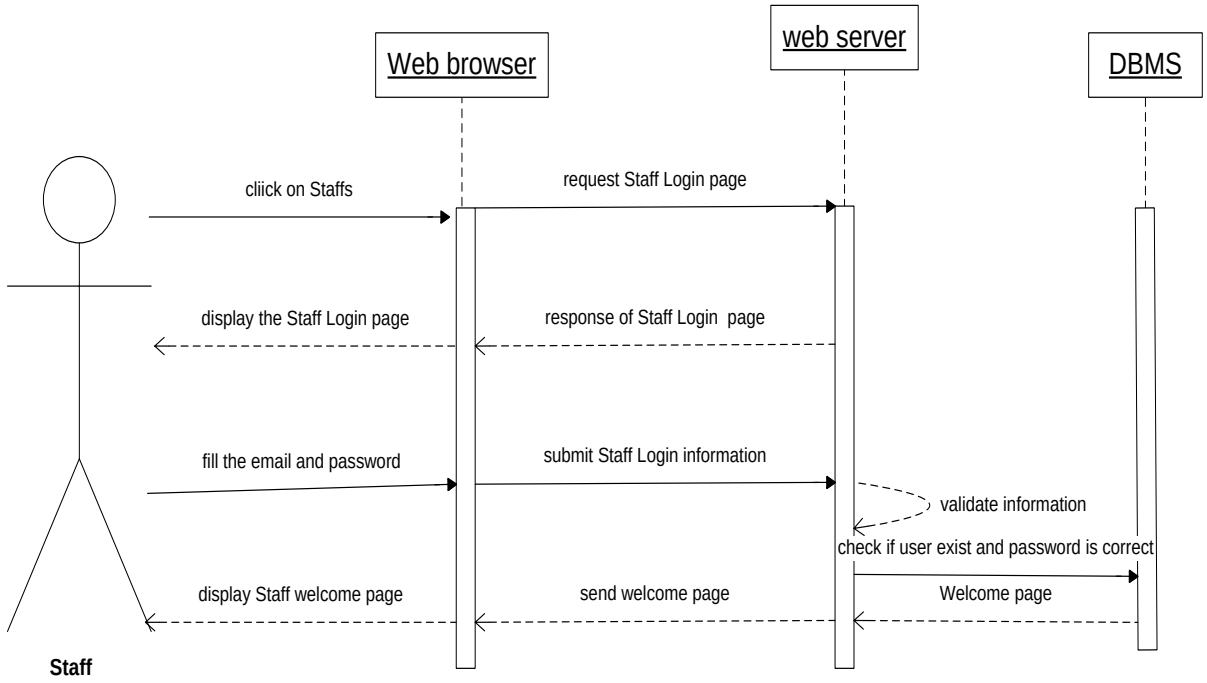


Figure 5: Staff Login into System Sequence Diagram

Engineer Login into the system sequence diagram

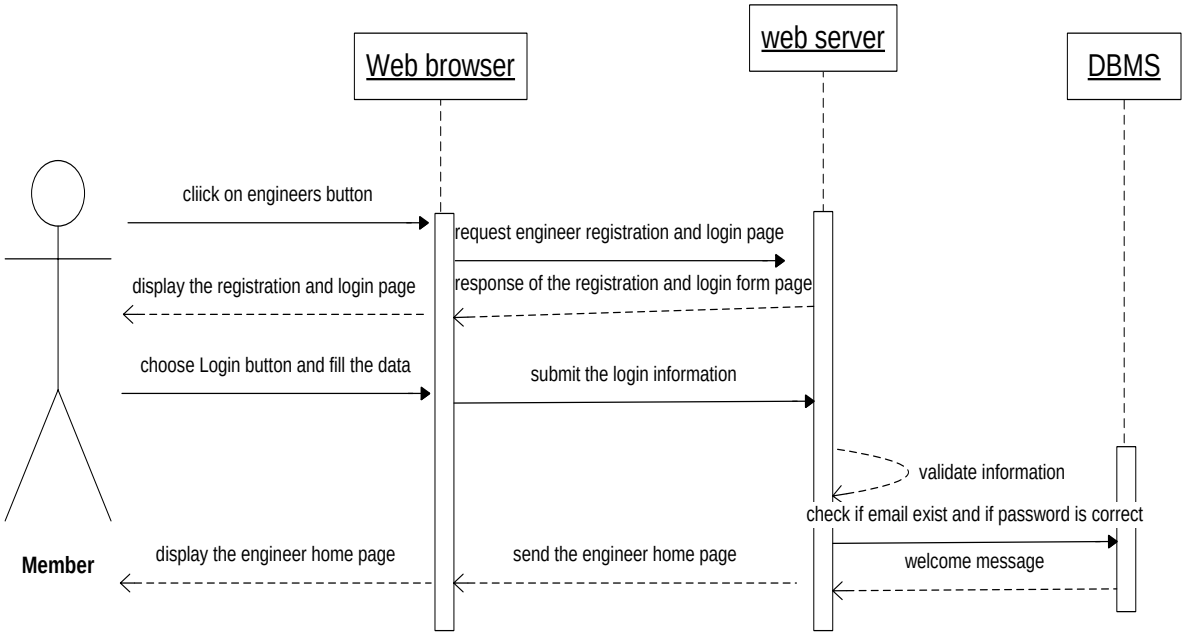


Figure 6: Engineer Login into System Sequence Diagram

Viewing Reports Sequence Diagram

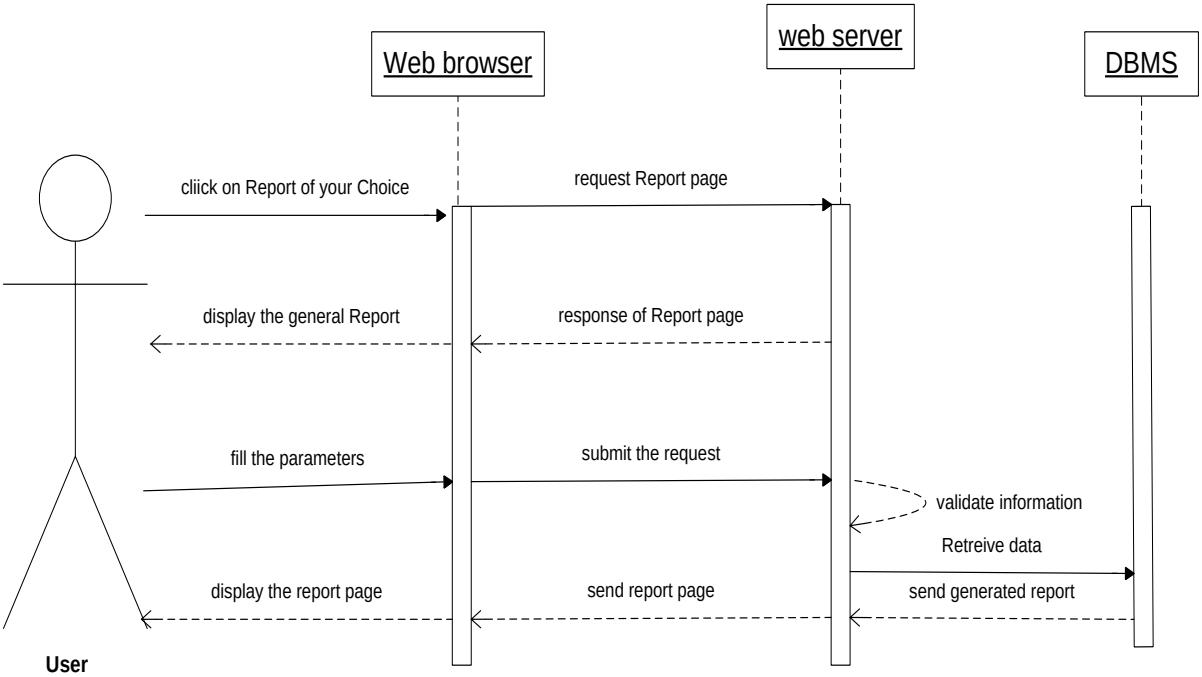


Figure 7: View Reports Sequence Diagram

New Engineer Registration Sequence Diagram

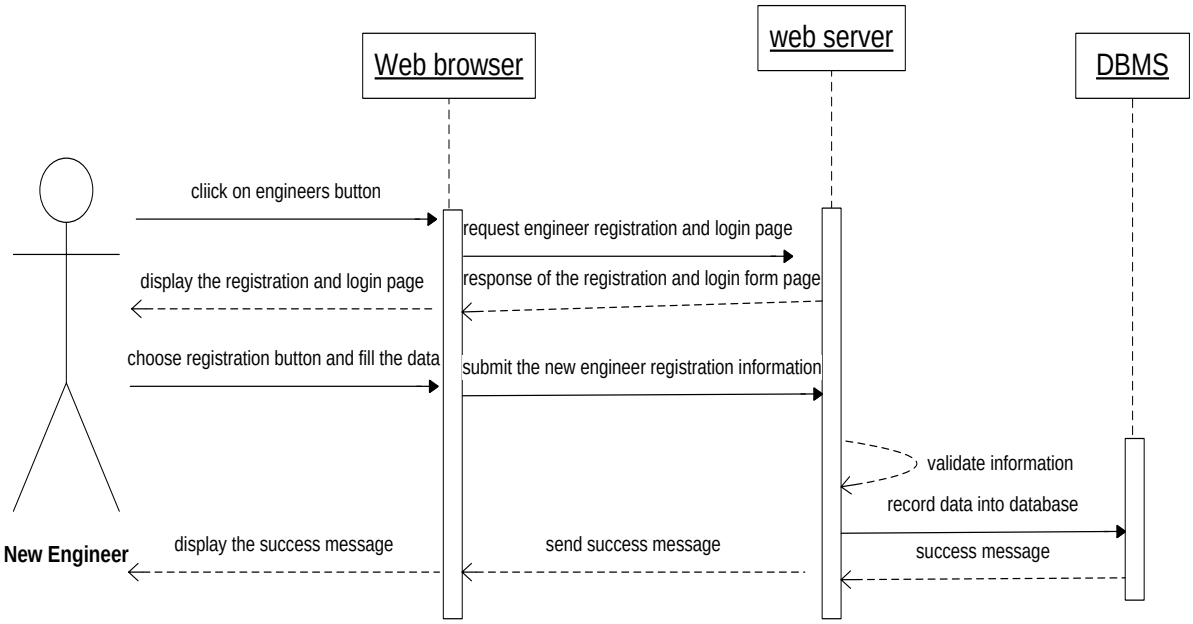


Figure 8: New Engineer Registration Sequence Diagram

Make Decisions on new Member Sequence Diagram

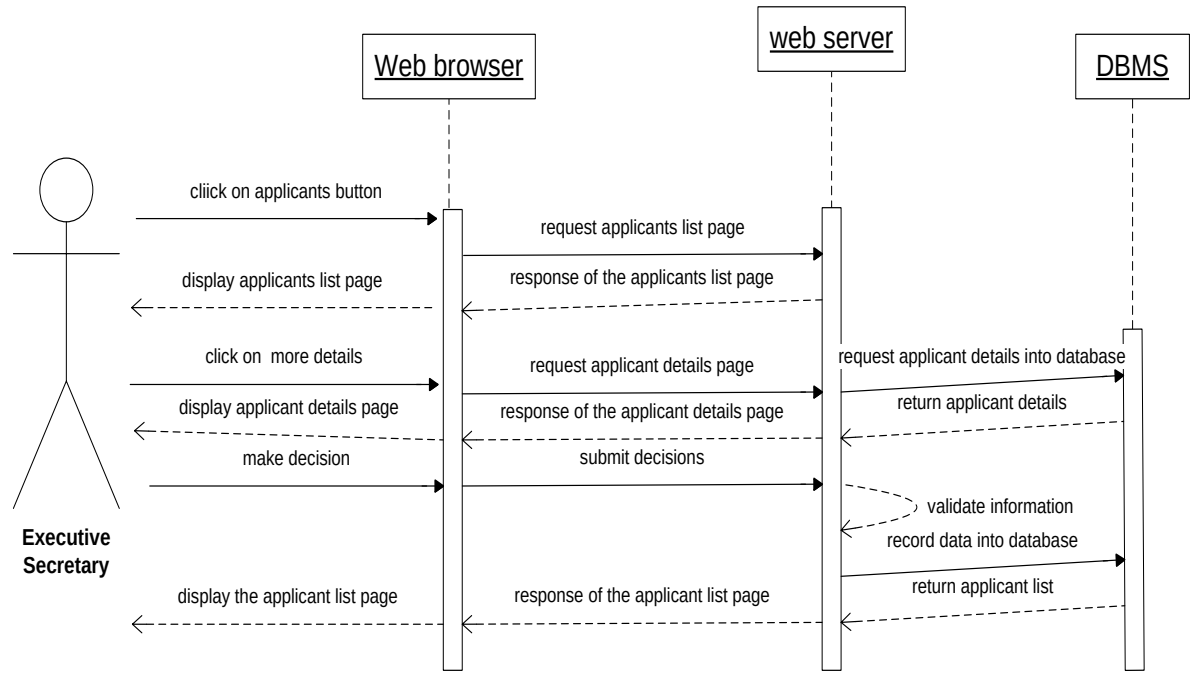


Figure 9: Make decisions on new Member Sequence Diagram

Record New activity Sequence Diagram

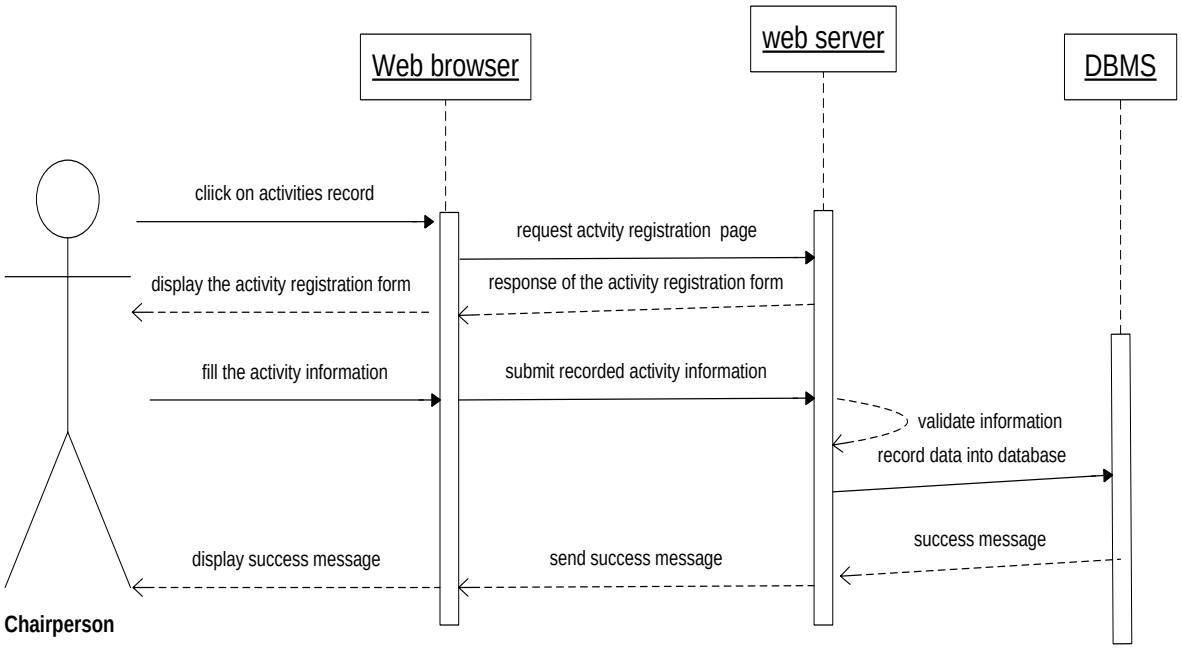


Figure 10: Record New Activity Sequence Diagram

Join Activity Sequence Diagram

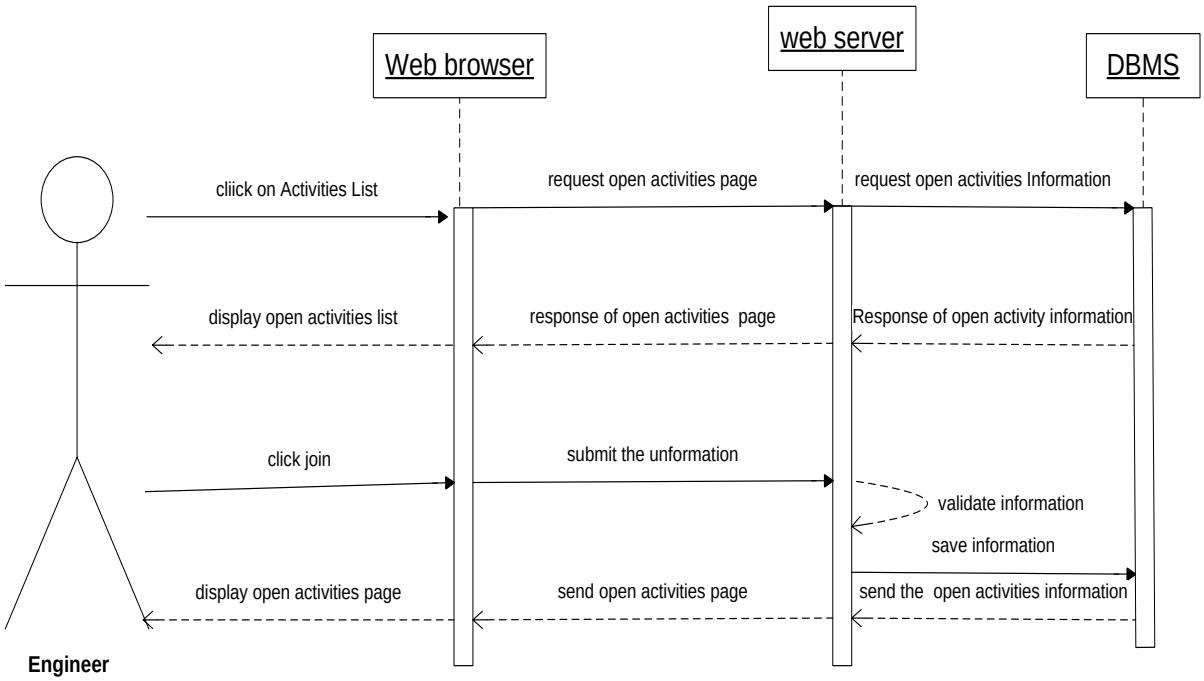


Figure 11: Join Activity Sequence Diagram

Database Design

A table: This is a set of data elements (values) that is organized using a model of vertical columns (which are identified by their name) and horizontal rows. A table has a specified number of columns, but not for rows.

TableName	

A relationship: this is the graphical representation of tables association

Database Diagrams

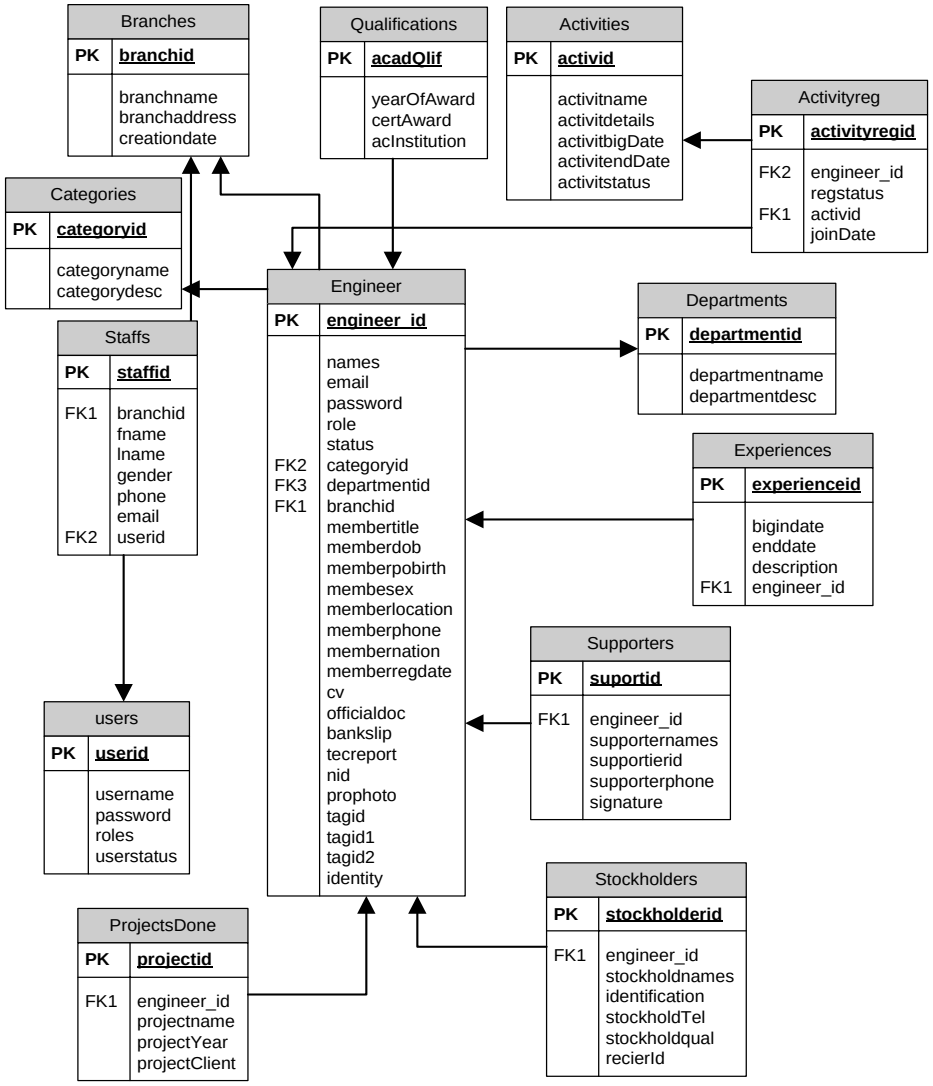


Figure 12: Database Diagram

Data Dictionary

Table name: ENGINEER

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
engineer_id	Integer	Primary Key	Unique identifier of the member
names	String	Not Null	The first name of the member
email	String	Not Null	The email of the member
password	String	Not Null	The password of the member
role	String	Not Null	The membership type
status	String	Not Null	The membership status
categoryid	String	Not Null	Identifier of the categories
departmentid	String	Not Null	Identifier of the departments
branched	Integer	Foreign key	Identifier of the branches
membertitle	String	Not Null	The title of the member
memberdob	Date	Not Null	The date of birth of the member
memberpobirth	String	Not Null	The member place of birth
membersex	String	Not Null	The sex of the member
memberlocation	String	Not Null	The location of the member
memberphone	String	Not Null	The phone number of the member
membernation	String	Not Null	The nationality of the member
memberregdate	Date	Not Null	The membership registration date
cv	String	Not Null	The CV of the applicant
officialdoc	String	Not Null	Official document presented
bankslip	String	Not Null	Bank slip of membership application fee
tecreport	String	Not Null	Technical report of the applicant
nid	String	Not Null	National identity card of the applicant
prophoto	String	Not Null	The applicant passport photo
tagid	String	Not Null	Member id tag
tagid1	String	Not Null	Member id tag
tagid2	String	Not Null	Member id tag
Identity	String	Not Null	Member identity card number

Table 11: Engineer Table Description

Table name: STAFFS

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
staff_id	Integer	Primary Key	Unique Identification of the staff in system
branched	Integer	Foreign key	The identifier of the branch
fname	String	Not Null	The first name of the staff
lname	String	Not Null	The last name of the staff
gender	String	Not Null	The gender of the staff
phone	String	Not null	The phone of the staff
email	String	Not Null	The email of the staff
user_id	Integer	Not Null	The identifier of the user

Table 12: Staffs Table Description

Table name: Users

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
userid	Integer	Primary Key	Unique Identification of the user in system
username	Integer	Foreign key	The login username of the user
password	String	Not Null	The login password of the user
roles	String	Not Null	The role of the user in the system
userstatus	String	Not Null	The status of the user

Table 13: Users Table Description

Table name: BRANCHES

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
branched	Integer	Primary key	Unique Identification of the branch in system
branchname	String	Not null	The name of the branch
branchaddress	String	Not null	The address of branch
creationdate	Date	Not null	The creation date of the branch

Table 14: Branches Table Description

Table name: DEPARTMENTS

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
departmentid	Integer	Primary key	Unique Identification of the department
departmentname	String	Not null	The name of the department
departmentdesc	String	Not null	The description of the department

Table 15: Departments Table Description

Table name: CATEGORIES

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
categoryid	Integer	Primary key	Unique Identification of the category in system
categoryname	String	Not null	The name of the category
categorydesc	String	Not null	The category description

Table 16: Categories Table Description

Table name: ACTIVITIES

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
activid	Integer	Primary key	Unique Identification
activitname	String	Not null	The name of activity
activitdetails	String	Not null	The descriptions of the activity
activitbigdate	Date	Not null	The beginning date of the activity
activitenddate	Date	Not null	The ending date of the activity
activitstatus	String	Not null	The status of the activity

Table 17: Activities Table Description

Table name: ACTIVITYREG

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
activityregid	Integer	Primary key	Unique Identification of the activity
engineer_id	Integer	Foreign key	The identifier of the member
actividd	Integer	Foreign key	The identifier of the activity
regstatus	String	Not null	The status of the registration on the activity

Table 18: Activityreg Table Description

Table name: STOCKHOLDERS

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
stockholdid	Integer	Primary Key	Unique Identification of the stockholder
stockholdnames	Integer	Foreign key	The stockholder names
identification	String	Not Null	The stockholder identification
stockholdtel	String	Not Null	The stockholder phone number
stockholdqual	String	Not Null	The stockholder qualifications
engineer_id	Integer	Not null	The identifier of the member in the system
recierid	Integer	Null	The registration number of the stockholder

Table 19: Stockholders Table Description

Table name: SUPPORTERS

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
suportid	Integer	Primary Key	Unique Identification of the supporter in system
supporternames	String	Not Null	The names of supporters
supportierid	Integer	Not Null	The identification of the supporter in the system
engineer_id	Integer	Foreign Key	The identification of the member
signature	String	Not Null	The signature status of the supporter
supporterphone	String	Not null	The phone number of the supporter

Table 20: Supporters Table Description

Table name: PROJECTSDONE

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
projectid	Integer	Primary Key	Unique Identification of the project
projectname	String	Not null	The names of project
projectyear	String	Not Null	The year in which the project done
engineer_id	Integer	Not Null	The identification of the member in the system
Projectclient	String	Not Null	The client of the project

Table 21: Projectsdone Table Description

Table name: QUALIFICATIONS

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
acadqlif	Integer	Primary key	Unique Identification of the Academic qualification in the system
engineer_id	Integer	Foreign key	The identifier of the member
yearofaward	String	Not null	The year when award is received
certfaward	String	Not null	The awarded certificate
acinstitution	String	Not null	The institution where award was issued

Table 22: Qualifications Table Description

Table name: EXPERIENCES

ATTRIBUTE NAME	DATA TYPE	CONSTRAINT	DESCRIPTION
experienced	Integer	Primary key	Unique Identification of the experience in the system
engineer_id	Integer	Foreign key	The identifier of the member
bigindate	Date	Not null	The date when work or training started
enddate	Date	Not null	The date when work or training ended
description	String	Not null	Explanation of the work or training

Table 23: Experiences Table Description

System Architecture Design

This system is designed based on a traditional three-tier architecture used by many web applications. **Three-tier** architecture includes a **presentation layer** (Client side), **business rules/ logic layer** (Web Server), and the **data layer** (DBMS). The three-tier architecture is shown in Figure 4.

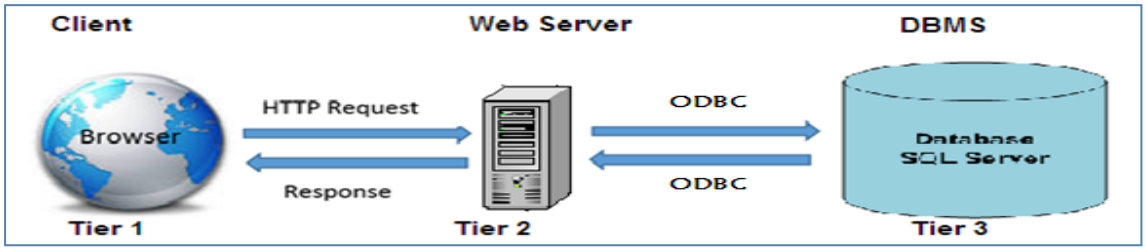


Figure 13: Three-tier architecture.

❖ The **Presentation Layer (client)**, also called the Client tier (1) is responsible for the presentation of data, receiving user events, and controlling the user interface. The user interaction with the system is entirely through this layer.

❖ The **Business Rules/Logic layer (web server)** is the middleman between the presentation layer (Tier 1) and the data layer (Tier 3). This middle tier was introduced to overcome the deployment limitation (whenever the application logic changed the application had to be redistributed at each and every client) in the two-tier architecture. The middle tier provides process management where business logic and rules are executed and can accommodate hundreds of users.

The **Data layer** (RDBMS and/ file systems) is responsible for data storage. Primarily this tier (layer) consists of one or more

CHAPTER 4 IMPLEMENTATION OF THE SYSTEM

Introduction

This chapter describes the development of the "ONLINE MANAGEMENT OF CIVIL ENGINEERS ACTIVITIES FOR INSTITUTION OF ENGINEERS RWANDA". We will describe briefly the technologies used to develop the application, and tests that have been applied. We will also describe the requirements of this application as well as software and hardware requirements.

Technologies used

To develop this application we have used different technologies and tools namely:

- MySQL: for the creation of the database
- Netbeans IDE 8.2: for writing and compile codes.
- HyperText Markup Language (HTML), JavaScript and Cascading Style Sheet (CSS): for the conception of the graphic interface creation and allowing the users to interact with the system and to control the look and provide efficiency to our web application.
- Java Server Page (JSP) and Java Servlets for programming.
- JavaMail
- iText: for the generation of the reports.

MySQL

MySQL is an object-relational database management system founded by Allan Larsson, Michael Widenius and David Axmark in the year 1995. It was realized under the name of Co-founder Michael wodenius daughter, 'My'. Mysql was owned by MySQL AB firm until it went into the hands of Oracle Corporation.

The purpose of a database is to store and retrieve related information. A database server is the key to solving the problems of information management. In general, a server reliably manages a large amount of data in a multiuser environment so that many users can concurrently access the same data. A database server also prevents unauthorized access and provides efficient solutions for failure recovery. (Elmasri, 2004).

Netbeans IDE 8.2

A programming tool or software development tool is a program or application that software developers use to create, debug, maintain, or otherwise support other programs and applications.

NetBeans IDE is a software development tool which is an open-source integrated development environment which supports development of all Java application types (Desktop Application, web application, Applets, etc).

Java is a programming language originally developed by James Gosling at Sun Microsystems and released in 1995 as a core component of Sun Microsystems' Java platform. One characteristic of Java is its portability, which means that computer programs written in the Java language can run similarly on any hardware/operating-system platform. Java is a pure object-oriented language which means that everything in a Java program is an object and everything is descended from a root object class.

To generate user interfaces we have used Java Server Pages technology. Java Server Pages (JSP) technology enables Web developers and designers to rapidly develop and easily maintain, information-rich, dynamic Web pages that leverage existing business systems. As part of the Java technology family, JSP technology enables rapid development of Web-based applications that are platform independent. JSP technology separates the user interface from content generation, enabling designers to change the overall page layout without altering the underlying dynamic content.

Cascading style sheets

Cascading style sheets are used to format the layout of Web pages. They can be used to define text styles, table sizes, and other aspects of Web pages that previously could only be defined in a page's HTML.

CSS makes it easy to change styles across several pages at once. For example, a Web developer may want to increase the default text size from 10pt to 12pt for fifty pages of a Web site. If the pages all reference the same style sheet, the text size only needs to be changed on the style sheet and all the pages will show the larger text.

While CSS is great for creating text styles, it is helpful for formatting other aspects of Web page layout as well. For example, CSS can be used to define the cell padding of table cells, the style, thickness, and color of a table's border, and the padding around images or other objects. CSS gives Web developers more exact control over how Web pages will look than HTML does. This is why most Web pages today incorporate cascading style sheets.

JSP Technology and Java Servlets

JSP technology uses XML-like tags that encapsulate the logic that generates the content for the page. The application logic can reside in server-based resources (such as JavaBeans component architecture) that the page accesses with these tags. Any and all formatting (HTML or XML) tags are passed directly back to the response page.

JavaServer Pages technology is an extension of the Java Servlet technology. Servlets are platform-independent, server-side modules that fit seamlessly into a Web server framework and can be used to extend the capabilities of a Web server with minimal overhead, maintenance, and support. Unlike other scripting languages, servlets involve no platform-specific consideration or modifications; they are application components that are downloaded, on demand, to the part of the system that needs them.

One of the most time-consuming challenges for developers is to exchange data between incompatible systems over the Internet. XHTML document should follow some rules as given below:

1. Tags and attributes names must be in lowercase
2. "Empty" tags must be properly ended with closing slash
3. Tags with opening tag must have an end tag
4. Attributes must always have a value
5. Attributes values must be quoted
6. Must have a DOCTYPE declaration.
7. Html, head, title, and body elements must be present.

Jasper Reports

A report is a nicely formatted way of presenting the data that you have entered, reports are all about querying a database and displaying the results in a nice format. Jasper Report is an open source Java reporting tool that can be used in Java enabled applications, including web applications, to generate dynamic content. It has the ability to deliver rich content in various formats such as PDF, HTML, XML files, or directly on the screen or printer.

Jasper Report is a content-rendering library, not a standalone application. It cannot run on its own and must be embedded in another client or server-side Java application. Jasper Report is a pure Java library and can be used on any platform that supports Java; you do not really install it.

“Installing” Jasper Report, simply means downloading its JAR file and putting it into the Class path of your application along with the other required JAR files.

Generating reports is a common, if not always glamorous, task for programmers. In the past, report generation has largely been the domain of large commercial products. Today, the open source Jasper Reports report generating library gives Java developers a viable alternative to commercial software. Jasper Report provides the necessary features to generate dynamic reports, including data retrieval using JDBC (Java Database Connectivity), as well as support for parameters, expressions, variables, and groups.

Presentation of the new system

This work has the aim of developing a computerized system to IER that will help during Registration and Activity management via internet. The system will also help the users to access the information related on their types and roles.

Home Page

Figure 14: Welcome page

This figure illustrates the welcome page of the Institution.

Engineer Registration Form

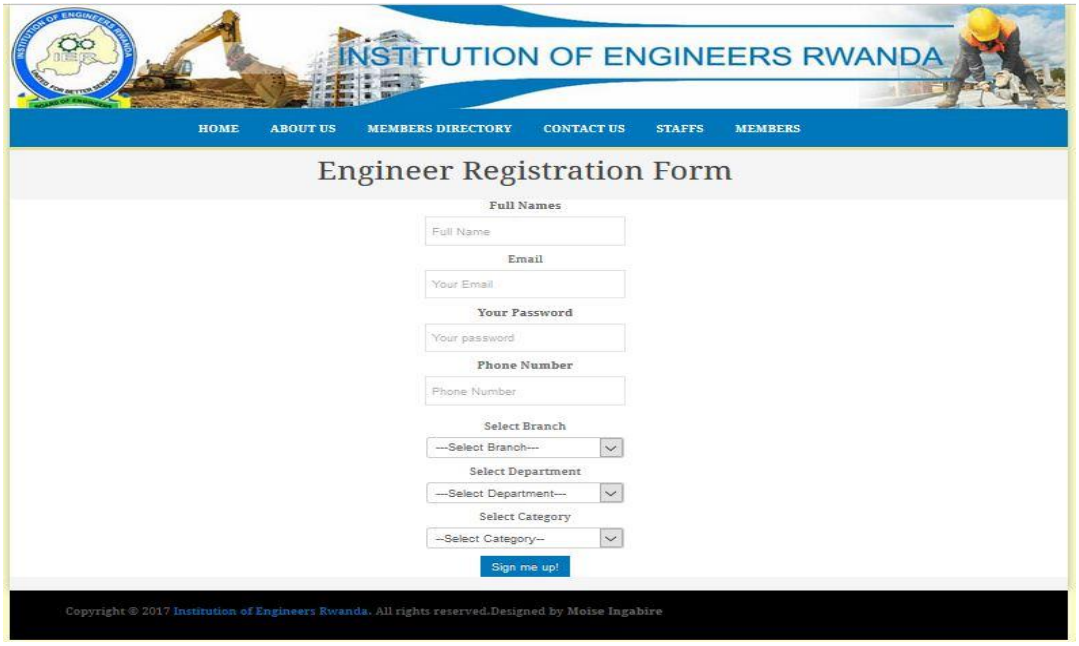


Figure 15: Engineer Registration Form

This interface allows Engineer to register online

Company Registration Form

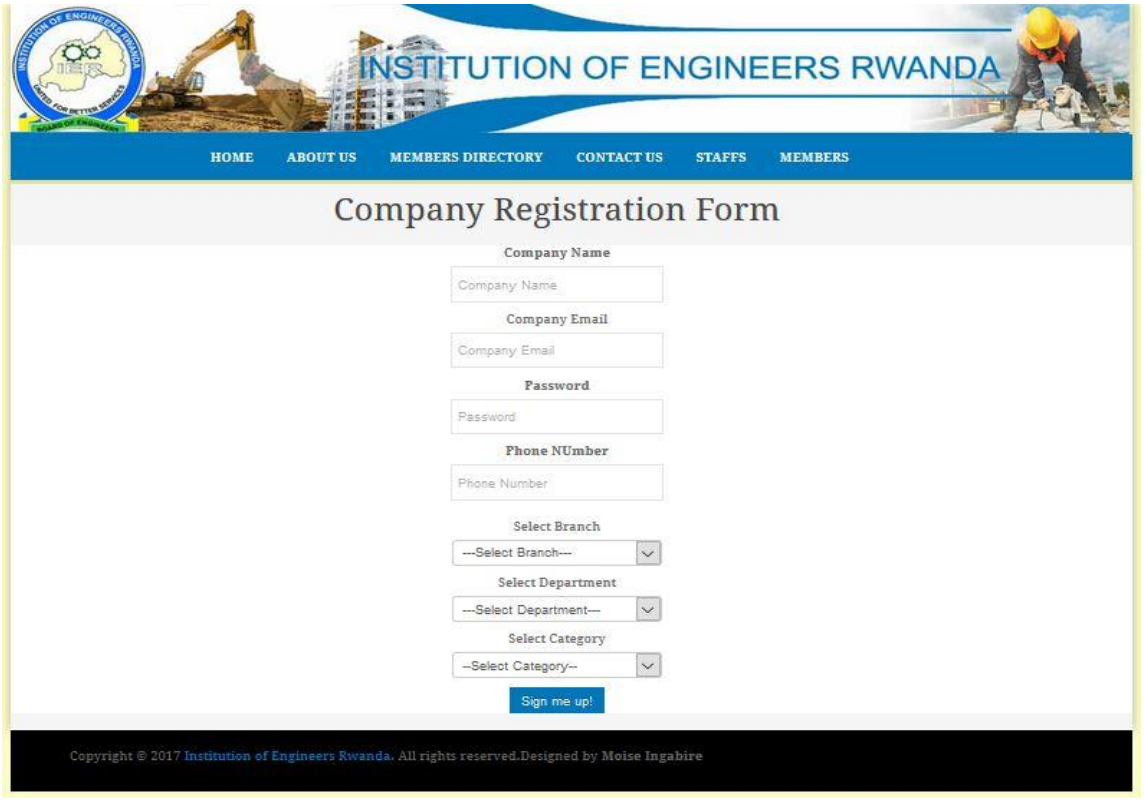


Figure 16: Company Registration Form

This interface allows Company to register online

Member Login Form

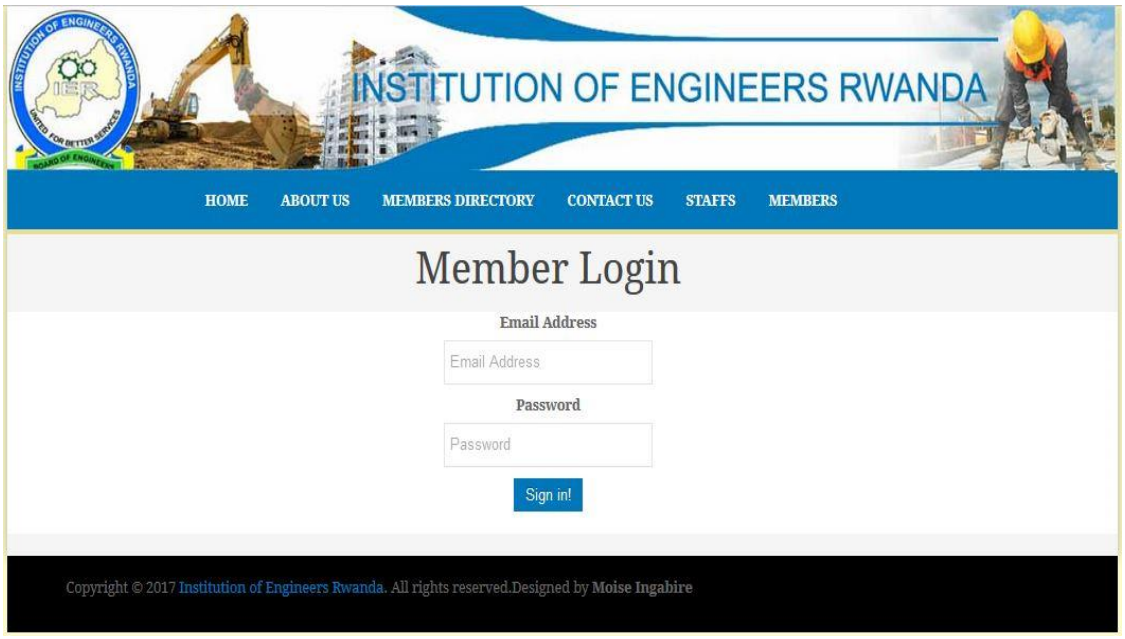


Figure 17: Member Login Form

This interface allows a member to identify him or herself by typing the valid parameters (Email address and Password)

Change Password Form

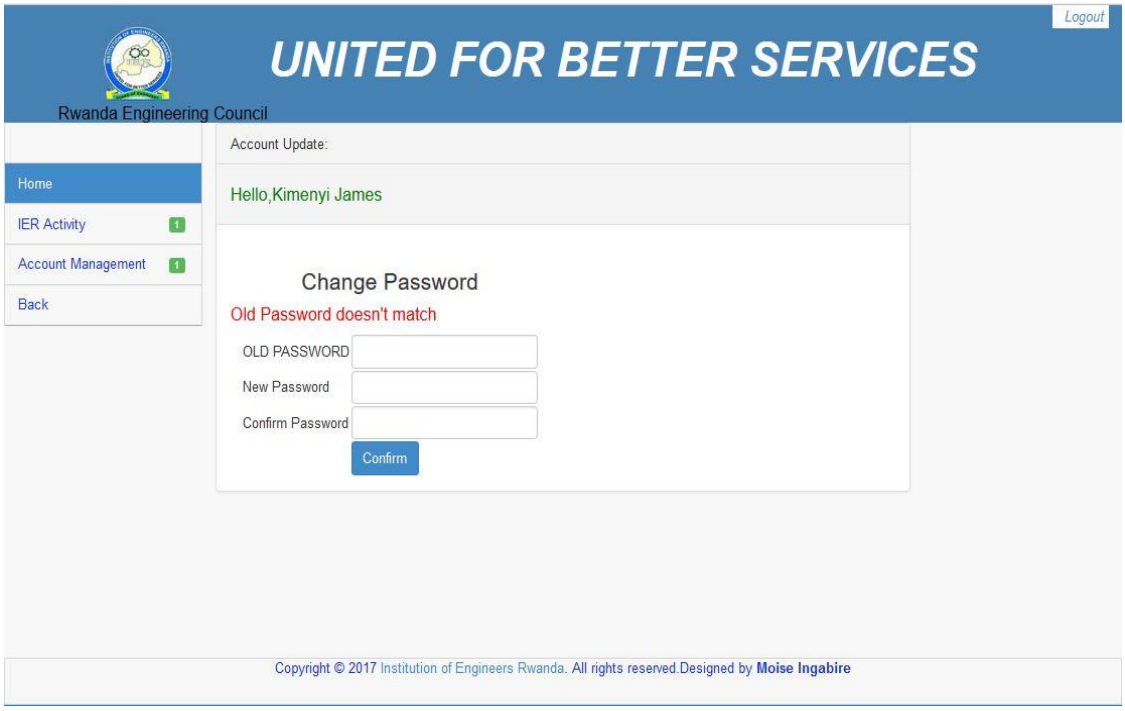


Figure 18: Changing Password Form

This interface allows a member to change her/his password.

Activity registration form

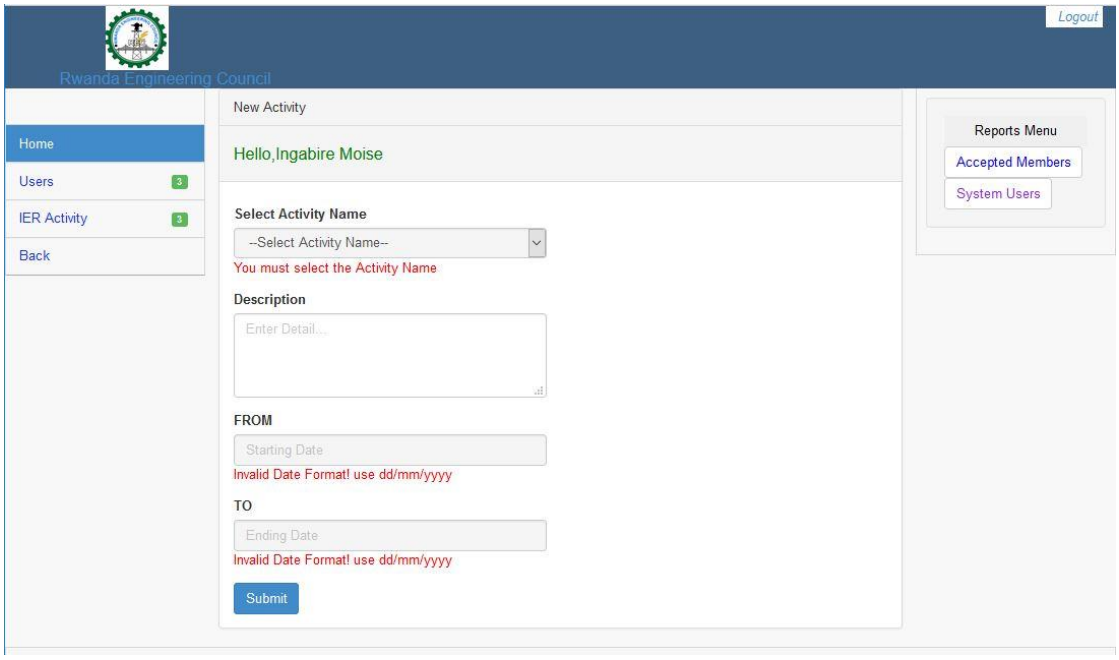


Figure 19: Activity Registration Form

This page is used to register any activity programmed by the institution (meetings, trainings etc…) that the member may attend.

Documents Submission Form

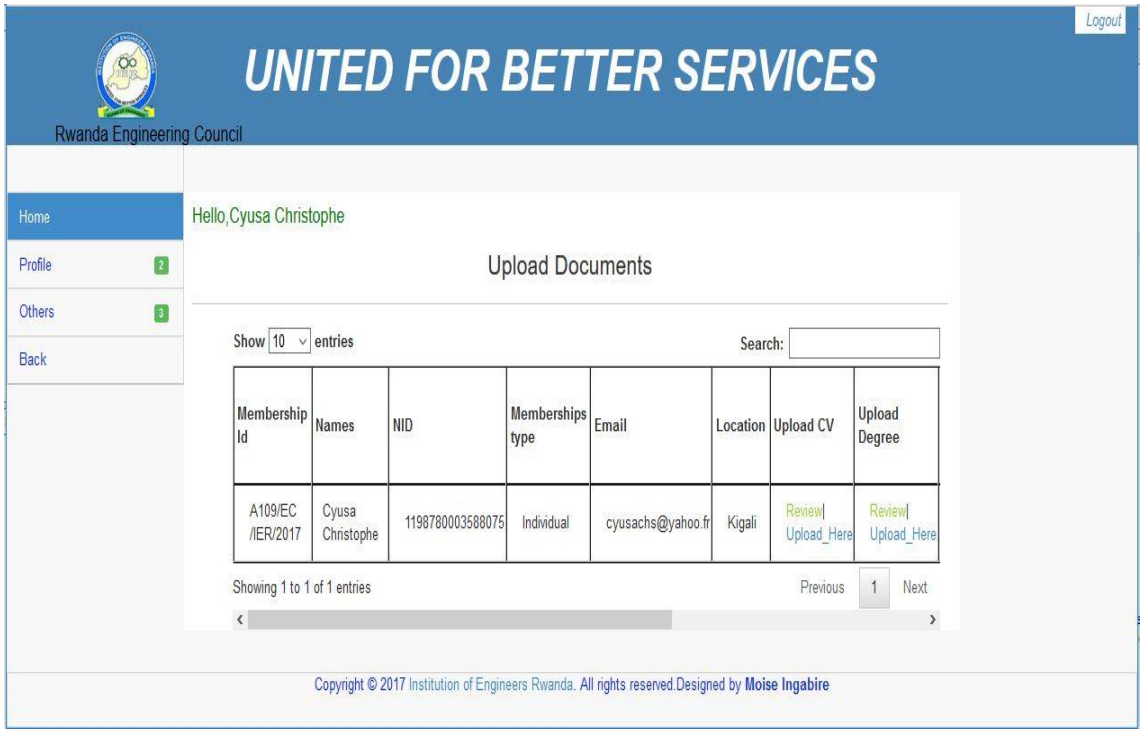


Figure 20: Document Submission Form

This page is used to upload all documents required for membership registration process.

Staff Login Form

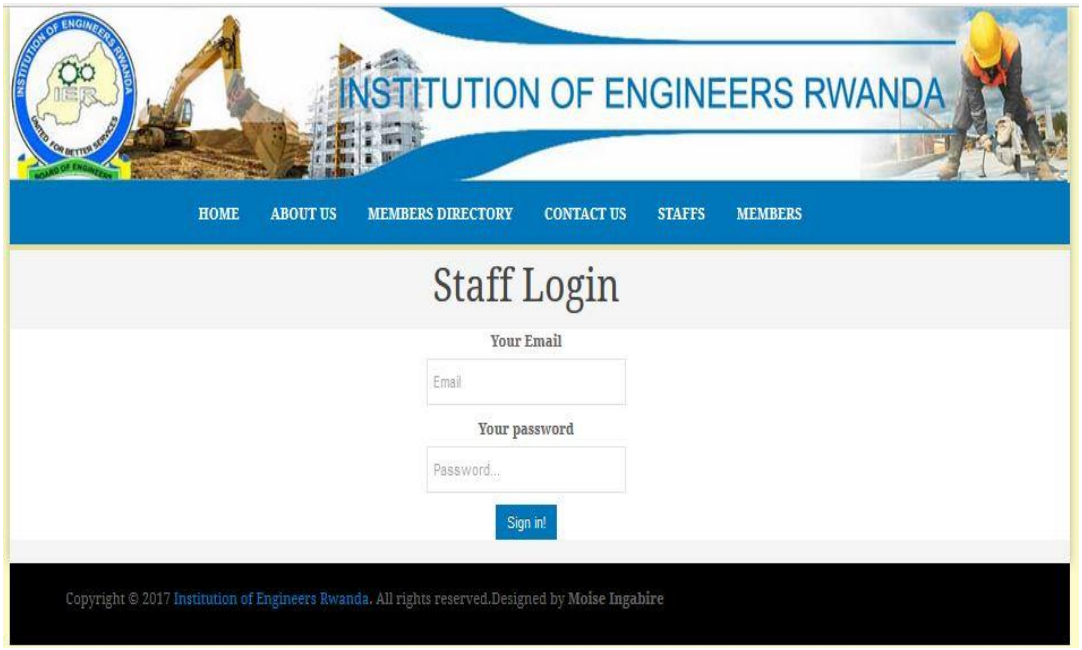


Figure 21: Staff Login Form

This Form is used for staff registration where a registered staff will provide the correct email and password. If email or password is incorrect the system will not allow the staff to continue. It will display validation messages.

System Users List

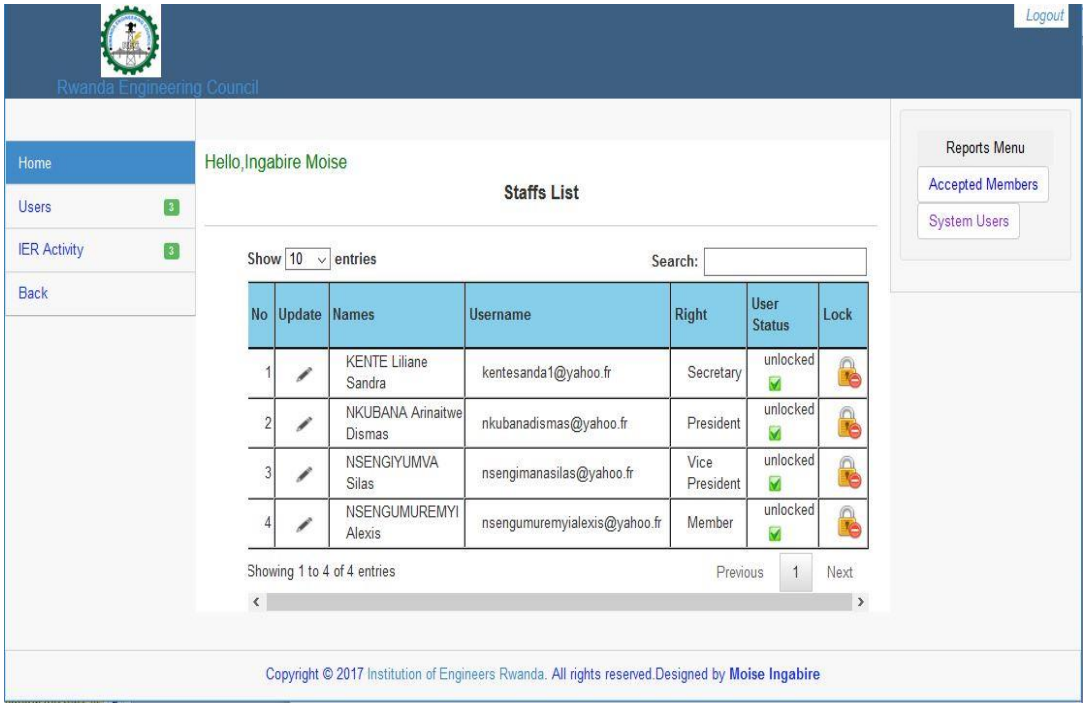


Figure 22: Staffs List page

This page is used for staff management, the admin is able to lock or unlock the staffs.

Activity List Page

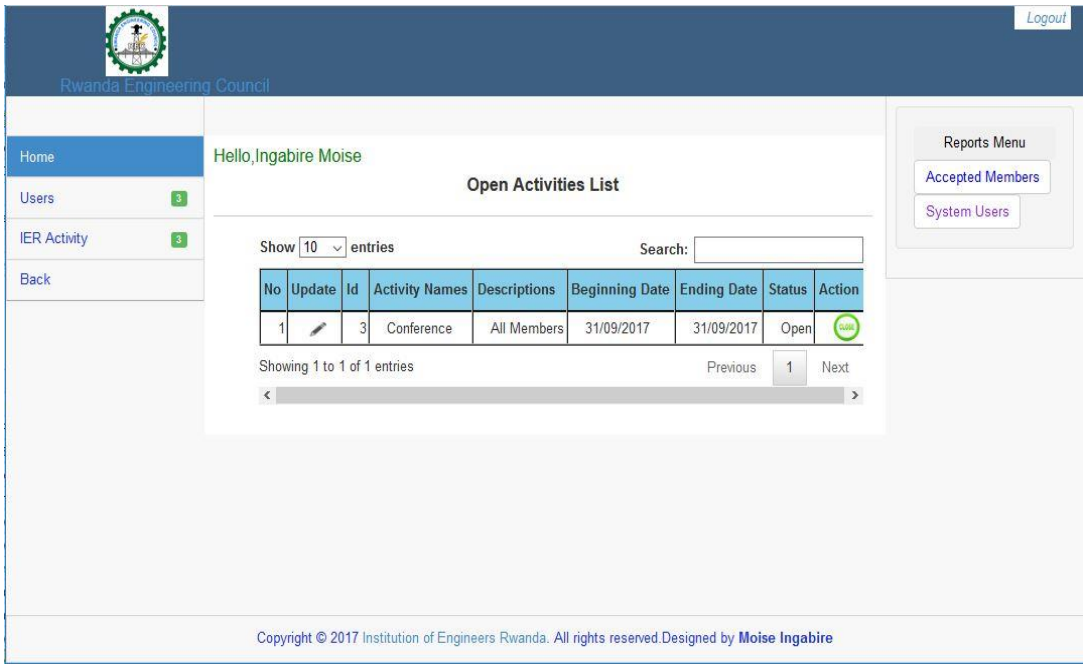


Figure 23: Open Activities List page

This page is used to display open activity, the admin is able to close the activity when it is done.

Individuals Application List

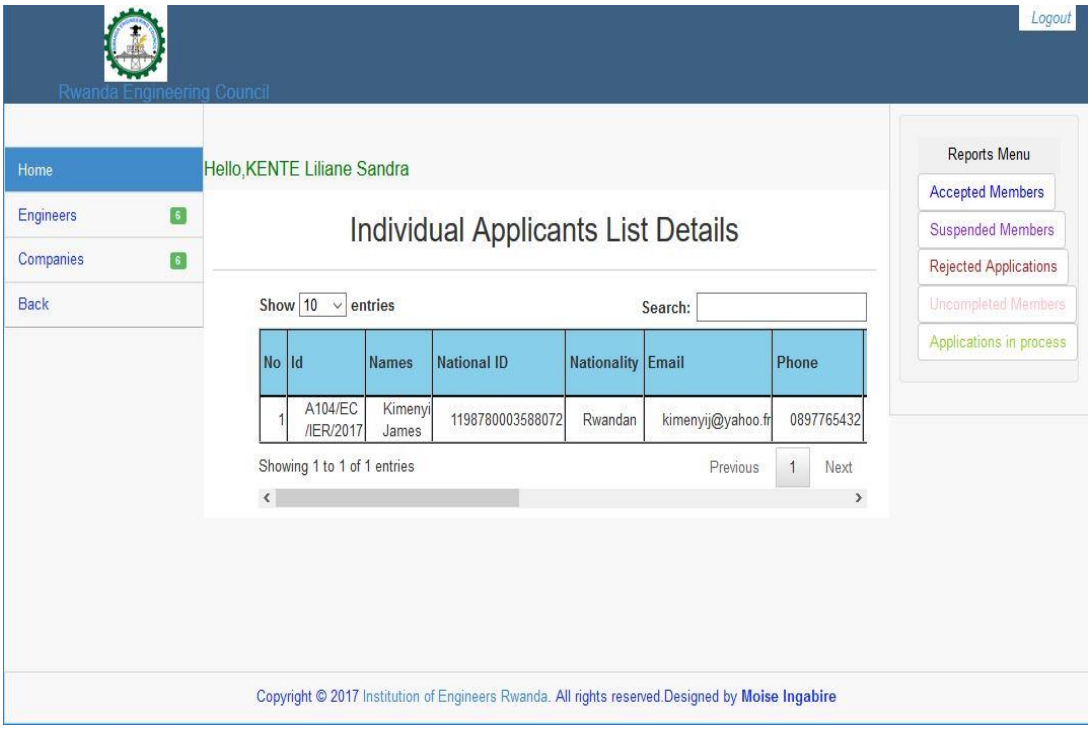


Figure 24: Individual Application List

This page is used to view the applicant detail. The information provided by the applicant will help the membership committee to decide the decision on application (Accepted or Rejected).

Decision form

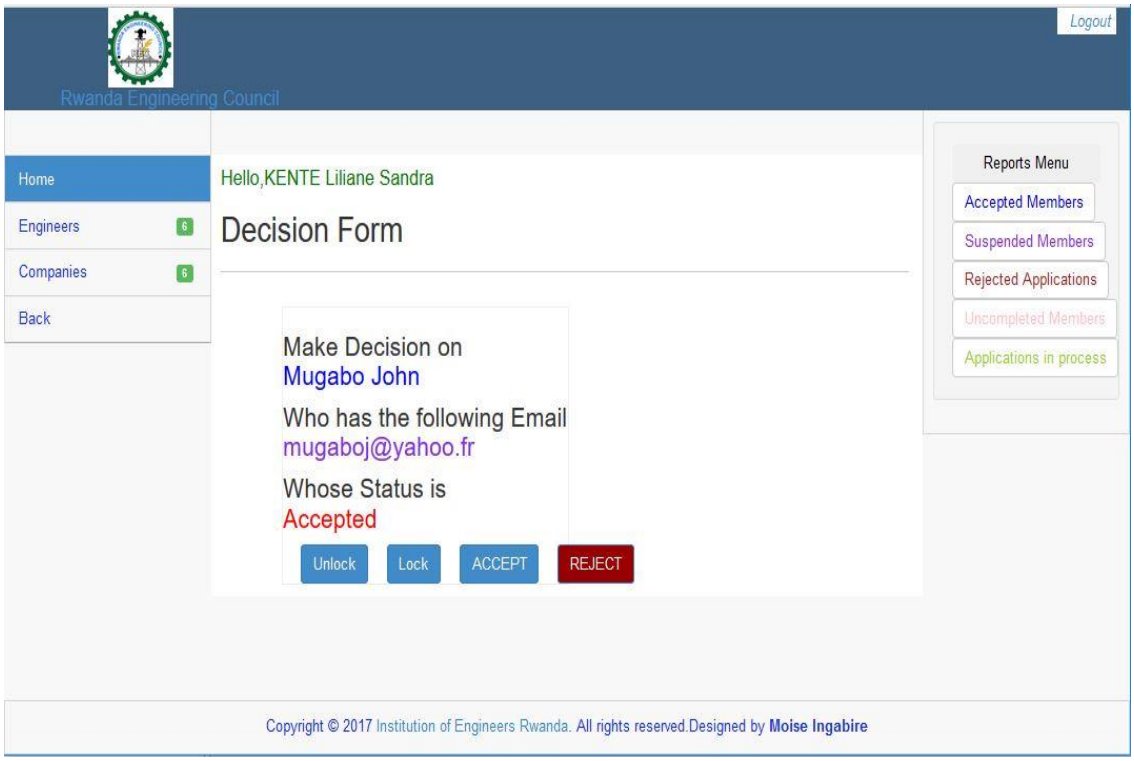


Figure 25: Decision Form

This page is used to make the decision on the member depending on the information received.

Sending Email Message

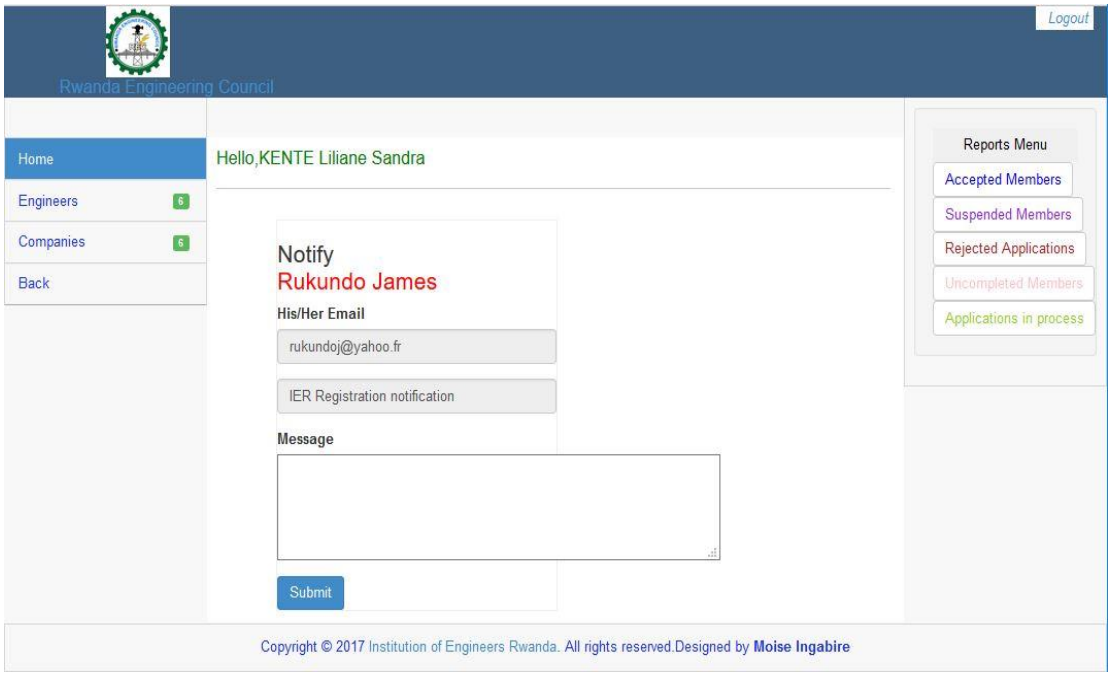


Figure 26: Sending Email Form

This page is used to send email to the member depending on the decision taken.

Report by Parameters

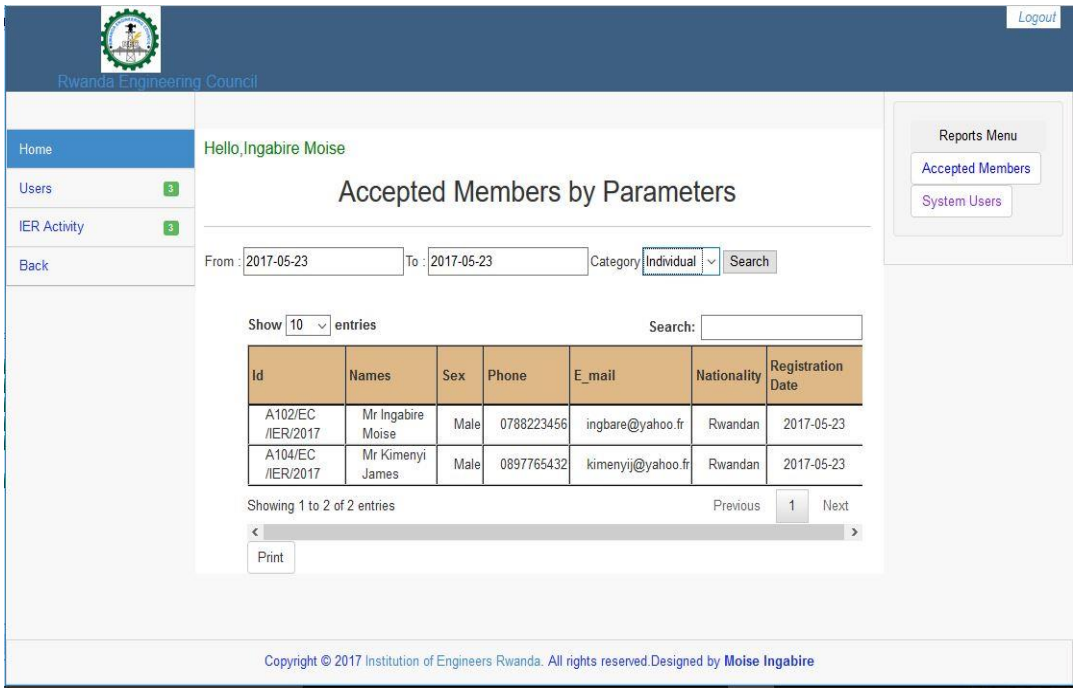


Figure 27: Report by Parameters page

This page is used to choose the report of registered members by date (From →To) and category of membership.

Report of Registered individuals

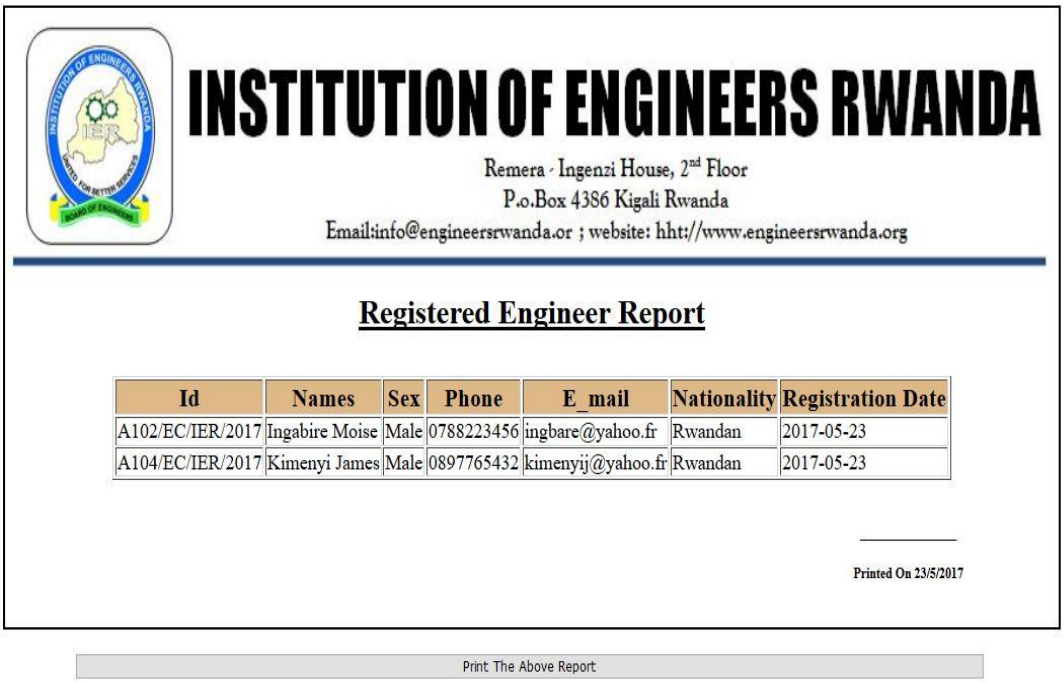
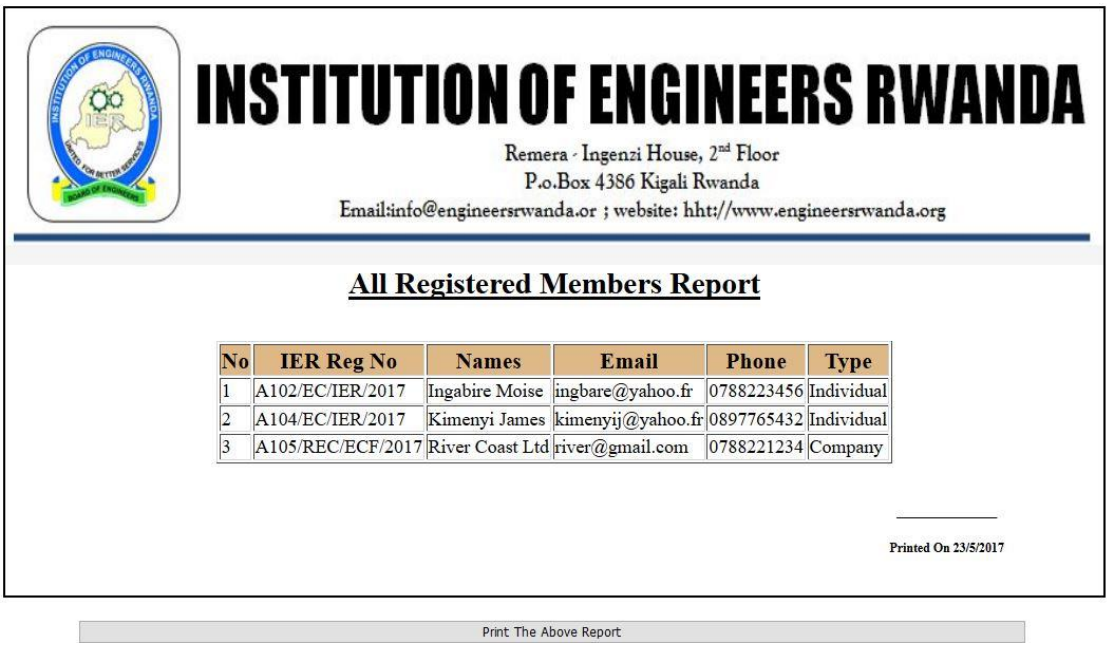


Figure 28: Report of Engineers Registered

This page Displays the report of registered engineers that was generated by provided parameters: date (From →To) and category of membership.

All Registered Members Report



INSTITUTION OF ENGINEERS RWANDA

Remera - Ingenzi House, 2nd Floor
P.o.Box 4386 Kigali Rwanda
Email:info@engineersrwanda.or ; website: hht://www.engineersrwanda.org

All Registered Members Report

No	IER Reg No	Names	Email	Phone	Type
1	A102/EC/IER/2017	Ingabire Moise	ingbare@yahoo.fr	0788223456	Individual
2	A104/EC/IER/2017	Kimenyi James	kimenyij@yahoo.fr	0897765432	Individual
3	A105/REC/ECF/2017	River Coast Ltd	river@gmail.com	0788221234	Company

Printed On 23/5/2017

Print The Above Report

Figure 29: Report of engineers Registered

This page displays the report of all registered Members.

Software testing

We have proceeded to test our application in order to verify the effectiveness of the application so that we make sure that it actually does what it was supposed to solve. During those tests we have considered the following key aspects in that software testing:

- To verify if the application has met the requirements which were considered during its design and development?
- To verify if the application works as expected.
- Does the application have been correctly implemented to satisfy the needs of the customers?

Software testing types

During development of our application, this was tested in the following way:

- ***Unit Test***

Progressively, during development of our application a small part (piece) of source code (written code) was checked and tested to ensure the proper functioning of particular portion of a program. By this method, every small component was compiled with the goal to know that every unit matches to its specifications and to know if there are logical mistakes or not. This method is more efficient, means that permits to detect the maximum possible mistakes.

❖ ***The Integration test***

As well as source code become complex, another method was used where different parts of source code were combined and tested as group until the entire system is tested. The application modules have been successively tested until completion to ensure that the whole constituted by the assembled software components answers to the required functional and technical specifications.

❖ ***The Validation test***

This was the last test phase of testing, in order to validate the software in its external environment. The product has been put in final situation, we verified if it perfectly answers to the customer's needs. We have tested our application in its entirety, and it is in this way that we noticed that the progress of operations done corresponds to the functional specifications. (Beizer, software_testing, 1995)

Software and Hardware requirements

Client side requirements:

- Any Operating system.
- A web browser (Internet Explorer, Mozilla Firefox, Google Chrome, Safari, etc)

Server side requirements:

- Java SE Development Kit;
- A Web server which support Java and JSP(TOMCAT, GRASS FISH, etc);
- MySQL 5.5

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

Conclusion

In Institution of Engineers Rwanda, every day they have different activities to be accomplished like receive and make decisions on applications, Schedule meetings and trainings, also must make a report on the activities done, etc.

We have developed a web application" ONLINE MANAGEMENT OF CIVIL ENGINEERS ACTIVITIES FOR INSTITUTION OF ENGINEERS RWANDA" which will facilitate the institution's activities. With the new system, membership application will be easily done through online and the IER staffs will have access to the system to manage the daily activities.

My hope is that this system can enable IER to improve its performance in all activities management regarding to Engineers. I remain available to receive suggestions and to meet the demands that could be sent to me to participate to the perfection of this work.

Recommendations

This project will help Institution of Engineers Rwanda to overcome the problems that have been identified in chapter two.

We recommend to this institution (IER) shifting from the manually system to the computerized system by implementing this web application in order to beneficiate its feasibilities and performances so that they may avoid some problems caused by the existing system like losing of data, spending much time and much financial means unnecessarily, erroneous from calculation and compilation of information.

We recommend a buck up of data from the system on regular basis once installed and used, in order to avoid any potential data loss.

Before we close our recommendation we accept and encourage whoever wants to contribute to the improvement of this work.

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APPENDICES

A. Proposal Approval

B. Request for the Permission of doing Research

C. Authorization for Collecting Data

D. Curriculum Vitae

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PERSONAL INFORMATION
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Citizenship : Rwandese

Additional Personal Information
Marital Status: Married
Spouse Name: SHEMA Diane UWAYO

EDUCATION

YEAR	INSTITUTION	ACHIEVEMENT
2004-2007	Ecole Technique Officielle de Gitarama	Electronic et Telecommunication A_2

OTHER QUALIFICATION

CERTIFICATION	SKILL ACQUIRED
Microsoft Windows, Microsoft Office, Internet and Computer Maintenance	Computer Literacy

LINGUAGE PROFICIENY

HIGH PROFICIENCY	MEDIUM PROFICIENCY	LOW PROFICIENCY
Kinyarwanda	French	English

ENTERESTS
I am interested in sportive activities like Football Ball

REFEREES

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Phone: 0783544255
2. Mr. HABIMANA Jean Pierre
Phone: 0787837017

I hereby, confirm that all the information above is right and true to the best of my knowledge.