WOLKITE UNIVERSITY

COLLEGE OF COMPUTING AND INFORMATICS

DEPARTMENT OF SOFTWARE ENGINEERING

PROJECT ON

STUDENT UNION MANAGEMENT SYSTEM

BY

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Wolkite University, Wolkite, Ethiopia

AUGUST 2021 GC

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SUBMITED TO DEPARTMENT OF SOFTWARE ENGINEERING IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF BACHLER OF SCIENCE IN SOFTWARE ENGINEERING

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DECLARATION

This is to declare that this project work which is done under the supervision of Muluken Basha and having the title Student union management system is the sole contribution of: Firew Meto, Eyosias Tesfaw, Yonatan Eyob. No part of the project work has been reproduced illegally (copy and paste) which can be considered as Plagiarism. All referenced parts have been used to argue the idea and have been cited properly. We will be responsible and liable for any consequence if violation of this declaration is proven.

Date: _____

Group Members:

NAME OF THE STUDENTS	SIGNATURE
FIREW METO	
EYOSIAS TESFAW	
YONATAN EYOB	

APPROVAL FORM

This is to confirm that the project report entitled Customizable organizations system submitted to **Wolkite University, College of Computing and Informatics department of Software Engineering** in partial fulfilment of the requirement for the award of the degree of **Bachelor of Science in Software Engineering** is an original work carried out by **Firew Meto, Eyosias Tesfaw, Yonatan Eyob** under my guidance. The matter embodied in this project is reliable and is genuine work done by the student and has not been submitted whether to this University or to any other University /Institute for the fulfilment of the requirement of any study.

Student Team Approval Form

Name of the students	Signature	Date
Firew Meto	_____	_____
Eyosias Tesfaw	_____	_____
Yonatan Eyob	_____	_____

Advisor and department head Approval Form

Advisor Name _____ Signature _____ Date _____

Department Head Name _____ Signature _____ Date _____

Examiner Approval Form

Examiner Name	Examiner Signature	Date
_____	_____	_____
_____	_____	_____
_____	_____	_____

ACKNOWLEDGEMENTS

First of all, we are indebted to our Almighty God for helping us complete this project documentation and for all his help throughout our life. Our heartfelt gratitude goes to our major advisor, Mr. Azmeraw Desalegn for his constructive comments and support from the beginning to the end of this documentation. Our thanks also go to sectors of Wolkite University Student Union which helped us while gathering requirement by giving all information that we had asked. Last but not least we would like to thank our Teachers and class mates for helping and giving us some advices, comments and suggestions during conducting this research.

TABLE OF CONTENT

Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

No	Abbreviation	Description
1	CSS	Cascading Style Sheets
2	HTML	Hypertext Markup Language
3	PC	Personal Computer
4	PHP	Hypertext Preprocessor
5	SUMS	Student Union Management System
6	TB	Terabyte
7	UI	User Interface
8	UML	Unified Modeling Language
9	WKU	Wolkite University
10	xampp	Cross-Platform, Apache, Mysql, PHP

ABSTRACT

Wolkite University Student union is a student-led organization under the university, Wolkite. As an organization it has a lot of tasks in order to achieve their goal. Though it is composed of students with different qualities and departments, it is still working in the manual system. getting deeper into their tasks, we found it boring to get their job done. This project aims to develop a web based management system which completely changes the late manual system into digital and helps the stakeholders ease their jobs.

In addition to the direct observation, interviews were taken from those stakeholders. The results showed that almost all of the respondents were sick and tired of doing their jobs in the existing way.

Having this, we started to design a solution by determining the tasks that each and every one is assigned. In the proposed solution everything that can be done using a computer system is included.

To create this system, we have used different programming languages, scripting languages, tools, and so much more technologies.

In general, Wolkite University student union management system is a web based system which is deployable in the union's office to manage any activity regarding the affairs that is expected from each member.

CHAPTER ONE

1. Introduction

Students union is a non-political and non-governmental organization under any university which is organized and managed by only students and stands for the right of students. In this context Wolkite University has its own students' union that is right beside of the students of WKU students. WKU students' union mainly focuses on building students who are qualified and well-structured knowledge in academic intelligence, research and public service.

WKU students' union is mainly controlled by the union's president whereas, there are sectors that do their own tasks for the common goal of the union. The specific seat of the union is Wolkite University. These days, the entire existing activities of Wolkite University are being done manually and it is not that much hard to understand how it would be tedious and boring to work with them. As a result, we proposed an automated version of system for WKU students' union. WKU students' union management system is aimed to digitally manage tasks that are being done now a days or developing better platform for the union's office purpose.

1.1 Background of the organization

Wolkite University (WKU) is one of the third generation higher institutions that have been founded in 2012. It is established for the purpose of providing and promoting higher education learning, research, and outreach programs in the country to ensure the realization of the national vision of reaching the level of middle income countries by 2020. The University is located in the Southern Nation Nationalities Regional State, in Gurage zone, 158 km southwest of the capital city, Addis Ababa, on the way to Jima. It is situated at Gubreye sub-city, 14 km away from Wolkite town, of the gubreye-butajira road. The major link road to the University is a direct route to Wolkite-Jimma, Wolkite-Hossana and wolkite-Butajira. (university, 2007)

Wolkite university students' union was stablished in 2012 when the campus started its purpose.

Wolkite university Students unions is big structural office that stands with the right of the university students. When students are in need of something the union ask the university officials beside them.

Mission

- By making the teaching learning process peaceful, building students who are qualified and well-structured knowledge in academic intelligence, research and public service.

Vision

The union has the following vision

- In the process of making the university's vision of being precedent come true, to build continually succeeding union and creating effective members.
- To be one of the best 5 students' union in east Africa by 2020

1.2 Statement of the problem

Having 12 sectors, the student union office uses manual based system. Every sector has its own managers with their own specific tasks. For every sector manager to perform their task they use papers. If the managers of every sector want to give task to the union workers under their sector, they have to give order using paper or communicating face to face. If every union member wants to write report of their task, they have to submit their report on paper and give the paper to their group leaders which that leader gives the report to the sector manager. This long process takes a lot of time and resource. After the sector manager reads all the reports, he has to take measures depending on that report. If he wants to communicate with other managers of other sectors, he has to write a letter on a paper and delivers it personally to those managers. Again which is a waste of time and resource. when students want to be a member of the students' union, their information is saved on a piece of a paper, which leads to data redundancy and errors while saving that information. As we said students' union stand for the rights of students, so when students want to file a complaint against any teacher, students or any staff workers in the campus, their complaints are written in a piece of paper, which can be lost or damaged at any time. And there is no way to keep up with the progress of the complaint.

When we generalize the above problem:

- They use paper to perform every task.
- It's hard to communicate with each member of the students' union
- It's difficult to manage every sectors and members
- It's hard to manage the progress of complaints made by the students.

- It’s difficult to send report to their superiors
- It’s hard to manage and organize documents
- It’s difficult to retrieve needed documents
- It makes every job tedious

1.3 Objectives of the Project

1.3.1 General objectives

The general objective of this project is to build a web based system that will automate the existing manual system for WKU students’ union

1.3.2 Specific objectives

- Study and analyze the current system
- Review related works on students’ union management system
- Design and develop new database system
- Test and evaluate the proposed system using software testing mechanisms
- Identify functional and non-functional requirements for the existing system

1.4 Feasibility analysis

1.4.1 Technical feasibility

The proposed system develops is developed by using the latest system development techniques that works on different platforms such us windows, macOS and other web based applications. The system is developed using available software’s and hardware’s such us computer and web based applications. Our groups have technical knowledge about

- PHP to write code
- WAMP server too build the database and store data
- UML model to analyze and design in a well-organized manner

1.4.2 Economic feasibility

The proposed system is economical feasible to the organization because when the team compare the cost that is needed to develop and implement the proposed system, it is less expensive than that of the existing manual system. The system will not require much more cost beyond the capacity of the organization’s capital when automating the system such as cost for networking equipment, hardware and other infrastructures. Therefore, our system is acceptable economically toward solving problems.

1.4.3 Operational feasibility

The operational feasibility of the proposed system is simple for users to interact with the system, user friendly UI, no more complexities to user because we use well defined user interface and follow steps of the way existing system works. The proposed system will be available for user to access the system, because the system store data on server without no time limitation. The system is also compatible with all operating systems and web browser. So the project is operationally feasible.

1.5 Scope and limitations of the project

Our project has the following scope and limitations

1.5.1 Scope of the project

- Registration of new members for every sectors.
- Generate and send report form/ to union sector managers.
- Post information and events for the members of the students' union.
- Allow students union members to view posted events.
- Maintenance of user account.
- Take complaints from students.
- Allow students to follow up on their complaints.

1.5.2 Limitations of the project

- It works for the one who understands English language
- The system doesn't serve a student who are visually impaired

1.6 Significance of the project

- It will be easy to protect the union's file from unauthorized access
- It will be Fast for generating and sending reports
- It will Reduce redundancy of information or data
- There will not be duplication and loss of information since we will develop a well-organized database.
- It will be easy to take complaints from students.
- It will Save the time that is lost while recording user information
- It will be easy to search and retrieve precisely done activity that may use as a reference
- It will provide available information easily.

- It will reduce the energy and time needed to follow up with the progress of the complaint.

1.7 Beneficiary of the project

Our system will be beneficiary for:

- **Students union**
  - Students union president
  - Students union vice president
  - Students union secretary
  - Discipline and good governance sector
  - Sport and entertainment sector
  - General services sector
  - Food affairs sector
  - Special need sector
  - Female affairs sector
  - Charity sector
  - Clubs and social works sector
  - Health sector
  - Academic sector
  - Information and public communication sector
  - Reform guidance sector

    - ✓ Reduce cost of time and resources
    - ✓ Speed up job efficiency
    - ✓ Easy to store information
    - ✓ Easy to retrieve information
    - ✓ Makes communication with union workers very easily
- **students**
  - ✓ Reduce time
  - ✓ Easy to get registered
  - ✓ Easy to give complaints

- **University management staffs**
  - ✓ Reduces time
  - ✓ Easy to send and receive work related documents.

1.8 Methodology of the project

1.8.1 Data collection techniques

Interview

We went to the WKU student union office and made interview with every sector manager of the union to get some information about how the current system works and we were able to pick some information about the current work flow.

Observation

We have observed that how the current system works and every task is done using paper which is leading to high cost of time and resource.

1.8.2 System analysis and design

In the system analysis and design phase of a project, we will use the object-oriented approach because the systems designed using Object-Oriented are closer to the real world as the real-world functioning of the system is directly mapped into the system designed using Object-Oriented.

1.8.3 System development model

There are several software approaches to develop software. From those approaches we will use waterfall software development life cycle model. We chose this approach because

- We have requirements that are well known, clear and fixed.
- Technology is understood and is not dynamic
- Resources with required expertise are available to support the product.

1.8.4 System testing methodology

Unit Testing

We will test each individual unit or component of the system to validate if each unit performs what it is expected to do.

Integration testing

- We will test if individual software modules are combined and function as a group.
- We will conduct integration testing to evaluate if individual components achieve the desired functional requirement if they work together.
- We will test whether the project could be integrated and installed on the given hardware and could be compatible with the current technology.

System Testing

In this level of testing process we will examine how the whole subsystems came together to achieve the desired goal. The goals of the system testing are to detect faults that can only be exposed by testing the entire integrated system or some major part of it.

1.8.5 Development tools and technologies

1.8.5.1 Frontend technologies

- HTML 5
- CSS 3
- JavaScript
- JQuery

Frameworks

- Bootstrap

Editing tool

- Notepad++

1.8.5.2 Backend technology

- XAMPP server
- PHP

1.8.5.3 Documentation and modeling tools

- Microsoft office word 2016
- Enterprise architect 14.1.1429.3
- Adobe Photoshop 2020 version 21.1.0.106

1.8.5.4 Deployment environment

- **Computer**
  - The system requires a minimum of the following specification to run
    - ✓ Processor – core i3 @ 2.30 GHz
    - ✓ RAM 4GB
    - ✓ Hard Drive – 250 GB 5400 RPM hard drive
- **Backup Device:**
  - ✓ External hard drive
  - ✓ USB Flash Drive

CHAPTER TWO

2. DESCRIPTION OF THE EXISTING SYSTEM

2.1 Introduction of the existing system

There are many sectors in student's union. All sectors have their own duties. Beside the sectors the student union is administrated by the president the V/president and the secretary which have a lot of duties too.

When we see the first sector which is Discipline and good governance sectors. the sector deals with cases related to discipline and the good management and governance in the campus. every student is put into a group in which every group has their own group leaders. Every student member of the sector has the right to handle discipline matters and report back to their group leader by writing their report on form of paper. Every group leader analyses the report generated by the group members and then formulate their own report and send that report to the sector leader. And the discipline sector is obligated to answer only to the president of the student's union.

When we see the other sectors they have the same workflow as discipline sector. They all have to be organized into groups and they all have to generate report and send it to their group leaders. Those group leaders review and analyze those reports and generate their own report to submit to the head of the sector.

The administration offices, the president, v/president, the secretary, have to write on a piece of paper of the work they need to be done and sends or personally delivers it personally to the sector. They have to call or text sector when they need to notify or announce information or events to the sector.

When student come to the student unions office to be a member, they have to fill out their personal information on a piece of paper. Then they are called up when they are needed every time. Every member has to come to the office or have to take a form paper to fill out and generate a report.

When students come to the office for complaint, their complaint is registered in a piece of paper with their full information and put under a stack of complaints. Students have to come to the office to see the progress of their complaints.

2.2 users of the existing system

- **President**
  - Calls for meetings and announce events.
  - Takes and do some sort of decisions that are decided by the union.
  - Inspects activities of discipline sector.
  - Designs and formulate unions' policies then addresses for the union.
  - Formulates strategies that makes the unions vision come true.
  - Leads the unions daily tasks by
  - Making management decisions in case of some working activities.
- **Vice president**
  - Replaces the president whenever he is not available.
  - Structures and leads food affairs, academy, sport and entertainment, charity, girls' affair, special needs and clubs.
  - Takes and do some sort of tasks that come from the president and the committee.
- **Secretary**
  - Structures and organizes the unions' offices
  - Announces time and places of events whenever the president calls
  - Forms documents for every activities of the union
  - Takes and do some sort of tasks that come from the president or the vice president of the union.
- **Discipline**
  - Participates in discipline case of students
  - Punishes those who commits forbidden practices
  - Take and do some sort of tasks that come from president
- **Academics**
  - Accepts and follows student's complaints on grades
  - Inspects whether the teaching learning process is going well
  - Dose some sort of tasks that come from the president
- **Food affairs**
  - Participates in the process of buying food supplies with those who concerns
  - Inspects qualities of foods served daily and material are deterged

- Being with those it may concern, solves problems related to food staff sooner
- Take and do some sort of tasks that come from president

❖ **Club**

- By involving students in different clubs, lets their knowledge enhanced
- Supports different clubs in material and moral
- Searches for sponsorship for the clubs
- Prepares fliers and distributes among members
- Take and do some sort of tasks that come from president

❖ **Special need**

- Involves disables in various social activities
- Take and do some sort of tasks that come from president

❖ **Charity**

- Does analysis on background of those students who are in need
- Creates condition of support for those who are in need and who are in emergency
- Take and do some sort of tasks that come from president

❖ **Women's affair**

- Follows and verifies the rights of girls in the campus
- Protects women from any kind of moral and psychological harassment
- By selecting those who need special support, helps them to achieve in their academic
- Take and do some sort of tasks that come from president

❖ **General services**

- Let's dormitory inspectors, floor and block inspectors selected, strengthen and may replace those inspectors with bad conduct
- If there are any king of organizations which support students in finance, they control whether it is distributed fairly or not
- Take and do some sort of tasks that come from president

❖ **Sport and entertainment**

- Prepares some sort of sport competition being with those it may concern
- It initiates students to participate in sport competition
- Take and do some sort of tasks that come from president

2.3 Major functions of the existing system

- generate report
- assign students into groups
- send and receive report
- register new members
- register complaints
- follow up complaints
- review and analyze report
- assign work to members of the student's union

2.4 Forms and Other Documents of the Existing Systems

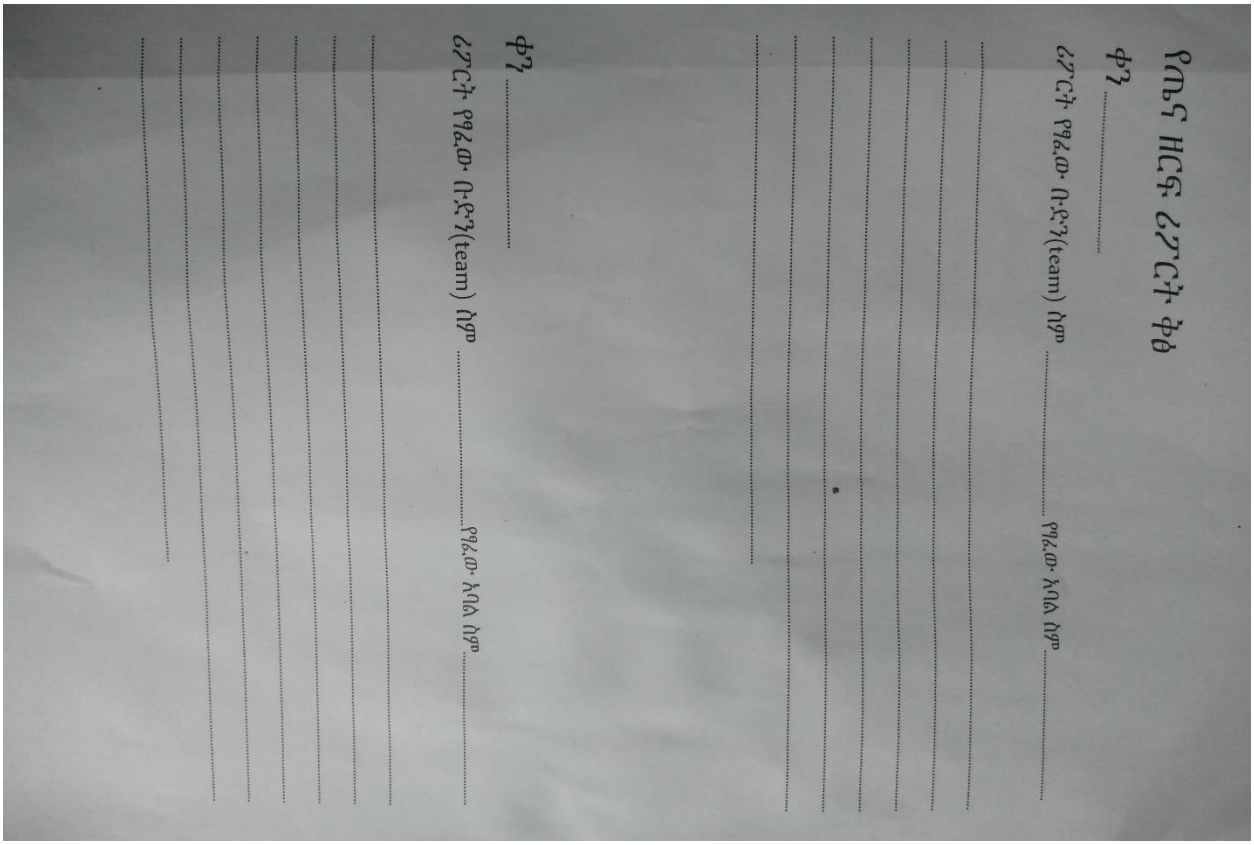
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Figure 1: Report form

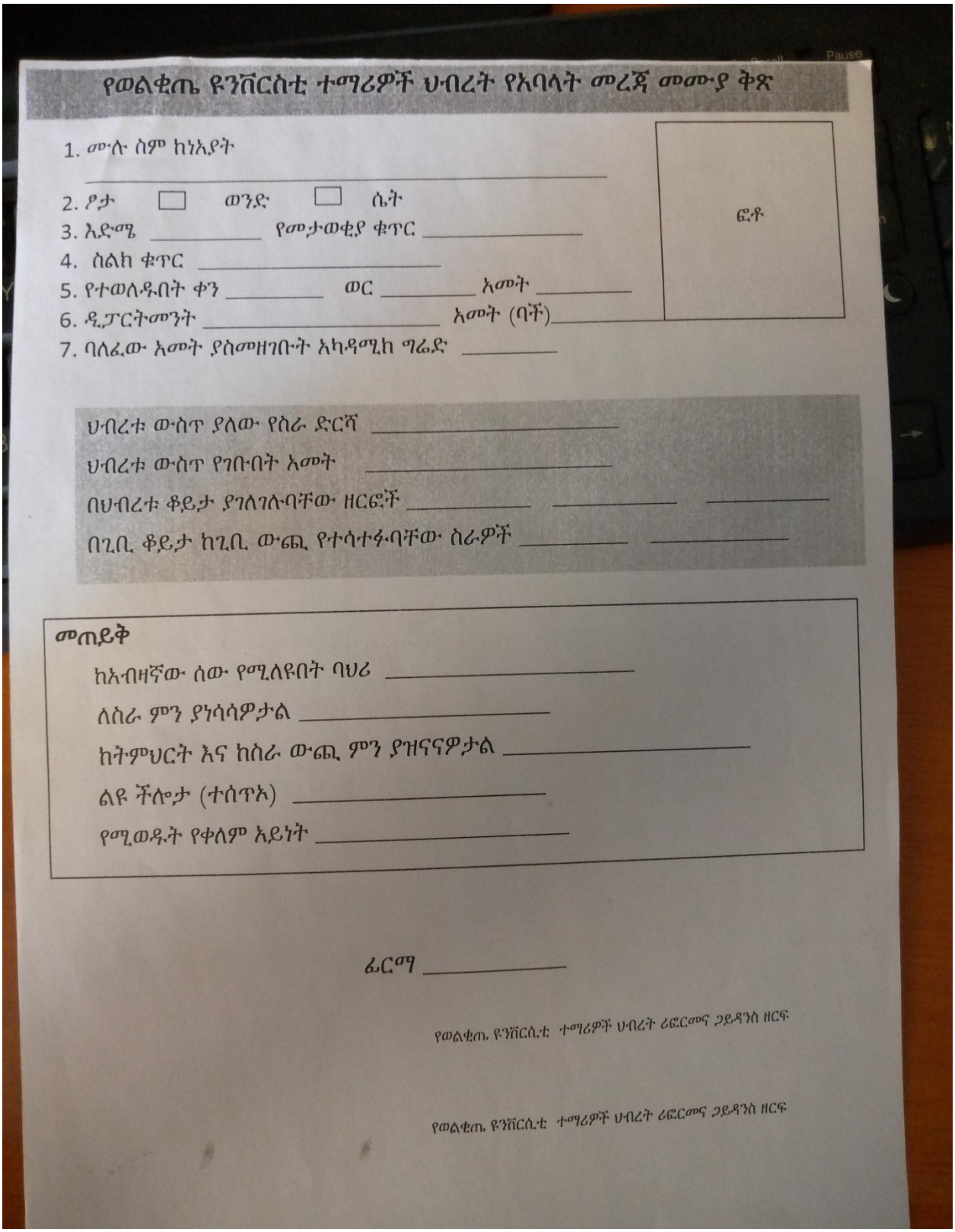

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Figure 2: Member Registration form

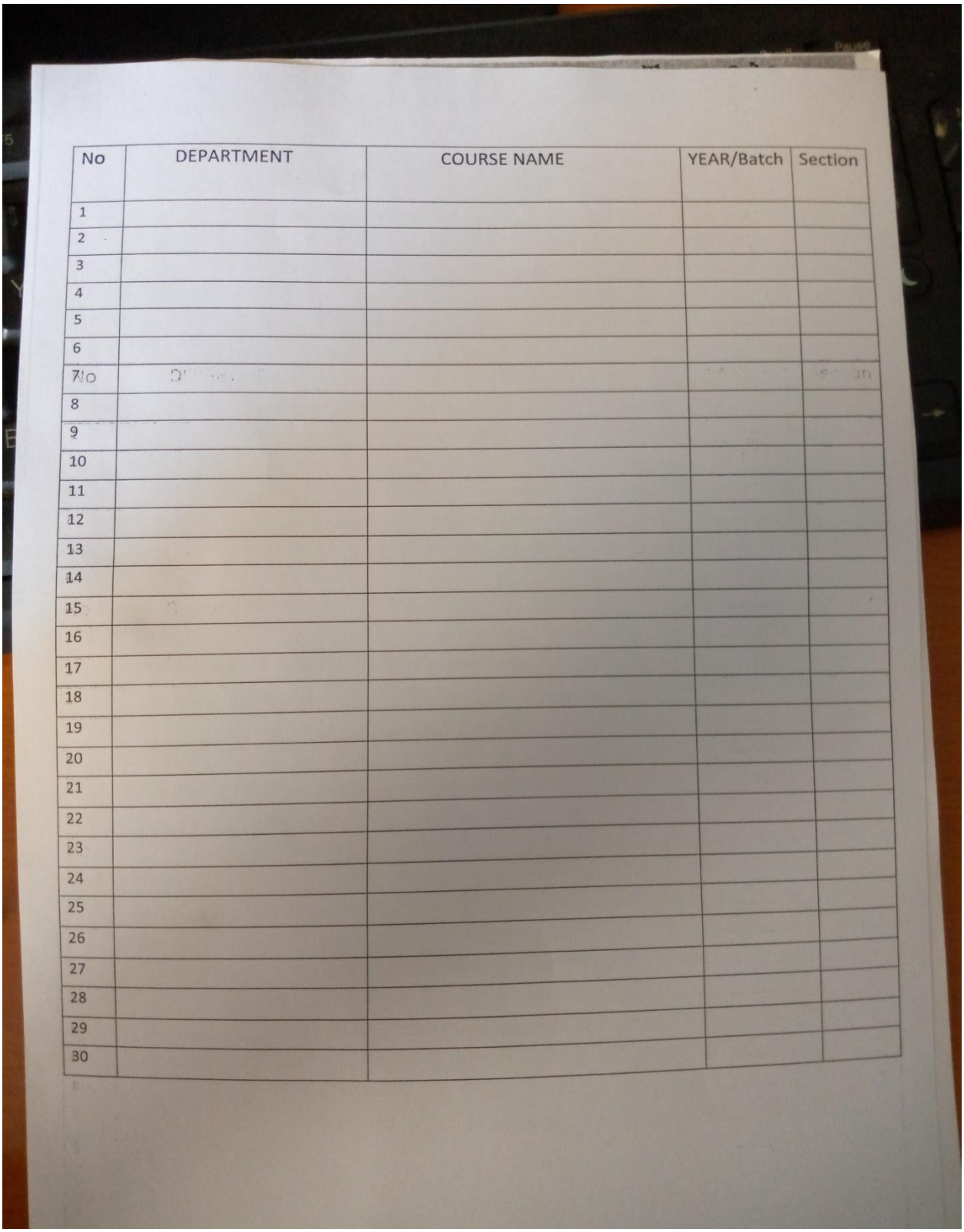

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Figure 3: Academic Sector Academic Form

2.5 Drawbacks of the Existing System

- Since the company accomplished its activity manually, its response time is somewhat slow & depends on the person in charge. When the employee is active the response time becomes little best and when the employee is dormant vice versa. Generally, the response time of the system is slow.
- Input data is not correctly captured and updated.
- Data is captured redundantly; Data entry may be duplicated.
- inputs are not flexible, means once the input is entered it can't be edited rather removing the paper.
- Output delay on report
- Takes time to retrieve data
- hard to organize overall report.
- Hard to manage the work of every member
- Hard to organize complaints
- Takes time to register

2.6 Business Rules of the Existing System

- User should be a member of the student's union
- Students should me a student of the university
- All students must report to their superiors
- Students can only register to the sectors they want to work for

CHAPTER THREE

3. PROPOSED SYSTEM

The proposed system is going to be developed to solve problems affecting the manual system in use. This system will do analyzing and storing information either automatically or interactively. The proposed system has the following features.

- The system must have login activity to make the system secured
- Accuracy during handling of data
- Better storage and faster retrieval systems
- Fast rate of operation

3.1 Functional Requirement

Our proposed system will have the following functional requirements

The **president** of the union

- Shall be able to log in to his/her profile
- Shall be able to manage sector leaders
- Shall be able to view members of the union
- Shall be able to manage complaints
- Shall be able to manage his/her own profile
- Shall be able to register sector leaders
- Shall be able to generate report
- Shall be able to view report
- Shall be able to notify
- Shall be able to log out from his/her personal profile

The **vice president** of the union

- Shall be able to log in to his/her profile
- Shall be able to manage sector leaders
- Shall be able to view members of the sector
- Shall be able to manage his/her own profile

- Shall be able to register sector leaders
- Shall be able to generate report
- Shall be able to be able to view report
- Shall be able to notify
- Shall be able to log out from his/her personal profile

Secretary of the union

- Shall log in to his/her profile
- Shall be able to manage his/her own profile
- Shall generate report
- Shall be able to view report
- Shall be able to notify
- Shall be able to log out from his/her personal profile

Sector

- Sector leader Shall be able to log in to his/her profile
- Sector leader Shall be able to manage its division leaders and members
- Sector leader Shall be able to manage complaints
- Sector leader Shall be able to manage his/her own profile
- Sector leader Shall be able to register sector members and division members
- Sector leader Shall be able to generate report
- Sector leader Shall be able to view complaint
- Sector leader Shall be able to view report
- Sector leader Shall be able to notify
- Sector leader Shall be able to log out from his/her personal profile
- Sector's division leader shall be able to log in to his/her profile
- Sector's division leader shall be able to manage his/her own profile
- Sector's division leader shall be able to generate report
- Sector's division leader shall be able to notify
- Sector's division leader shall be able to log out from his/her personal profile
- Sector's division member shall be able to log in to his/her profile
- Sector's division member shall be able to manage his/her own profile

- Sectors division member shall be able to generate report
- Sectors division member shall be able to notify
- Sectors division member shall be able to log out from his/her personal profile

Student

- Shall log in to his/her profile
- Shall be able to give complaint
- Shall be able to follow his/her own complaint

3.2 Non-Functional Requirements

The system will have non-functional requirements that will define the systems attributes to make it more preferable than that of the manual and any of that are planned to be made.

3.2.1 User Interface and Human Factors

The system provides most interactive, user friendly and easily usable interface using the Bootstrap framework. The system is a web based system which is compatible in any device and browsers which will make it more useable. In addition, the expected users of the system must be educated so that they will use the system with a little bit of training or guidance.

3.2.2 Security Issues

The system protects each profiles and accounts of the system users with passwords. The system encrypts and stores user passwords in the database using MD5 encryption. As a result, only privileged users can access the system, which will make it hard for peoples with unauthorized access.

3.2.3 Performance consideration

Having a UI that is easy to use and operate, the system provides best performance and gives response in small time while any number of users can access it at once. The system can make users able to search the required key on time. And also it has the minimum load on the server.

3.2.4 Error Handling and Validation

The system will be able to handle any errors happening at the time of performance that might be caused by either the user him/herself or some other problems.

- The system pop ups error notification for wrong inputs and commands and also suggests what the user should do to operate in the right way
- For any power shortage the system will remain as it is after restarting
- The system provides confirmation for any risky commands like deleting and updating data
- For each input field there is validation message and this prevents the user from making errors

3.2.5 Physical Environment

The system is a distributed system which will be deployed in every offices of the users with no other side effects of weather and other natural factors

3.2.6 Resource Issues

For the system to be in the working condition it only needs a desktop computer which acts as a server for the whole system and the user can use either hit/her personal computer or even his/her smart phone can act as a client side device.

CHAPTER FOUR

4. SYSTEM ANALYSIS

4.1 System model

4.1.1 Use case model

The use case mode is composed of a use case diagram and the accompanying documentation describing the use case, actors, and associations. In this system there are so many actors and use cases.

The system consists of five major actors. Therese are:

- **President**: the president controls and manages all offices under the student union and he has high role in the system. He manages the leaders of the sectors including adding deleting and editing from the system.
- **Sector**: has responsibility to control all over activities of the sectors.
- **Vice president**: is an office under the president which has sectors that answers to the office.
- **Secretary**
- **Students**: students submit their complaints.

4.1.1.1 Use case diagram

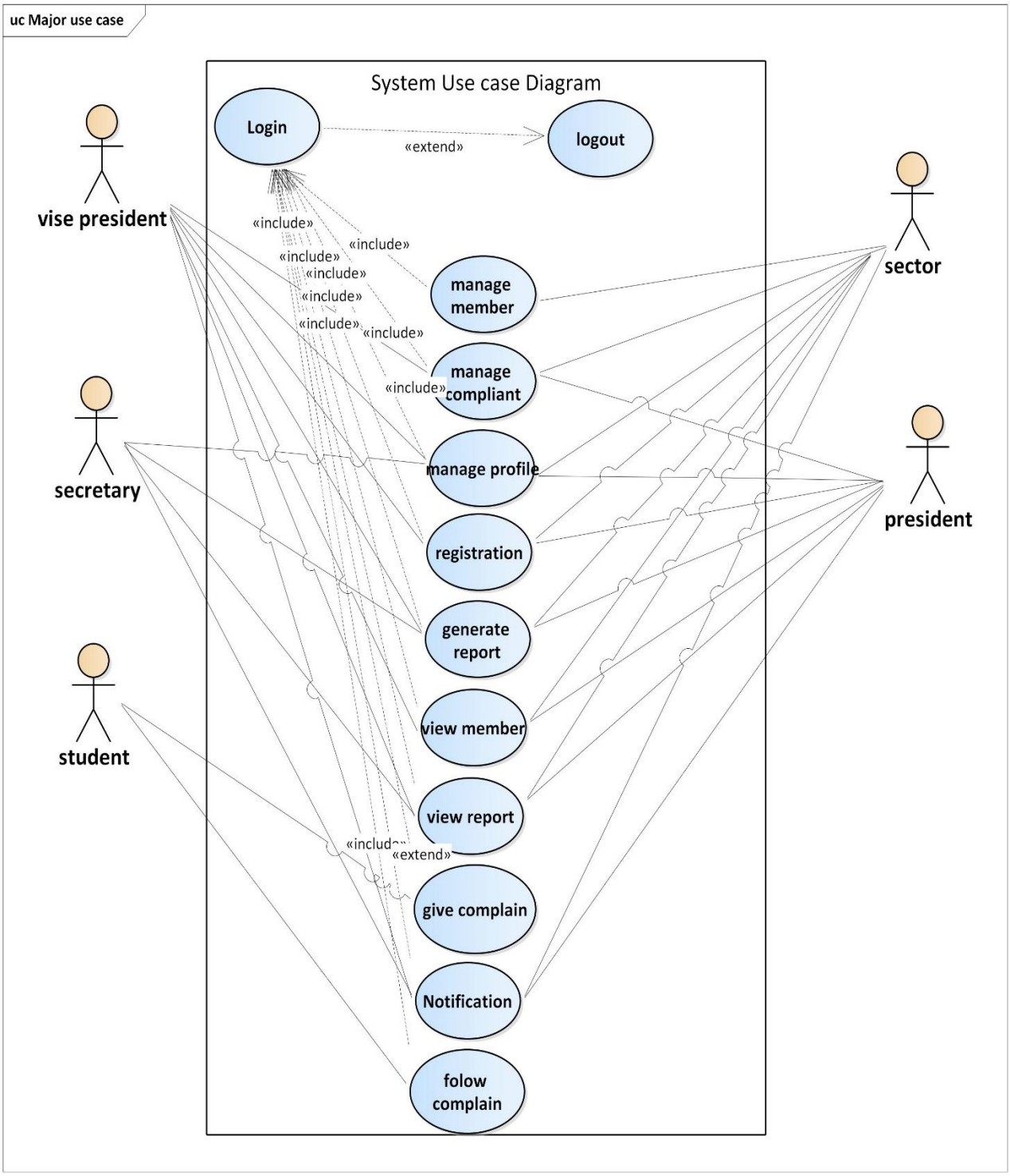


Figure 4: Use case diagram

4.1.2 Use case description

Use case description for Manage complaint

Use case ID	UC-05
Use case name	manage complaint
Actor	President, vice president, sector
Description	The use case is done by President, vice president and sector when they want to manage complaints come from students
Goal	To review complaints and contact to the student concerning the progress
Pre-condition	President, vice president, sector must be logged in
Post-condition	President, vice president, sector accomplish their intended tasks
Main course of action	Manage complaint
Actor action	**System response**
Step 1: President, vice president, sector leader click complains button **Step 3:** president, vice president, sector leaders review complaints	**Step 2:** the system retrieves available complaints **Step 4:**use case ends
Alternative course of action	If there is no record to manage system displays massage "no record is found to manage".

Table 1: Use case description for Manage complaint

Use case description for Generate report

Use case ID	UC_08
Use case name	Generate report
Actor	President, vice president, secretory, sector
description	This use case is done by the actors of the use case when they want to generate report.
goal	To report daily work to above leaders.

precondition	The student have to login to their account to generate their report
post condition	The report will be sent and be reviewed by their leaders.
Main course of action	Report generation for President, vice president, secretory, sector.
Actor action	**System response**
Step 1: the users clicks report button **Step 3:** the users will fill out the form **Step 4:** the users will submit the form.	**Step 2**: the system displays report form **Step 5**: the system makes validation **5.1:** if all fields in the form is filled out, it notifies the user that the report has successfully been submitted. **5.2:** if there are empty field, it shows error message to late the user knows there is an empty field.
Alternative course of action	If the form input is incorrect system notify invalid input message and back to step 3 of basic course of action.

Table 2: Use case description for Generate report

Use case description for View report

Use case ID	UC_10
Use case name	View report
Actor	President, vice president, secretory, sector.
description	This use case is done by the actors of the use case when they want to view reported generated by other member of the union.
goal	To view generated reported.
precondition	The user has to login to their account to view the generated report.

post condition	The report will be viewed by the leaders found in the hierarchy.
Main course of action	Report view for President, vice president, secretory, sector.
Actor action	**System response**
Step 1: the user clicks view report button **Step 3:** the will view the reports .	**Step 2**: the system displays reports sent to the user

Table 3: Use case description for View report

Use case description for Notification

Use case ID	UC_12
Use case name	Notification
Actor	President, vice president, secretory, sector
description	This use case is done by the actors of the use case when they want to notify any member of the union with any information
goal	To send notification between members of the union
precondition	The users have to login to their account to send notification
post condition	The notification will be sent and be viewed by other member of the union
Main course of action	notification for President, vice president, secretory, sector leader, sector
Actor action	**System response**
Step 1: the user clicks notification button	**Step 2**: the system displays notification area **Step 5**: the system makes validation

Step 3: the user will write and choose who he wants to send that notification to. **Step 4:** the user will click the send button.	**5.1:** if all fields in the form is filled out, it notifies the user that the notification has successfully been sent. **5.2:** if there are empty field, it shows error message to late the user knows there is an empty field.
Alternative course of action	If the form input is incorrect system notify invalid input message and back to step 3 of basic course of action.

Table 4: Use case description for Notification

4.1.3 Use case Scenario

Scenario name: log in

Participating actor instances: President, vice president, secretary, sector

Flow of events

1. President, vice president, secretary, sector, student browse for the system using any browsers
2. The system displays log in page
3. President, vice president, secretary, sector, student fills their username and password
4. They click login button
5. The system checks whether the username and password are matched or not
   5.1. If the username and password matches, the system provides appropriate page
   5.2. If the username and password doesn't match, the system gives error message and displays log in page to give second chance

Scenario Name: Registration

Participating actor instances: President, vice president, sector,

Flow of events

1. President, Vice president, sector clicks register button
2. The system retrieves registration form
3. President, Vice president, sector fill the fields required

4. President, Vice president, Sector clicks register button
5. The system checks whether fields are filled correctly or not

   5.1. If fields are correctly filled, the system saves the information provided and displays registration form again

If fields are not correctly filled, the system gives error message and displays registration for second chance

4.2 Object Model

4.2.1 Class diagram

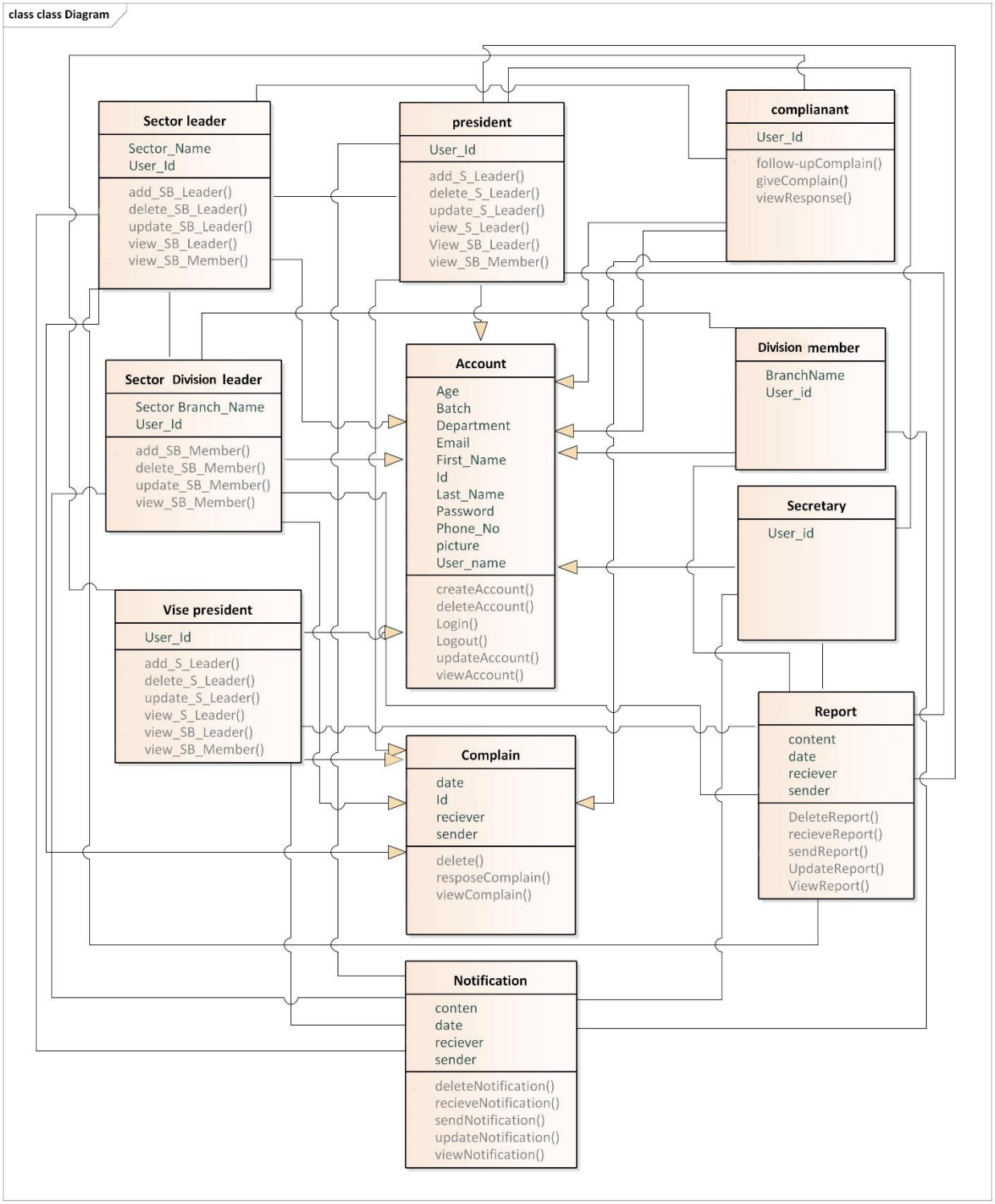


Figure 5: Class diagram

4.2.2 Data Dictionary

Data dictionary for user registration

Attribute	Size	Data Type	Null	Key	Description
ID	10	Varchar	Null	PK	Student ID
First Name	15	Varchar	Null		First Name
Last Name	15	Varchar	Null		Last Name
Grand Father Name	15	Varchar	Null		Grand Father Name
Gender	6	Varchar	Null		Gender of the student
Age	2	int	Null		Age
Phone Number	10	Int	Null		Student Phone
Department	15	Varchar	Null		Department
Batch	4	Int	Null		Batch
Last Year academic grade	4	Float	Null		Last year Cumulative
Birth Date	10	Date	Null		Birth Date
Role	10	Varchar	Null		Role in the Union
Username	10	Varchar	Null		User name
Password	10	Varchar	Null		Password
Students' Photo		BLOB	Null		Profile picture

Table 5: Data dictionary for user registration

Data dictionary for report

Attribute	Size	Data Type	Null	Key	Description
Date		Date	Null		Date of report generated
Reporter Sector Name	15	Varchar	Null		Accountable office for the report
Reporter Name	15	Varchar	Null		Accountable officer for the report
Report		text	Null		Content of the report

Table 6: Data dictionary for report

Data dictionary for Notification

Field Name	Size	Data Type	Null	Key	Description
Date		Date	Null		Date of notification sent
Notifier Name	15	Varchar	Null		The one who notified
Notifier Role	15	Varchar	Null		Role of the one who notified
Notification	100	Varchar	Null		Notification body

Table 7: Data dictionary for Notification

Data dictionary for complaint

Field Name	Size	Data Type	Null	Key	Description
First Name	15	Varchar	Null		Name of the student complaining
Last Name	15	Varchar	Null		Father name of the student complaining
ID	10	String	Null		Unique identifier of the complaining student
Gender	6	Varchar	Null		Gender of the complaining student
College	30	Varchar	Null		College of the complaining student
Department	30	Varchar	Null		Department of the complaining student
Phone Number	10	Int	Null		Phone number of the complaining student
Complain		text	Null		Complaint body

Table 8: Data dictionary for complaint

4.3 Dynamic Model

4.3.1 Sequence Diagram

Sequence diagram for view report

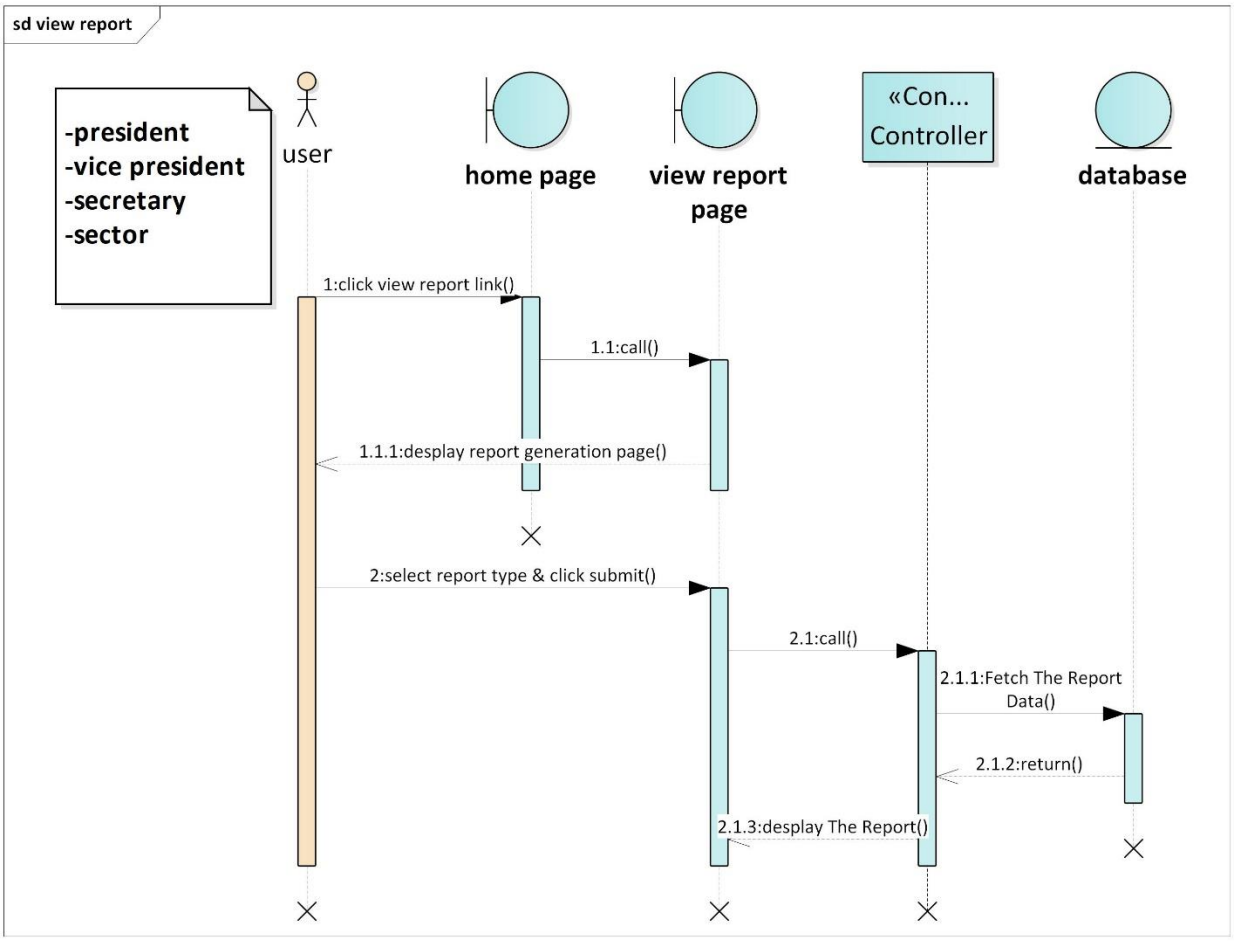


Figure 6: Sequence diagram for view report

Sequence diagram for Login

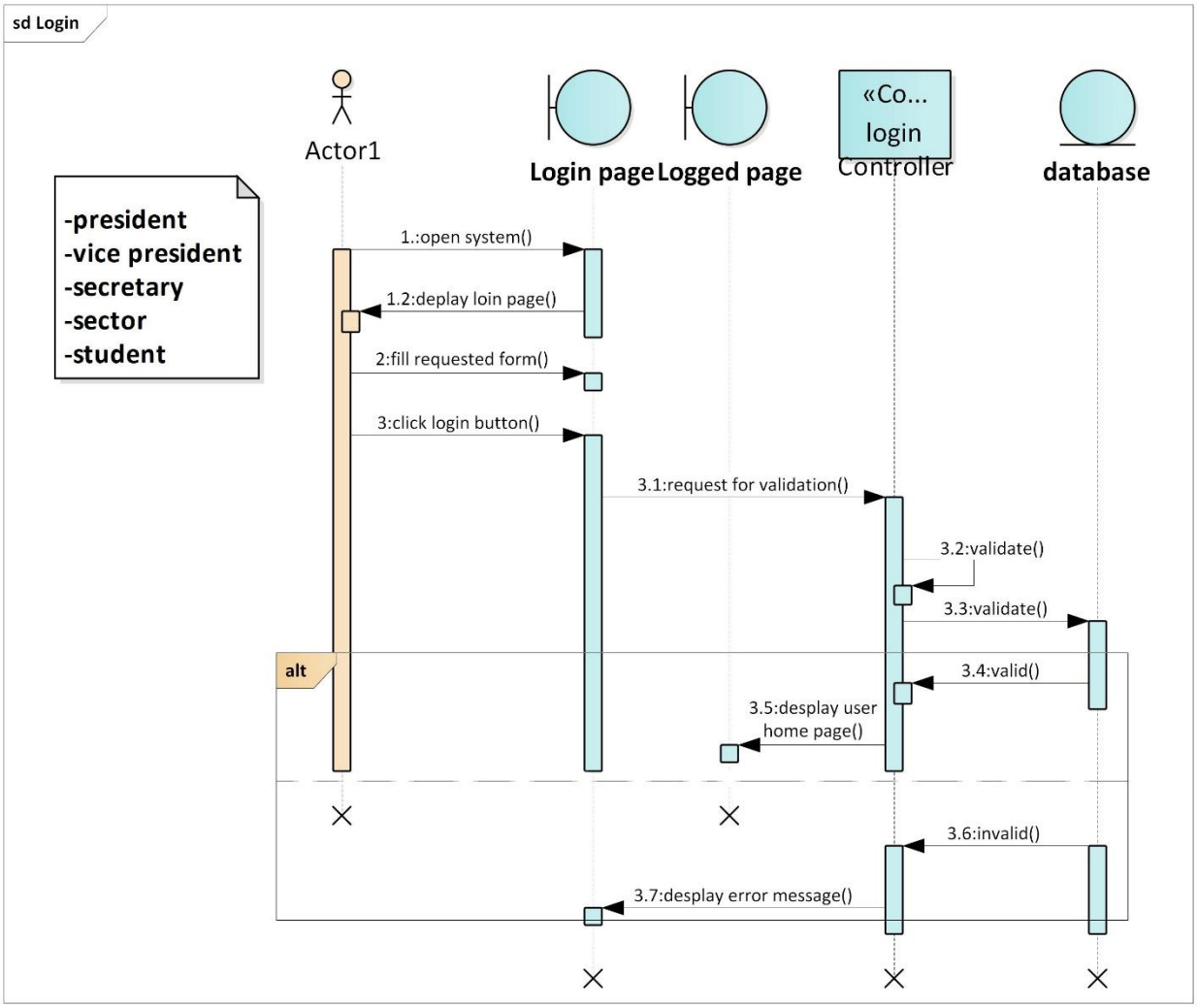


Figure 7: Sequence diagram for Login

Sequence diagram for Registration

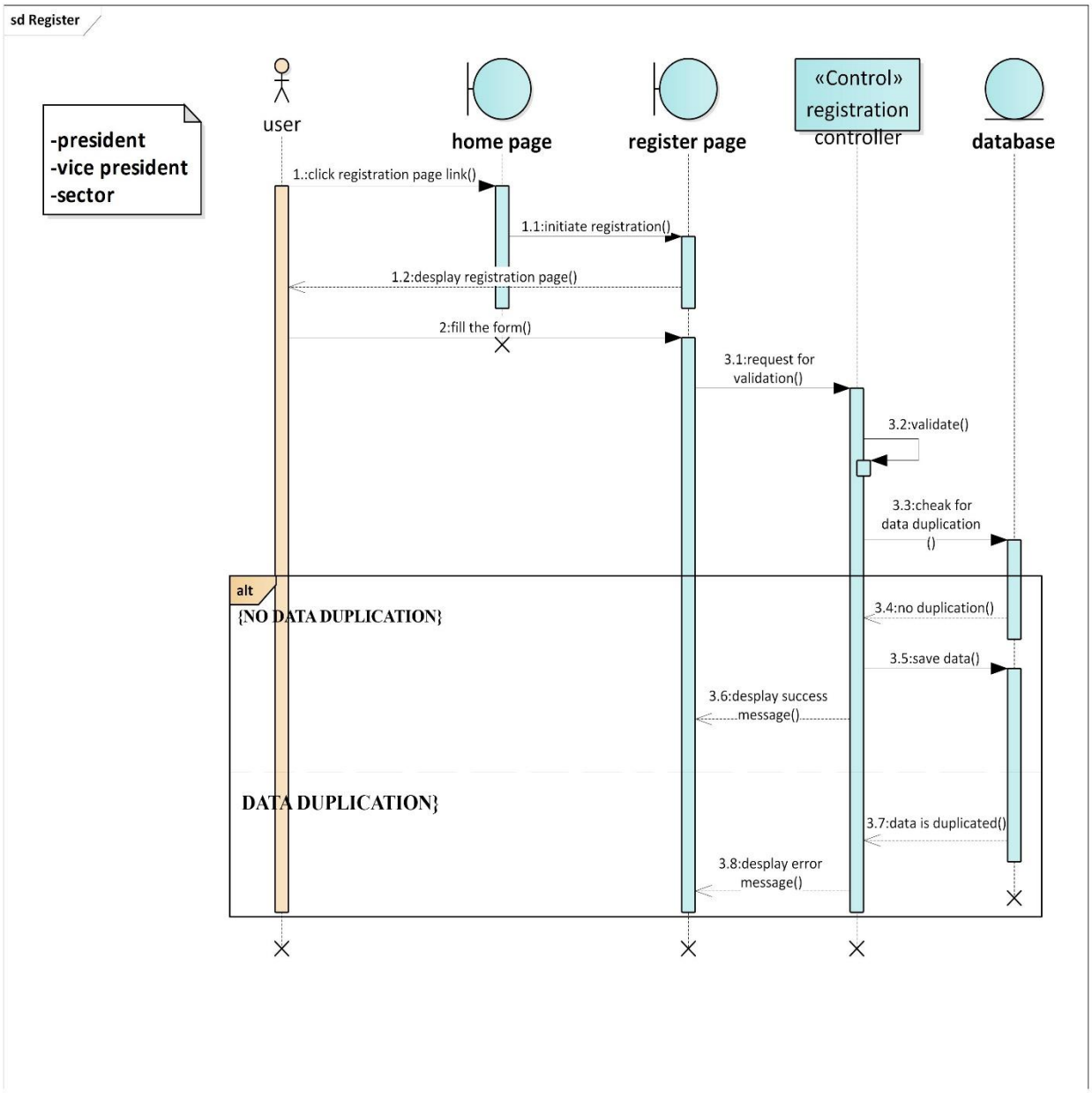


Figure 8: Sequence diagram for Registration

4.3.2 Activity Diagram

Activity diagram for president

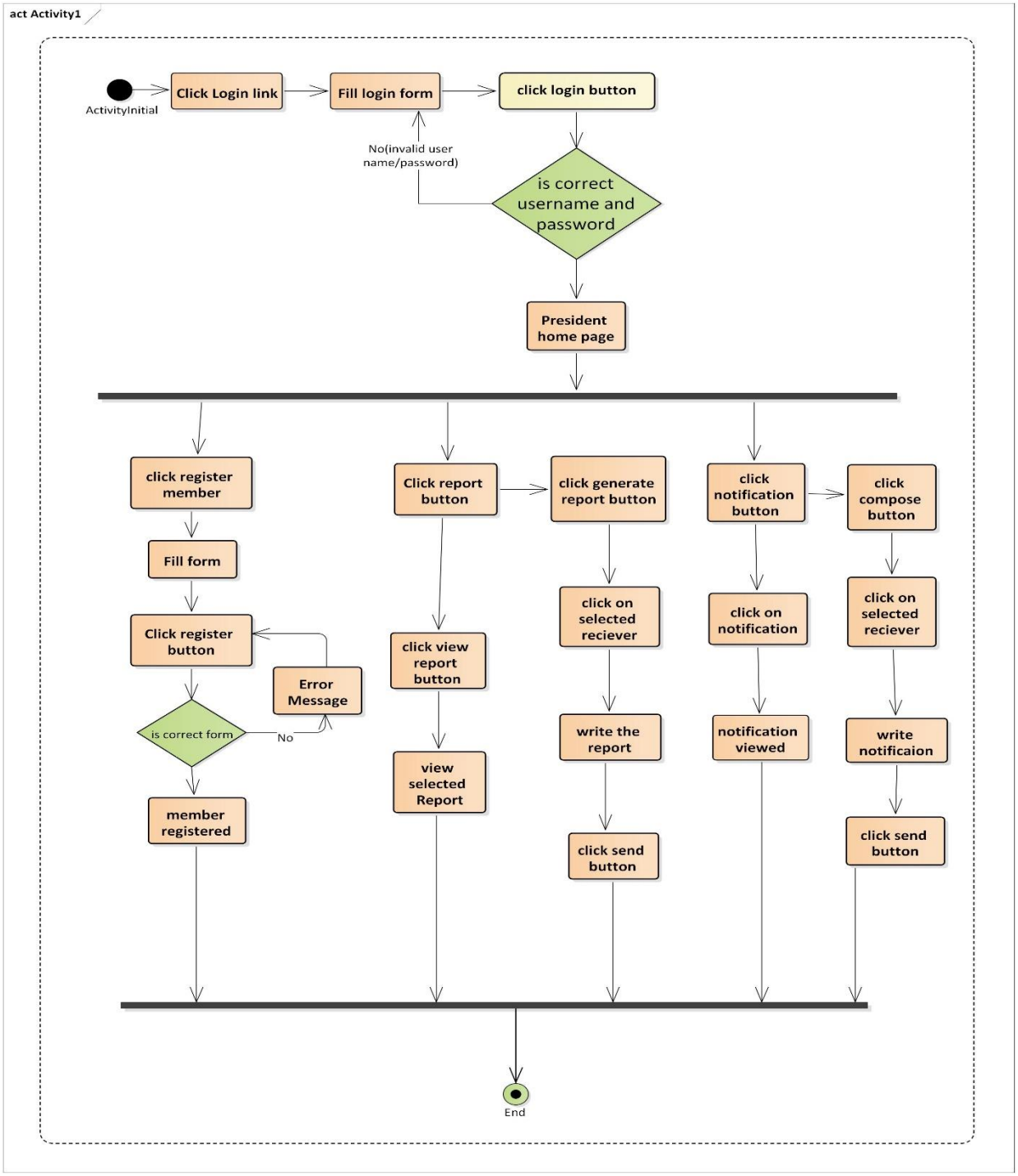


Figure 9: Activity diagram for receive and manage compliant

Activity diagram for give complaint

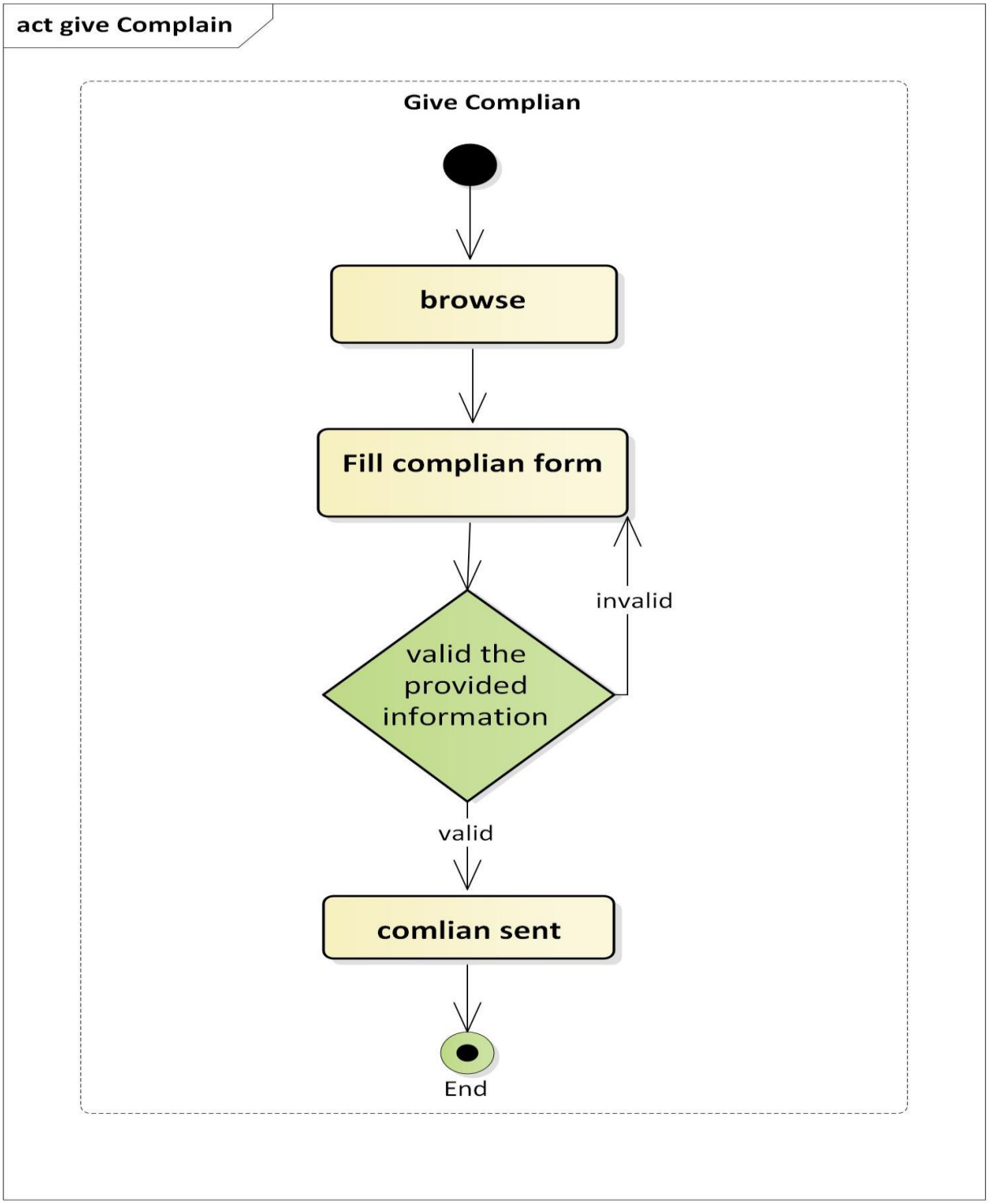


Figure 10: Activity diagram for give complaint

Activity diagram for Login

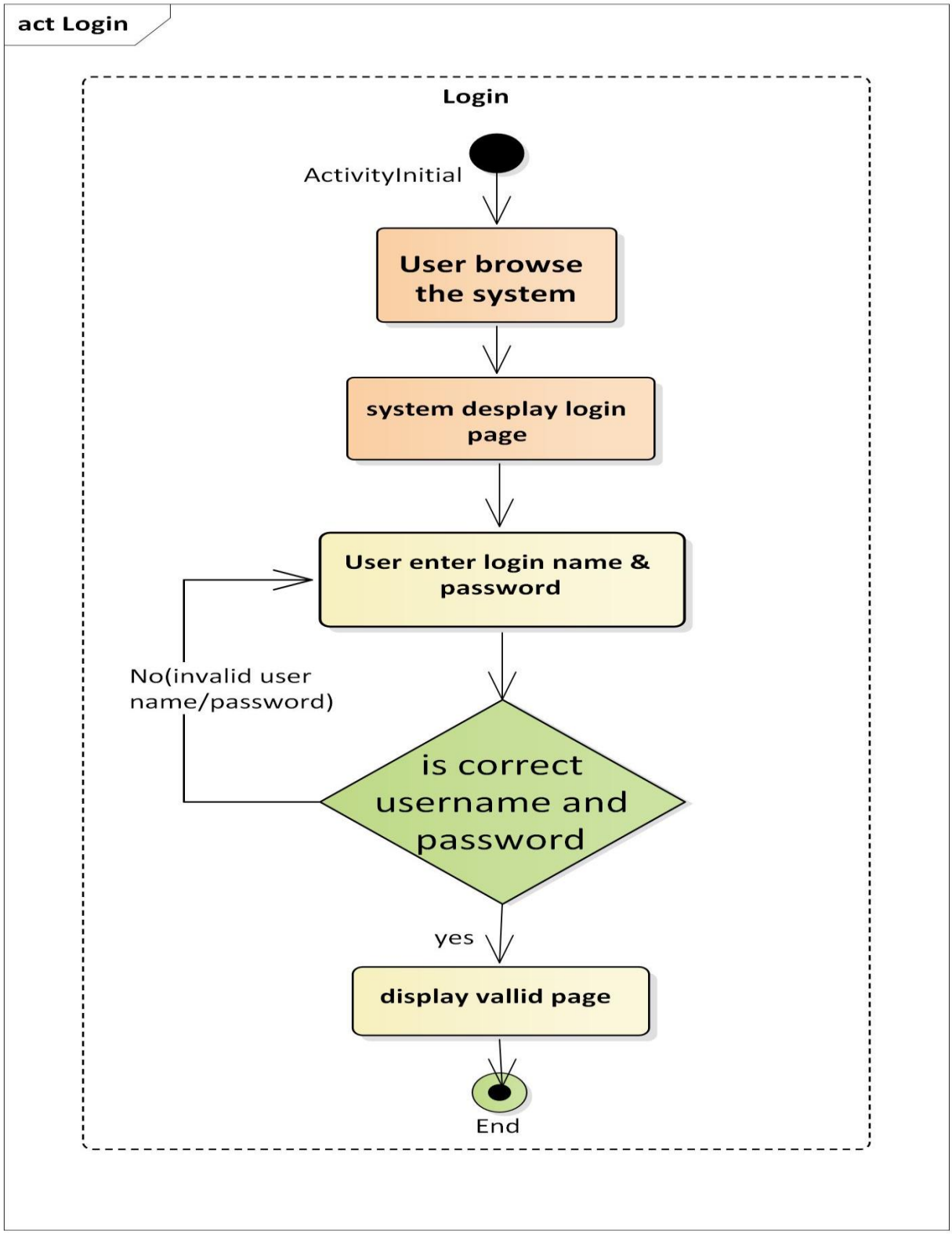


Figure 11: Activity diagram for Login

4.3.3 State Chart Diagram

State chart diagram for Registration

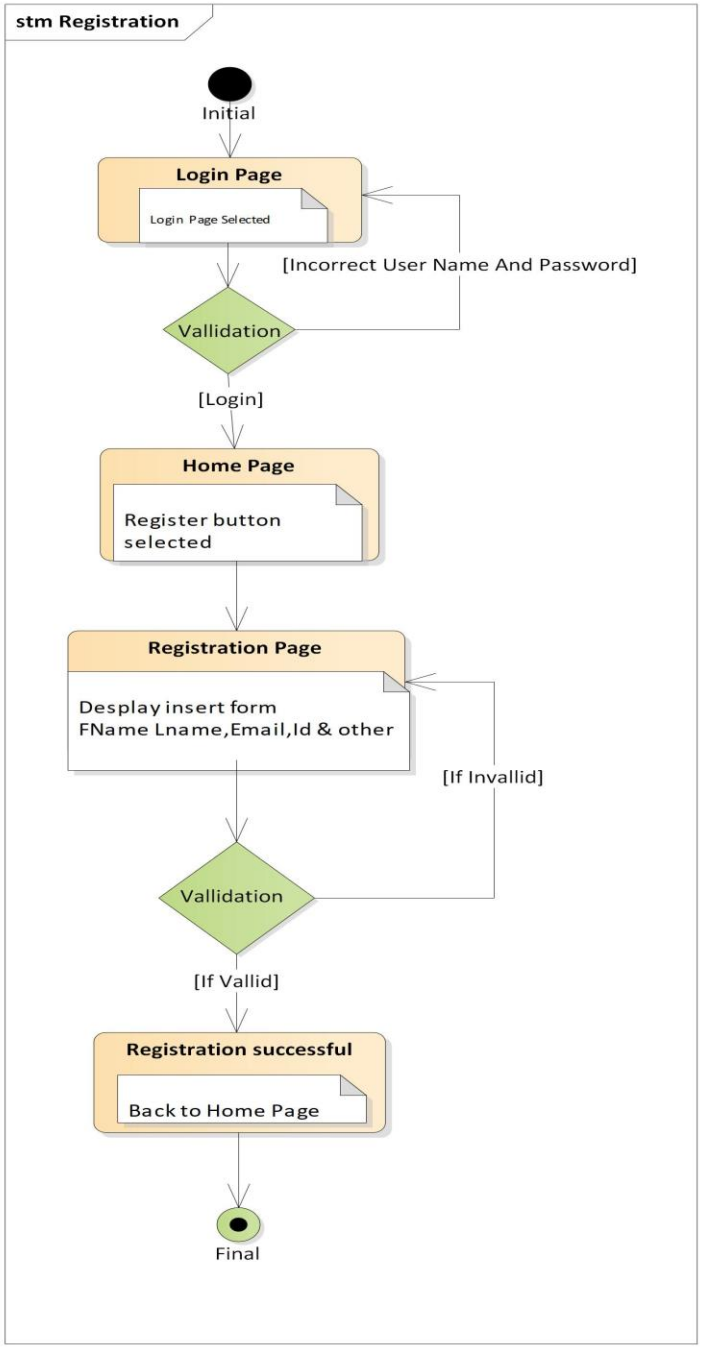


Figure 12: State chart diagram for Registration

State chart diagram for Login

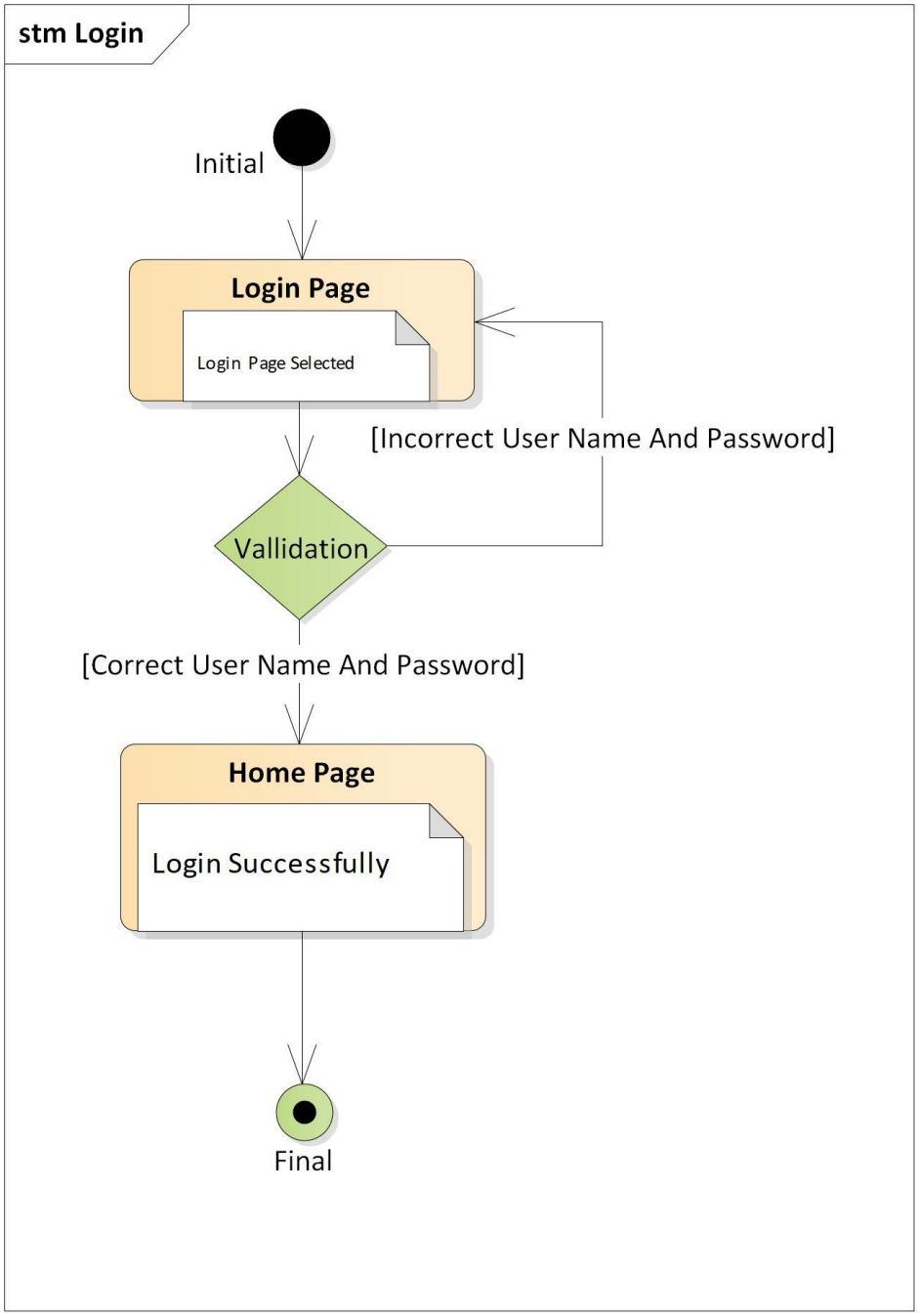


Figure 13: State chart diagram for Login

State chart diagram for complain

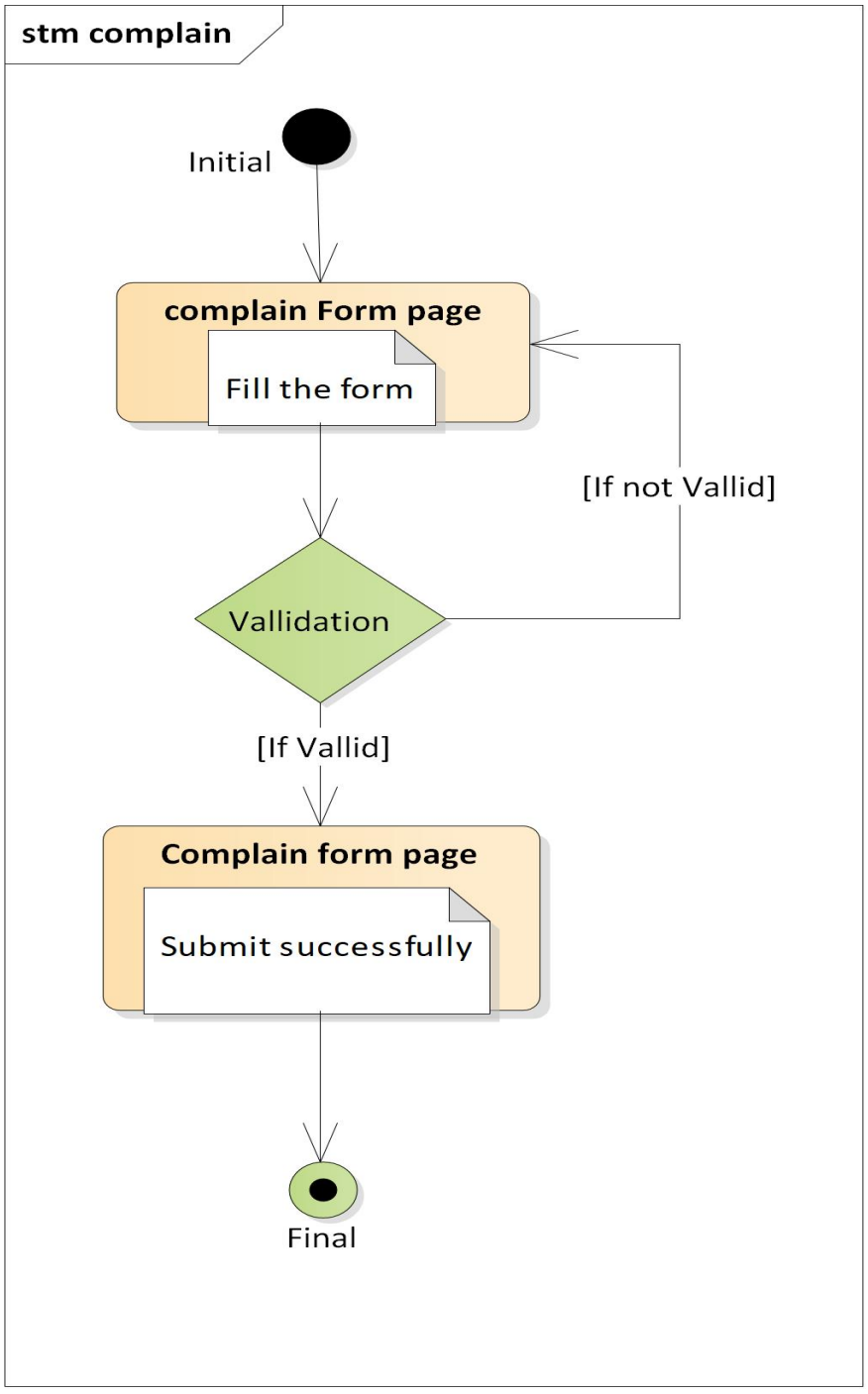


Figure 14: State chart diagram for complain

CHAPTER FIVE

5. SYSTEM DESIGN

5.1 Design Goals

User Interface and Human Factors

The system will be highly interactive with the users. It is all about to allow effective operation and control of the system from the end user, while the system simultaneously feedback the result of the user's operation. Anyone who can read English can use the system as it will be designed to be easier using Basic English and it is also rich in icons which are perfect representation of the operation to be committed and familiar for those users.

Hardware Consideration

The system is also designed to operate in minimum requirements of hardware materials. This is aimed to let the users feel free considering the environment to operate on. Having this quality, the users will not be frustrated to use the system or stop worrying about excess hardware specification.

Security Issues

For the purpose of security issue the system is designed to be highly conservative in providing secure service and protected from unauthorized access threats, attacks and vulnerabilities. And it will not be exposed to any security issues. In order to save password from those attackers and threats we use MD5 encryption system for the password.

Performance Consideration

The system is designed to have good performance for the end users and complete its tasks including its operation within a minimum amount of time and resource, and the user will get the expected result within a few seconds. To make all this come true, the database is designed to be simplified and multiple tables in a single database, and the overall architectural system is designed in three-tier architecture.

5.2 Proposed System Architecture

The architecture used in the system is a three-tier architecture where a client can use internet browsers to get the system interface. Figure below shows the architecture the proposed system.

Three-tiered architecture consists three components distributed in three layers (presentation layer, application layer and server layer).

- User System Interface (such as session, text input, dialog, and display management Services)
- Processing Management (such as process development, process enactment, process Monitoring, and process resource services)
- Database Management (such as data and file services)

1. Presentation Layer

This level of the application is the user interface. The main function of the interface is to translate tasks and results to something the user can understand. The user opens internet browser and searches the host using the ip address. Then an issue request is sent to remote server using appropriate protocol (usually HTTP). Also a returned HTML from the logic tier might be accepted. In the presentation layer interaction with client side scripts (e.g. using HTML) is supported.

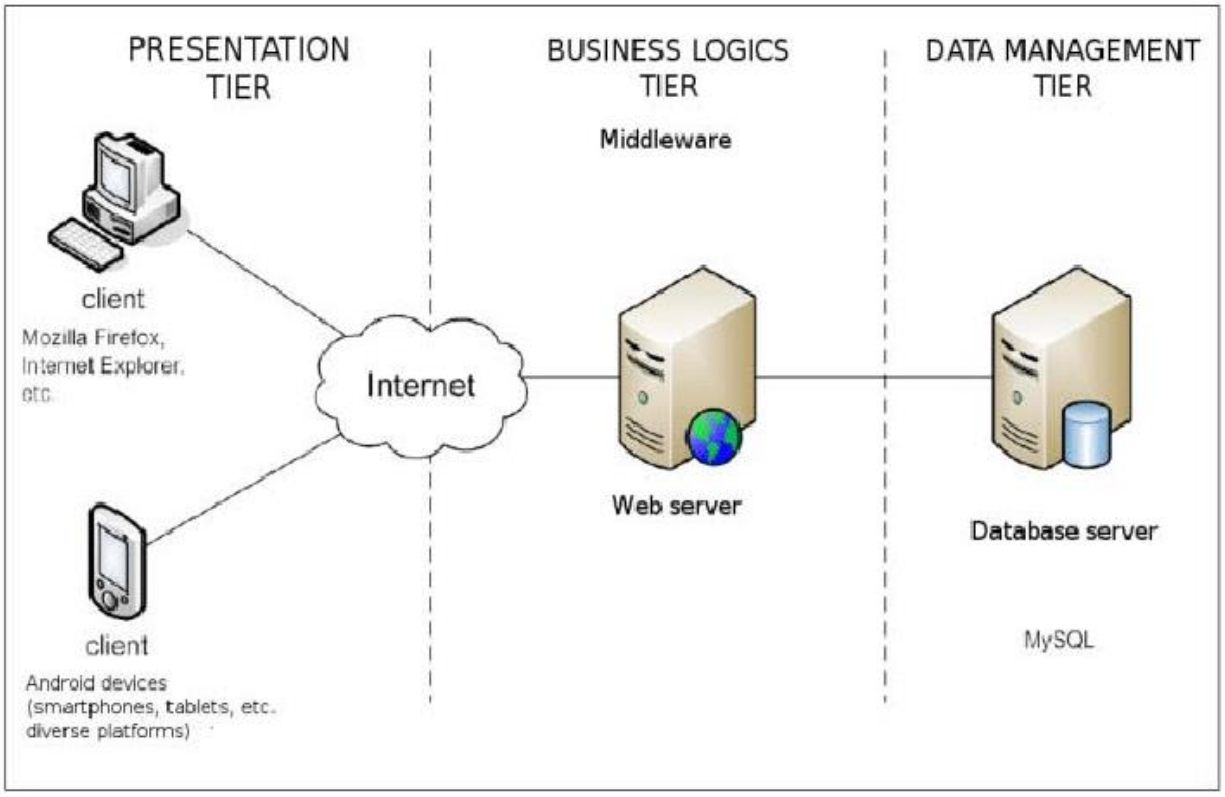
2. Application Layer

This layer is primarily concerned with business/logic tasks. It controls application functionality by performing detailed processing. Business logic includes:

- Validation of input
- Performing calculations/tasks
- Keeping track of sessions
- Access and retrieval of any data required for the presentation layer Scheduling of this tier uses Web to view the generated schedule

3. Data Layer

This layer is concerned with data storage and persistence issues and can be implemented by using a database or some sort of file storage mechanism. The data will be stored on the web server on a different machine. Data layer includes the data persistence mechanisms (database servers, file shares, etc.) and the data access layer that encapsulates the persistence mechanisms and exposes the data.



(Caballé, Xhafa, Raya, Barolli, & Uchida, 2014)

Figure 15: System Architecture

5.2.1 Subsystem Decomposition and Description

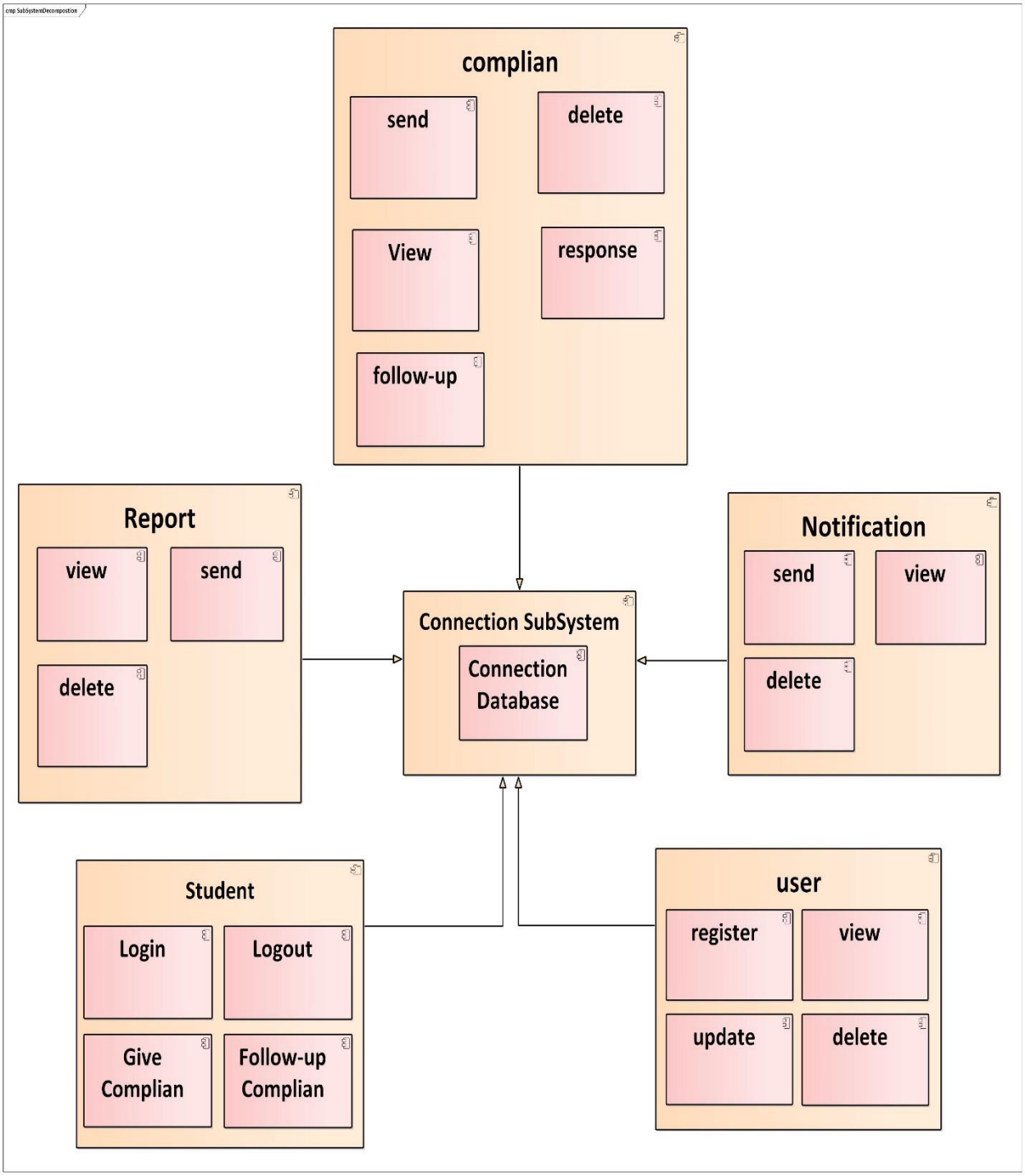


Figure 16: Subsystem Decomposition and Description

5.2.2 Hardware/Software Mapping

The system is inherently a distributed system, as users sit in front of different machines. However, we distinguish between two types of nodes: The User Machine to provide a user interface and the Server Machines to run the application logic and more generally to provide the scheduling services and to provide storage for persistence object.

One of the major tasks in system design deals with hardware/software mapping which deals with which components would be part in which hardware and so on.

- User interface and processing management will be deployed on the client machine. SUMS will present the Graphical User Interface (GUI) which allows the user to perform different functions.
- SUMS database will be deployed on the server.

The data collection module deployed on any device which have a browser

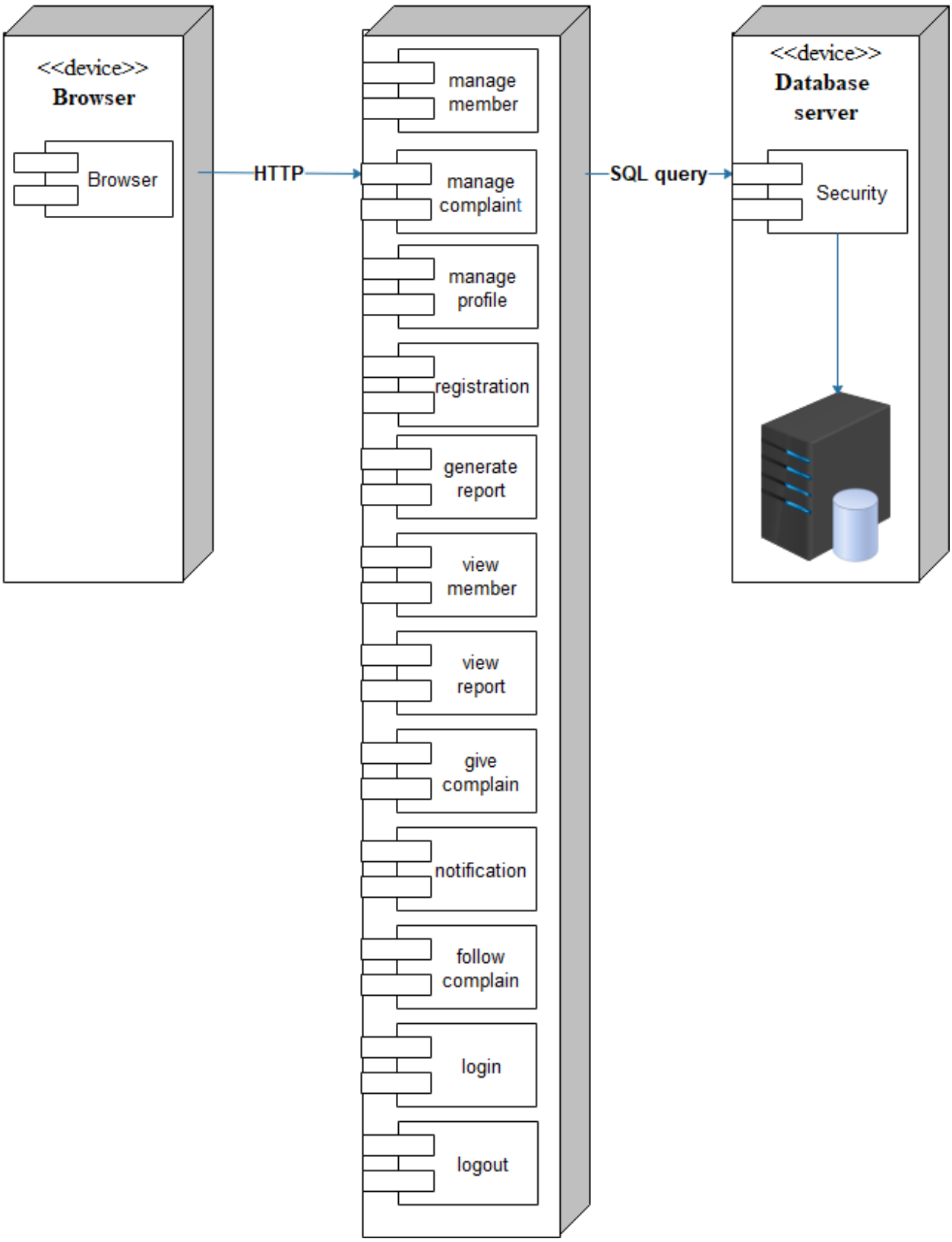


Figure 17: Hardware/Software Mapping

5.2.3 Detailed Class Diagram

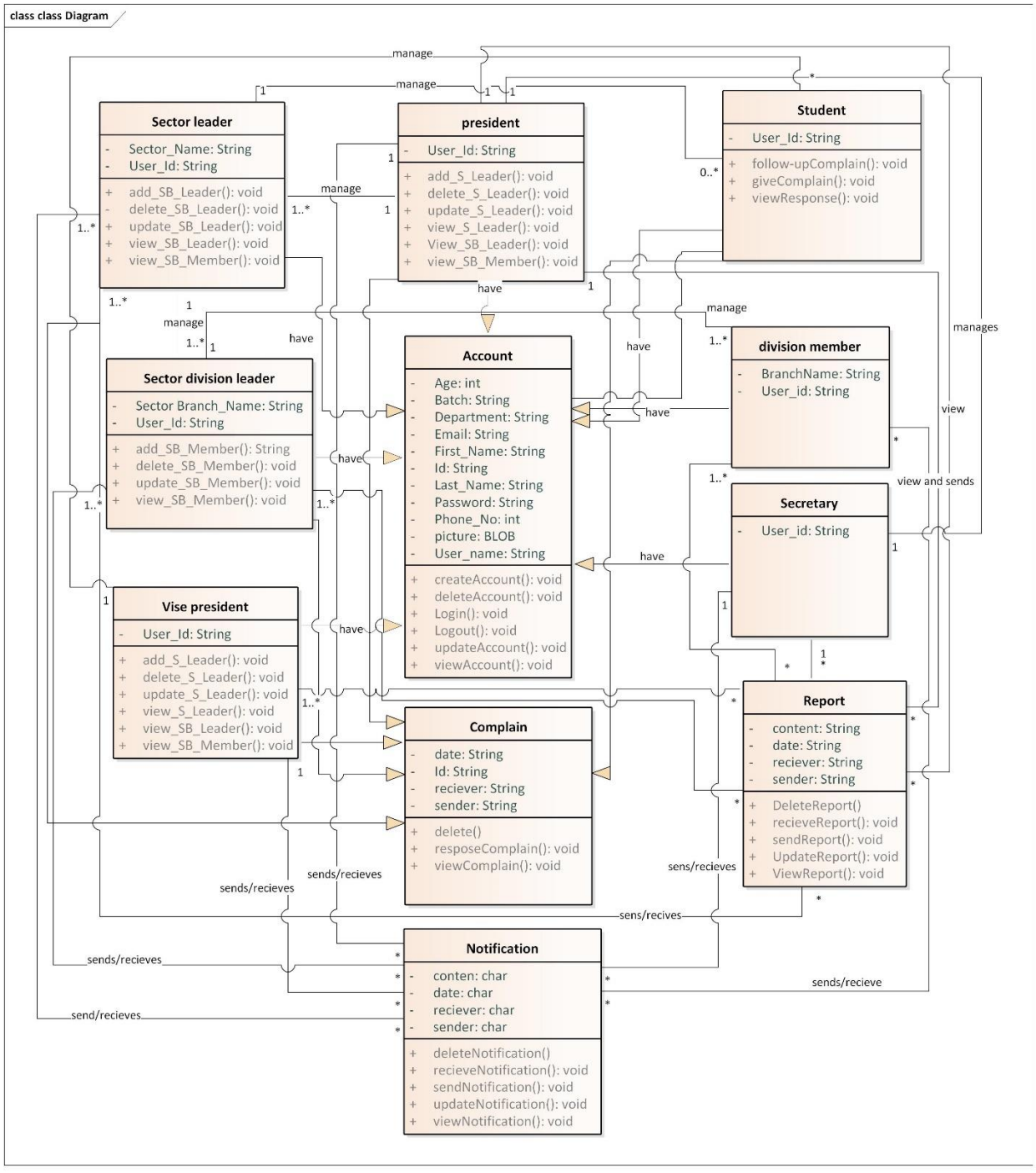


Figure 18:Detailed Class Diagram

5.2.4 Persistent Data Management

Persistent data management is realized with one of the following

- ❖ Data structure
- ❖ File system
- ❖ Database

In the system database we have used different tables as object and each object is related to each other and enforced by referential integrity by the use of foreign key and primary key. This schema enables as data manipulation activity such as select, search, delete, update on the database.

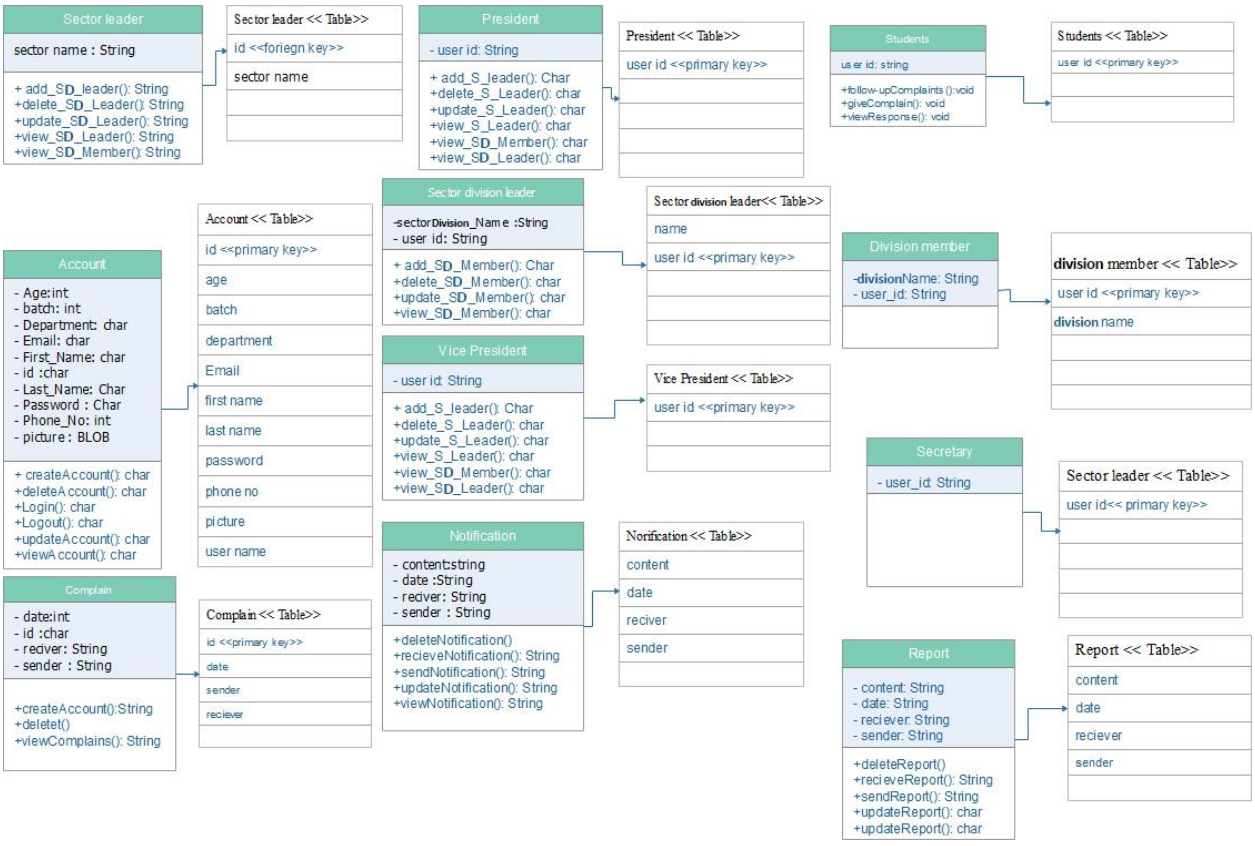


Figure 19: Persistent Data Management

5.2.5 Access Control and Security

Access control is one of the security technique that we designed to use. By access control we mean that a technique to regulate who can or who cannot use the computing environment or the system. For this system, we have designed this table to show who is able and who is not able to do so.

List of class	List of actors	Operation
President	President	Add sector leader Delete sector leader Update sector leader View sector leader View sectors' division leader View sectors' division member
Vice president	Vice president	Add sector leader Delete sector leader Update sector leader View sector leader View sectors' division leader View sectors' division member
Sector leader	Sector	Add sectors' division leader Delete sectors' division member View sectors' division leader View sectors' division member Update sectors' division leader
Complainant	Student	Give complain Follow up complain View response
Sector division leader	Sector	Add sector's division member Delete sector's division member Update sector's division member View sector's division member
Account	President	Create account

	Vice president Secretary Sector	Delete account Log in Log out Update account View account
Report	President Vice president Secretary Sector	Receive report Send report Update report Delete report View report
Complain	Students Vice president sector	Response complain View complain Delete complain

Table 9: Access Control and Security

5.3 Packages

We have used package diagram to show both structure and dependencies between modules, showing different views of the system.

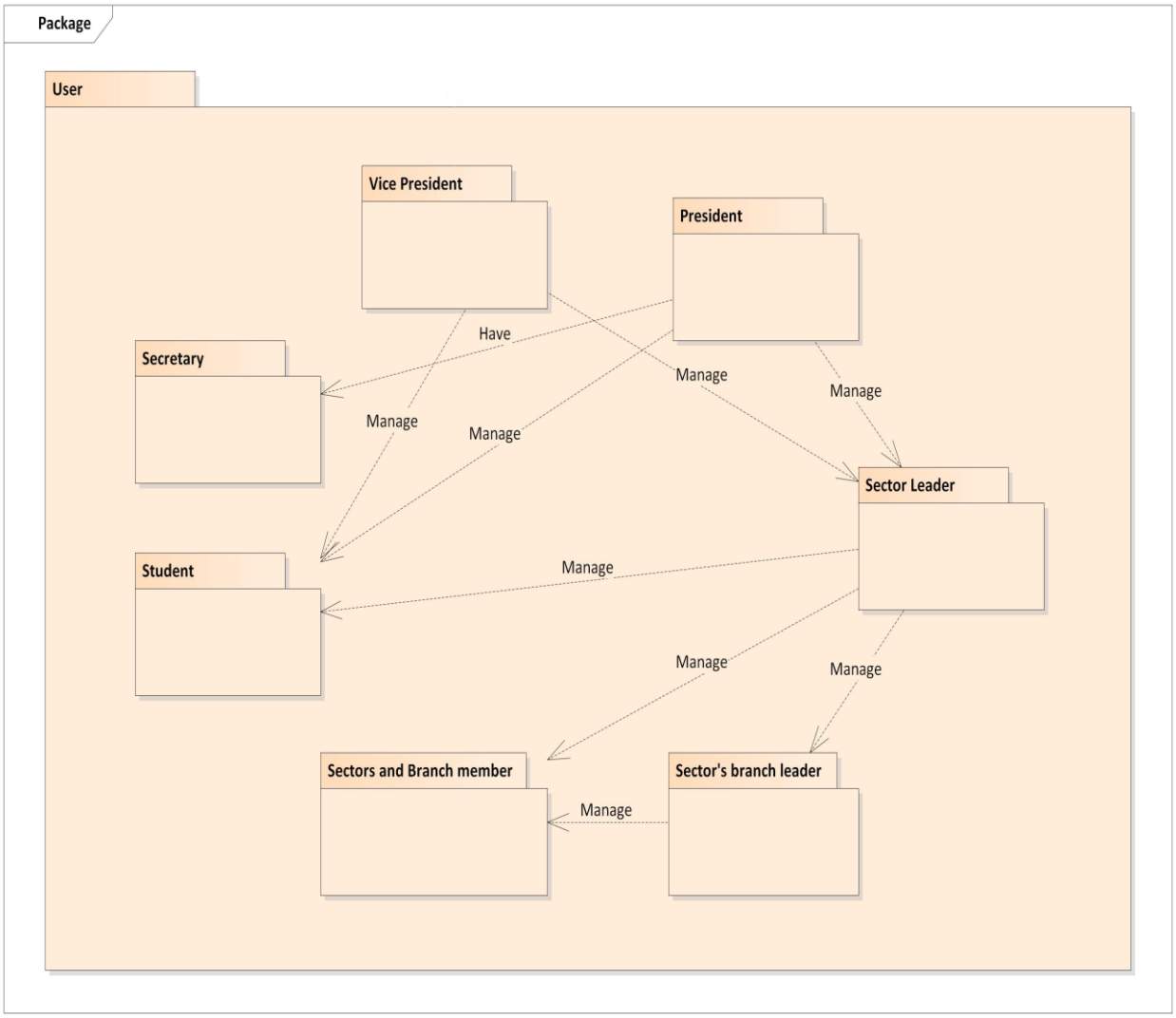


Figure 20: Packages

5.4 Algorithm Design

Algorithms are designed to show the flow of programs in the system. They are semantic driven rather than syntax driven. That means, the rule of syntax is not respected as other programming language but it has a complete meaning as that of syntax-based programming language. addition, Algorithms show the flow and steps of logic in each function. This design part is important in the coding part of implementation. Some of the algorithms are listed below.

- Login
  - Login page displayed.
  - **If** user Name and password is correct, **then**
  - **If** user is President, **then** system display president page.
  - **Else if** user is vice president**, then** system display vice president page.
  - **Else if** user is Secretary, **then** system display Secretary page.
  - **Else if** user is Sector leader, **then** system display Sector leader page.
  - **Else if** user is Sector's Branch leader, **then** system display Sector's Branch leader page.
  - **Else if** user is Sector and Branch member, **then** system display Sector and Branch member page.
  - **Else if** user is Student, **then** system display Student page.
  - **Else** user name and password is not correct, then system display error message and redisplay login page.
- Register
  - Home page displayed.
  - User click on Register
  - System display Registration page.
  - User fulfill its information.
  - **If** entered information is correct, **then** user information registered correctly.

Else user information is not correct, **then** system display your input is incorrect message**.**

5.5 User Interface Design

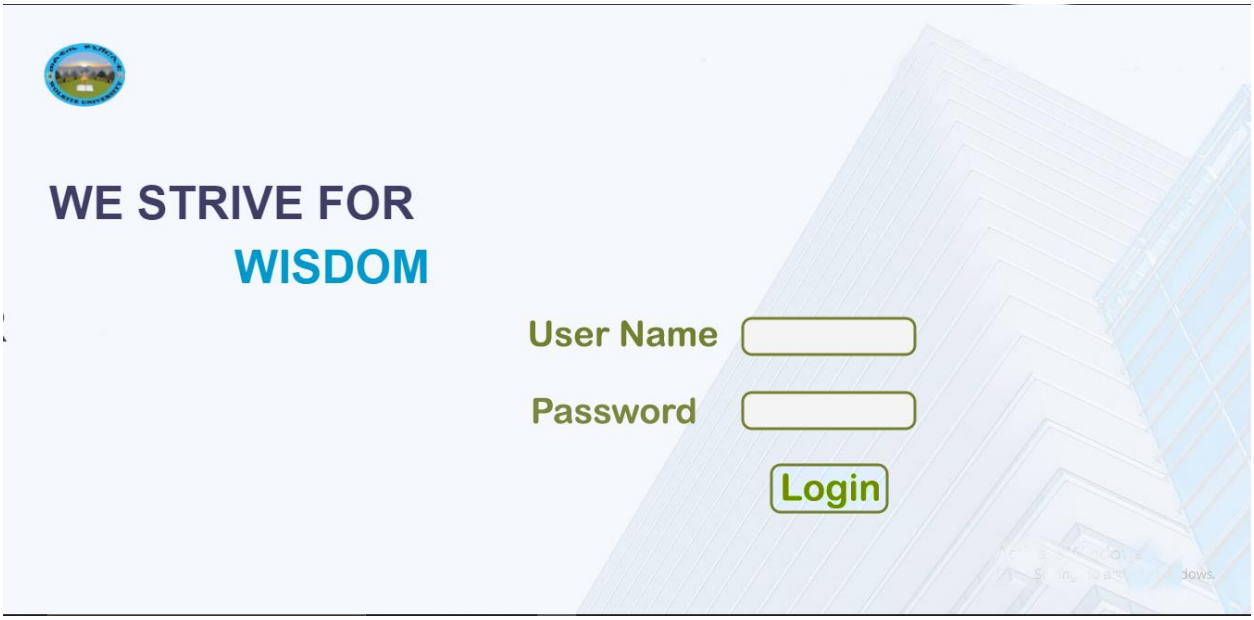


Figure 21: System home page

This is the home page for the system. In this page any of users can log in to their personal account using their username and their hidden password. For the successful log in the system leads to the appropriate page or the so called their profile

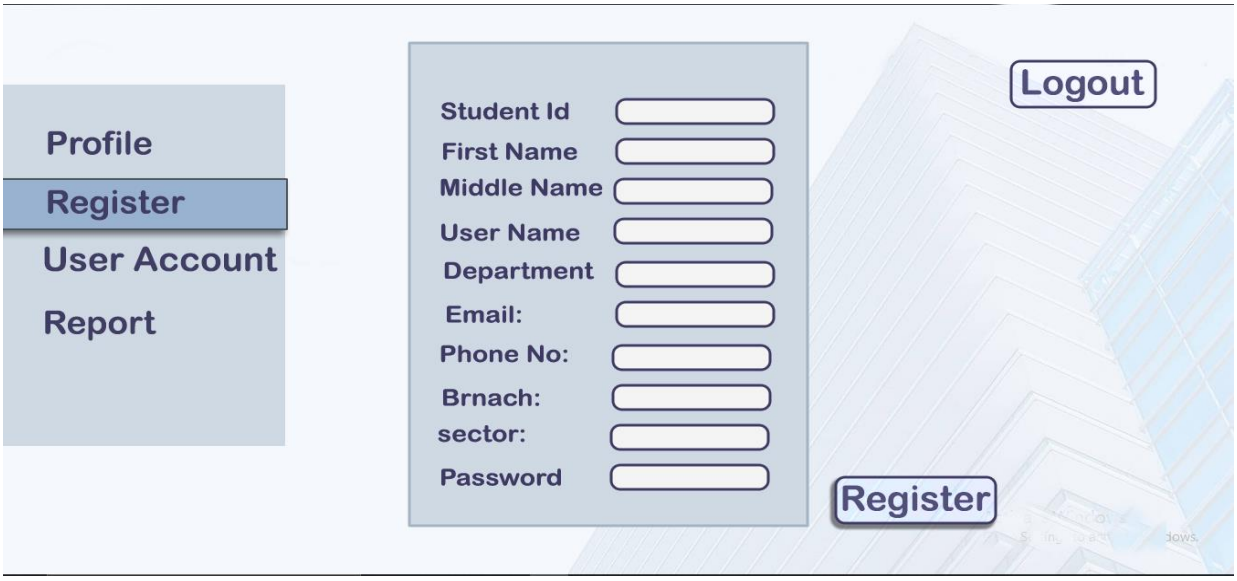


Figure 22: Registration

This is registration for those who are in task of registering members, branch leaders, sector leaders and others after the successful log in of higher staffs. After completing their task, they are expected to log out from this section.

CHAPTER SIX

6. IMPLEMENTATION AND TESTING

6.1 Implementation of database

Despite the fact that PHP can't store data by its own thereby a reliable database for storing information securely and being able to easily retrieve it whenever needed is required. MySQL is our first choice. As an open source Relational Database Management System (RDBMS) that uses SQL language, MySQL database helps to automate data retrieving and provide great support in PHP MySQL web application development.

Generally, we have used MYSQL for these best features:

- Cost-effective personalized PHP applications solutions;
- A complete open-source platform;
- Frequently updated (these updates are also available for free);
- Availability of various add-ons and plugins;
- Superior website performance;
- Vast amount of database interfaces;
- PHP checks various levels of security;
- Integration facility with various other open-source platforms;
- HTML Code can be embedded within PHP Code;
- Cross-platform ability;
- Server-side web programming language;
- Large user community.

We have created a database called SUMSDB, which have 10 tables.

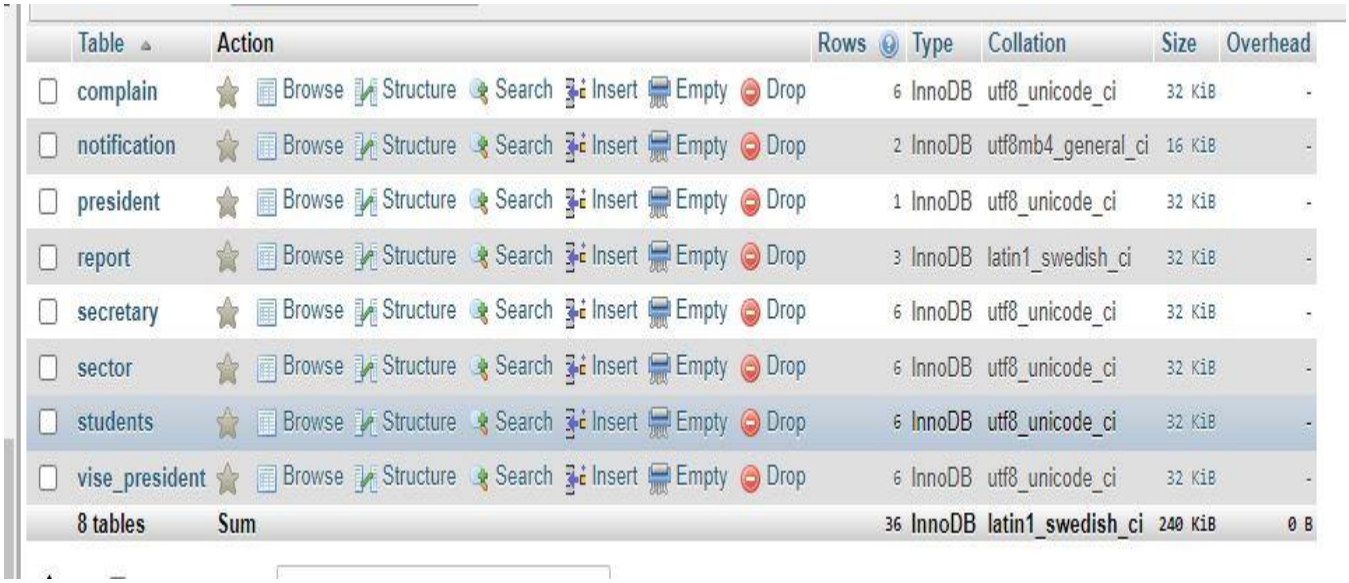


Table	Action	Rows	Type	Collation	Size	Overhead
complain	Browse Structure Search Insert Empty Drop	6	InnoDB	utf8_unicode_ci	32 KiB	-
notification	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16 KiB	-
president	Browse Structure Search Insert Empty Drop	1	InnoDB	utf8_unicode_ci	32 KiB	-
report	Browse Structure Search Insert Empty Drop	3	InnoDB	latin1_swedish_ci	32 KiB	-
secretary	Browse Structure Search Insert Empty Drop	6	InnoDB	utf8_unicode_ci	32 KiB	-
sector	Browse Structure Search Insert Empty Drop	6	InnoDB	utf8_unicode_ci	32 KiB	-
students	Browse Structure Search Insert Empty Drop	6	InnoDB	utf8_unicode_ci	32 KiB	-
vise_president	Browse Structure Search Insert Empty Drop	6	InnoDB	utf8_unicode_ci	32 KiB	-
8 tables	Sum	36	InnoDB	latin1_swedish_ci	240 KiB	0 B

Figure 23: Implementation of database

6.2 Implementation of Class diagram

- ✓ Implementation of class Account

```php
<?php
/**
 * @author Firew(pipa)
 * @version 1.0
 * @created 22-Aug-2021 10:32:03 AM
 */
class Account
{
    private $Age;
    private $Batch;
    private $Department;
    private $First_Name;
    private $Id;
    private $Last_Name;
    private $Password;
    private $Phone_No;
    private $picture;
    private $User_name;

    function __construct(){}
    function __destruct(){}
    public function createAccount(){}
    public function deleteAccount(){}
    public function Login(){}
    public function Logout(){}
    public function updateAccount(){}
    public function viewAccount(){}
}
?>
```

Figure 24: Implementation of class Account

- ✓ Implementation of class complain

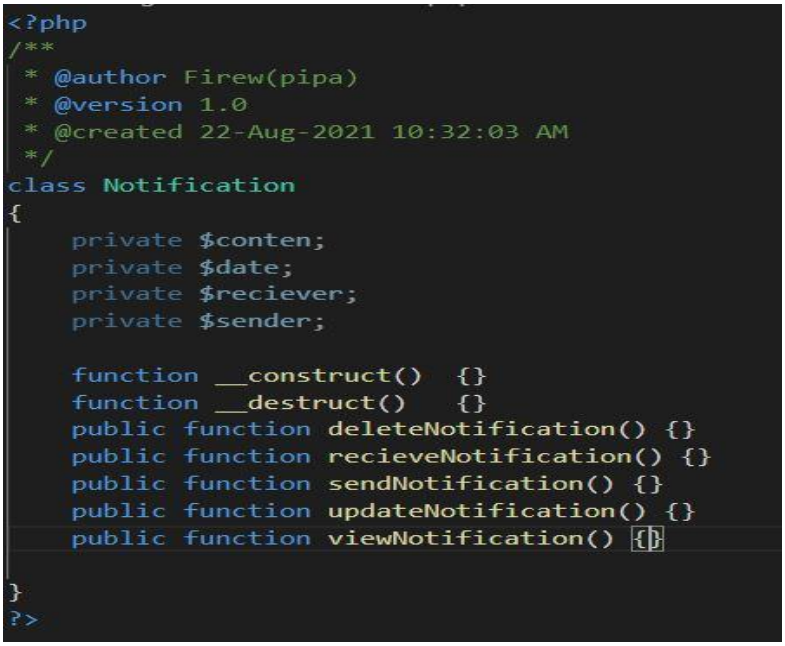
```php
<?php
/**
 * @author Firew(pipa)
 * @version 1.0
 * @created 22-Aug-2021 10:32:03 AM
 */
class Complain
{
    private $date;
    private $Id;
    private $reciever;
    private $sender;

    function __construct()  {}
    function __destruct()   {}
    public function delete()    {}
    public function resposeComplain(){}
    public function viewComplain(){}

}
?>
```

Figure 25: Implementation of class complain

- ✓ Implementation of class notification



```php
<?php
/**
 * @author Firew(pipa)
 * @version 1.0
 * @created 22-Aug-2021 10:32:03 AM
 */
class Notification
{
    private $conten;
    private $date;
    private $reciever;
    private $sender;

    function __construct()  {}
    function __destruct()   {}
    public function deleteNotification() {}
    public function recieveNotification() {}
    public function sendNotification() {}
    public function updateNotification() {}
    public function viewNotification() {}

}
?>
```

Figure 26: Implementation of class notification

6.3 Configuration of Application server

For the system, we have used XAMPP application server, which acts as local server with the following better features.

- XAMPP offers a major advantage of being compatible with a variety of operating systems. There are three different downloads available, for Windows, Linux, and macOS.
- XAMPP is a mere 149MB for both Windows and Linux and 158MB for macO which is relatively small in size.
- Most users find it much easier to install and configure XAMPP. Once you run the setup, the installer asks you which components you would like to install from the package.
- To help make the move from the local server to the live server even smoother and easier, you can use additional tools offered by XAMPP, such as:

    - ✓ Filezilla FTP Server
    - ✓ Mercury Mail Server
    - ✓ Apache Tomcat

Before it is started, the server is on the state ready as shown in the picture

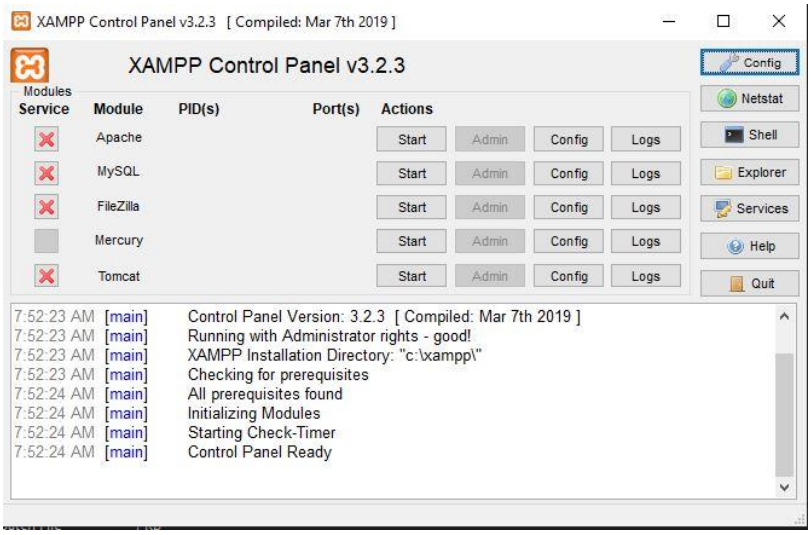


Figure 27: Configuration of Application server

When we need to start 'Apache' and 'MySQL' to access server services as shown in the picture below.

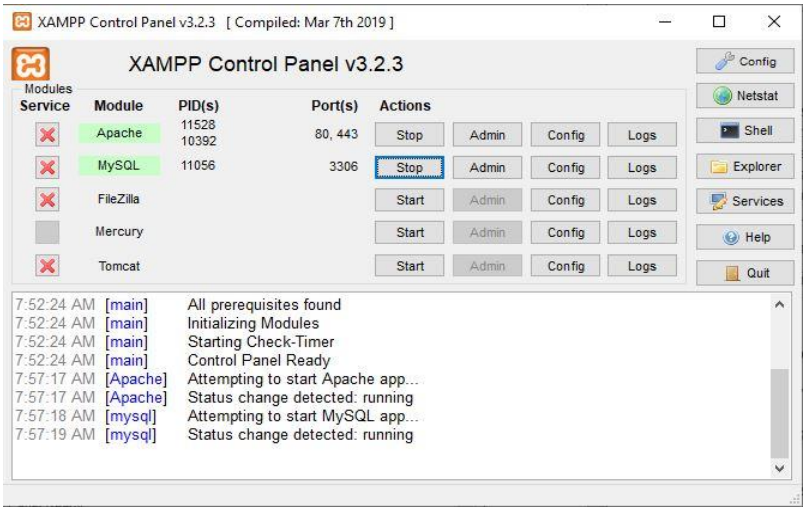


Figure 28: Configuration of Application server

As it is shown on the above picture, 'Apache' and 'MySQL' are correctly running.

After complete operation of the server services, we need to shut down those running servers correctly as shown in the figure below.

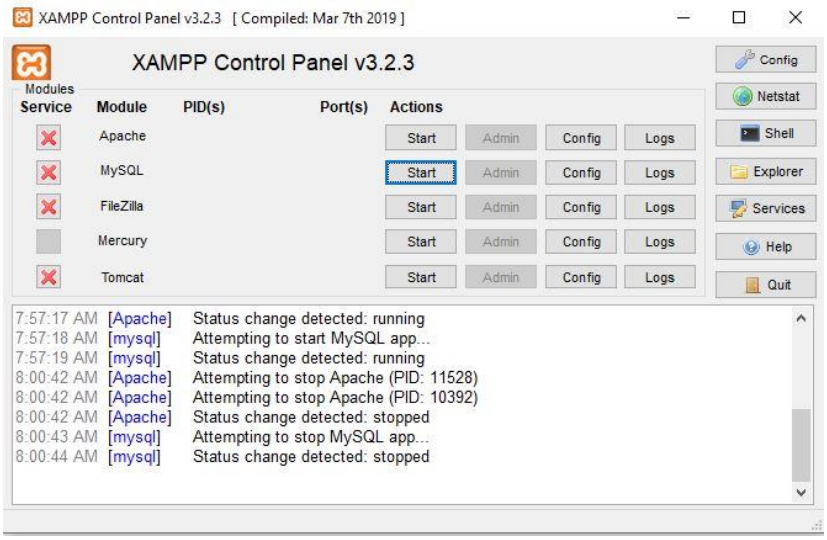


Figure 29: Configuration of Application server

Then we configure it with our code-igniter PHP framework in order to use it as base URL of the system which is **'http://localhost/'**

Folders and files in the server are arranged and organized in a perfect manner that explicitly shows which files exist in which folders or directories.

6.4 Configuration of Application Security

Form validation that are used in the system in order to prevent from storing the user wrong values are shown below.

```
<script>

function validate(){

 var error="";
var phone_no = document.getElementById( "phone" );

var phoneno = /^\(?([0-9]{3})\)?[-. ]?([0-9]{3})[-. ]?([0-9]{4})$/;
if( !phone_no.value.match(phoneno) )
{
alert("incorrect");
return false;
}


else
{
   alert("data successfully registered");
bb();
}


}
</script>
```

Figure 30: Configuration of Application Security

Implemented encryption

As we have proposed before, the encryption mechanism that we have used is MD5 for the stored password in the database. The following screenshot shows how we used the mechanism in the source code.

```
$passwordd  = mysqli_real_escape_string($conn, $_POST["password"]);
$passwordd  = md5($passwordd);
```

Figure 31: Implemented encryption

When it become stored in the database password index will have the following appearance.

Edit Copy Delete	189	Eyosias	Tesfaw	23	2147483647	software	president	Leader	1221	eyosi	52e3ddab6516e1e7edd92358166cdb85	4th year	Male
Edit Copy Delete	190	firew	meto	33	258963	software	vice president	Leader	269/10	meto	bfda57e801258d4ac36198faaf047d78	1st year	Male
Edit Copy Delete	191	yoni	eyob	22	2147483647	software	Health sector	Leader	6790	yoni	b1bd441640687fb9d62ce755d1b010d4	4th year	Male
Edit Copy Delete	192	estif	estif	23	2147483647	software	Discipline and good governance	Leader	2133	estif	1016194a11c2379c00b434e331f1694e	4th year	Female

Figure 32: database encryption

Defined roles of users in the system

Users of the system can login as the following manner:

- ✓ President
- ✓ Vice president
- ✓ Secretary
- ✓ Sector leaders
- ✓ Union members
- ✓ Student/complainants

User accounts and their privileges

- ✓ Account of the president provides the privilege to access dashboard for the president which contains mainly member management operations, president has also the privilege to send notification, report and update one's own profile
- ✓ Account of the vice president also provides the privilege to access dashboard for the vice president which contains member management, send notification and reports, and update one's own profile
- ✓ Account for the secretary provides the privilege to access
- ✓ Account for the sector leaders give the privileges for the sector leaders to access sector member management, reports sending and update one's own profile
- ✓ Account for the union members gives the privilege to student union members reports their intended progress of tasks and update their own profile
- ✓ Account for the students gives privilege for those students that have complains to register themselves and send them complain for all it may concern

Sessions

```
$query = "SELECT * FROM student_data WHERE user_name = '$username' AND password = '$password'";
$result = mysqli_query($conn, $query);

  if(mysqli_num_rows($result) > 0)
    {
     while($row = mysqli_fetch_array($result)){

   $stud_Id    = $row['stud_Id'];
   $fname  = $row['first_name'];
   $idPicture = $row['photo'];
   $lname = $row['last_name'];
   $sec  = $row['sector'];

   $_SESSION['sector'] = $row['sector'];
   $_SESSION['first_name'] = $row['first_name'];
   $_SESSION['last_name'] = $row['last_name'];

   }
```

Figure 33: Sessions

6.5 Implementation of User interface

In order to make the system easy and attractive, we have applied some features that are listed below:

- Simple and light colored pages
- Descriptive components
- Consistent design throughout all pages

Members of the student union would got the following page, which directly lets them sign in.

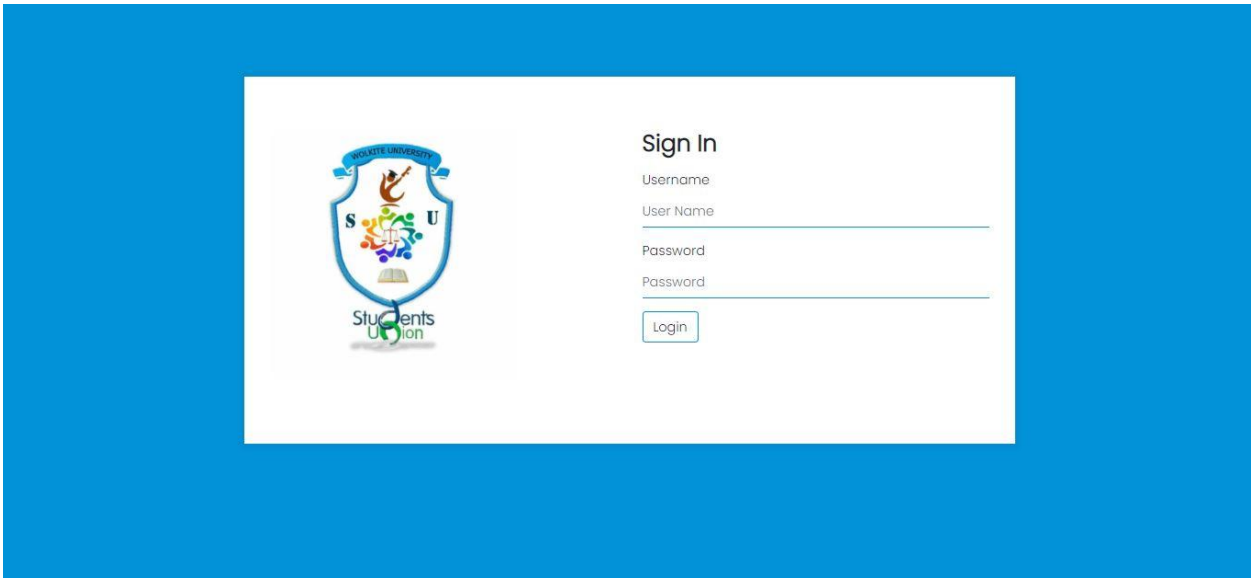


Figure 34: login UI

After a successful log in president will be provided with the following page

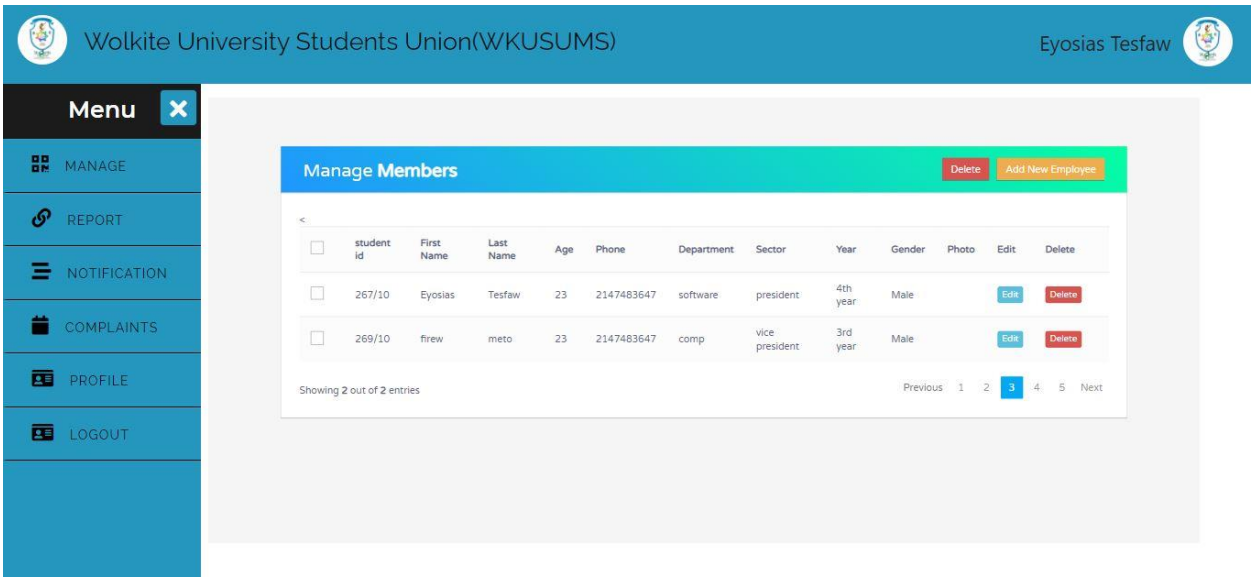


Figure 35: homepage UI

6.6 Testing

In order to meet end users' satisfaction and ensure the quality of the system, we made a test. Out of the two type of testing, we have chosen the manual type where testing process takes place with manually executed test cases.

In this testing section, reader of this document will find more on the way in which system is tested and what techniques were used to do so

6.6.1 Unit Testing

In this type of testing, individual units of components have been tested during the development of the system. By doing this, we were able to fix any kind of errors and validate that each unit of the software code performs as expected.

We performed unit testing for the following reasons.

- Unit tests help to fix bugs early in the development cycle and save costs.
- It helps us to understand the testing code base and enables them to make changes quickly
- Good unit tests serve as project documentation
- Unit tests help with code re-use. Migrate both our code and our tests to our new project.

6.6.2 Integration testing

In this level of testing, we have examined those logically integrated modules achieving their common task of the sub system. We have used this level of testing to expose defects in the integration among those software modules when they are integrated.

So as to achieve this level of testing we have used bottom up integration testing strategy in which the lower level modules are tested first. These tested modules are then further used to facilitate the testing of higher-level modules as long until all modules to the top level are tested.

For better understanding we brought the reader below some examples that we have been using throughout the integration testing.

Test id	Test case objective	Test case description	Test case result

Int_1	Check the interface link between the log in and president dashboard module	Enter login credentials and click on login button	To be directed to president dashboard
Int_2	Check the interface link between the president dashboard and manage member module	From the president dashboard select manage button	To display manage members table

Table 10: Integration testing

6.6.3 System Testing

After the complete test of the integration system testing had been took place, which generally validates the complete and fully integrated system. As it falls under black box testing category, we have tested the external working of the system, from the users perspective.

We have made system testing to:

- Verify thorough testing of every input in the application to check for desired outputs.
- Test the user's experience with the system.

Nowadays, there are more than 100 types of system testing and we have tried to make very little of them due to the shortest time we have got and most of them are not fatal that much.

6.6.4 Usability testing

For this purpose of testing, we have chosen some students randomly then let them try whether they can understand the system easily or not and they respond that it is easier even in their first sight. We also let those student union numbers for its usability and user friendliness and their response was beyond our expectation.

6.6.5 Functional testing

It took place to test for the completeness of system whether

Test_1: authentication of log in attempt

Assumption: redirects to home.php		
Test data ✓ User name (valid user name, invalid user name, empty) ✓ Password (invalid password, valid password, empty)		
Steps to be executed	data	result
Empty User name and Password filled and Click login button	Empty data	Username field is required Password field is required
Enter invalid username and password	Email or password that doesn't exist in users table	Account doesn't exist.Please try again
Trying to access home page by directly writing the path	http://localhost/index.php	Yore are not logged in!
Enter valid username and password and click log in button	Email and password that matches	Redirects to index.php

Table 11: Functional testing

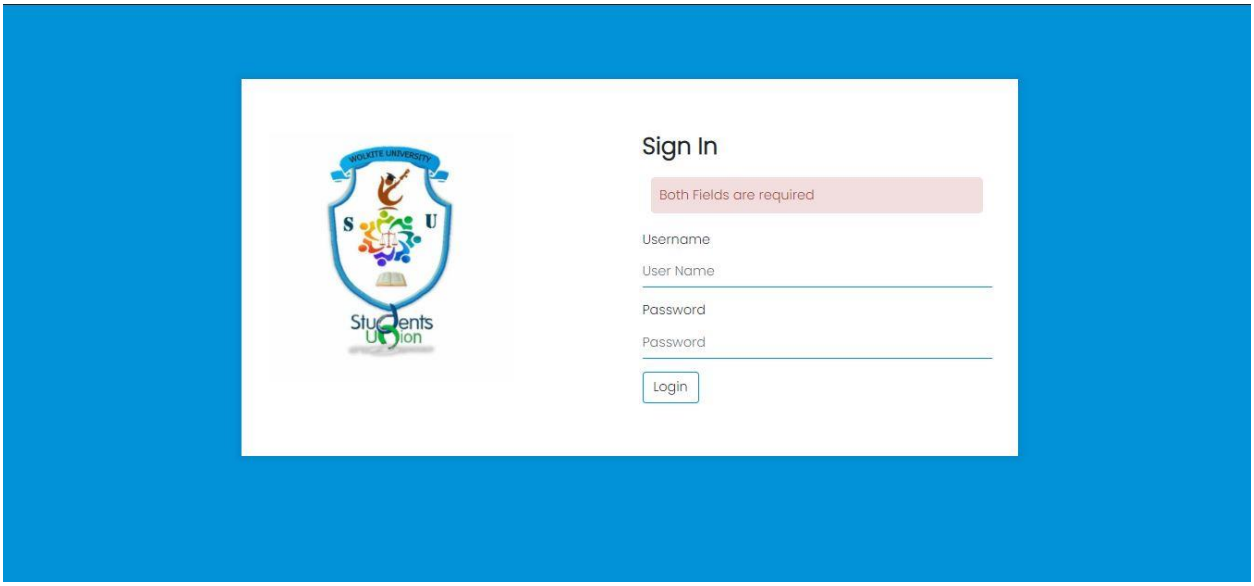


Figure 36: validation

Test_2: validation of user input

Assumption: register members and return success message		
Test data ✓ Id number (valid, invalid) ✓ First name (valid, invalid) ✓ Last name (valid, invalid) ✓ Age (valid, invalid) ✓ Department (valid, invalid) ✓ Email (valid, invalid) ✓ Phone_number (valid, invalid) ✓ Username (valid, invalid) ✓ Password (valid, invalid)		
Steps to be executed	data	result
All empty fields and click register button	empty	All fields respond “Fields are required”
Enter one of the field with empty field and click register button	One of the fields empty	Field with empty value will respond “field is requires”
Enter invalid phone number and click register button	Invalid length of phone number	Field will respond “invalid phone number”

Table 12: validation

CHAPTER SEVEN

7. CONCLUSION AND RECOMMENDATION

7.1 Conclusion

Wolkite University Student Union Management System is a web-based system, which mainly will be implemented in the student union environment in order to ease the routine tasks that the members and the union administrative used to perform manually. In addition to the union members, the campus students are also users of the system. Despite the shorter time we have, we have tried our best to satisfy the end user and to achieve those objectives that we started upon.

The system we built have good performance with better security and attractive UI. With this system the users can enhance their routine tasks effectively and reliably.

It was wonderful and learning experience for us while working on this project. The joy of working and the thrill involved while tackling the various problems and challenges gave us a feel of the professional world.

By and large, we extremely expect that this system will have a great role in effective management of the union.

7.2 Recommendation

It is known that the university is increasing its advancement in technology areas and the student union is having more tasks to do. This increases the need for such kind of systems with more applications and wide domain area. We as system developers, highly recommend that there should be a little bit modification on this so as to deploy the system.

If anyone who has interest in making advancement on the system, we suggest the usage of php that we have used to develop. By using php, a developer can easily do operations and integrate with MySQL database.

REFERENCE

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