



WOLKITE UNIVERSITY
COLLEGE OF COMPUTING AND INFORMATICS
DEPARTMENT OF SOFTWARE ENGINEERING

Web Based Election System for Wolkite University Student Union

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Thursday August 23, 2021

WOLKITE UNIVERSITY
COLLEGE OF COMPUTING AND INFORMATICS
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**Project on Web Based Election System for Wolkite University
Student Union**

Submitted to Department of Software Engineering in Partial Fulfilment of the
Requirement for the Degree of Bachelor of Science in Software Engineering

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DECLARATION

This is to declare that this project works that is done under the supervision of Mr. Belay A. and having the title Web Based Election System for Wolkite University Student Union is the sole contribution of: Nigussie Sefinew, Wondimu Anito and Ephrem Tesfaye. 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 the violation of this declaration is proven.

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APPROVAL FORM

This is to confirm that the project report entitled Web based election system for wolkite university student union. Submitted to Wolkite University, College of Computing and Informatics Department of Software Engineering by Nigussie Sefinew, Wondimu Anito and Ephrem Tesfaye is approved for submission.

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First of all, we would like to thanks the glorious and almighty GOD for help us to be alive, to do all and to be here today. We have special tanks to our adviser Mr. Belay A. for guiding us, correcting our mistake, constant supervision, encouraging us to do more and providing necessary information regarding the project. We have also so many tanks for wku class representatives, instructors, and members of wolkite university student union for helping and giving essential information about the existing system.\

Executive summary

Election is taken every two years in Wolkite university student union manually. But this process faced for many problems such as lack of election advertisement for students, loss of time for

election process and loss of money and effort. WKU student union is one of the sub institutions in the campus in this institution voting system has been used manually for last 9 years. Since the process is manual form only class representatives attend for election. To solve this problem, we have proposed a new automated system which used as online election process for selected voters. This system has many benefits for voters, election committee and others who use the system. Such benefits reduce work load for election committee and voters, it increases security, it displays result accurately for candidates and voters.

LIST OF ABBREVIATIONS

Acronym	description
APR	April
CGPA	cumulative grade average
COVID	corona virus disease
CPU	central processing unit
CSS	cascading style sheet
DR	doctor
EC	Ethiopian calendar
GB	gigabyte
HTML	hypertext markup language
ID	identification
MAR	march
MYSQL	structured query language
OOP	object oriented programming
PHP	hypertext pre processor
REQ	requirement
SU	student union
UML	unified modeling language
WAMP	windows apache mysql php
WKU	Wolkite university

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CHAPTER ONE

1. INTRODUCTION TO THE PROPOSED SYSTEM

1.1 Overview

Student Union is sub institutions of university, so as to connect students to the higher administration of university and it is a central part of universities of learning and serving as an interface between the students and management in the administration of the university voting at university level is a process by which voters(students) vote their representative(candidates) during election to lead them. To provide peaceful voting in free, fair and regular election, so that we would like to design automated online student union system for Wolkite University

1.2 Background of organization

Wolkite University which was generated in 2004 EC or 2012 in Gregorian calendar and one of the third generation universities in Ethiopia found around 160 kilometers south west of Addis Ababa. The University began its formal activities at Wolkite town with the appointment of the first president, Dr Admasu Shibru Have a vision to expand quality of higher education in the county Ethiopia.

The university is working to become research institute for different areas of field of studies. In the university there are different management activities that are performed. Among those activities Wolkite University Student Union is one branch of institution Which have an activities voting the leader of Student union and display the result for voters and candidates. In this process there is a problem to participate in voting, to advertise the election for the students and to address the result for voters and candidates. So we have a plan to initiate an automated system to identify and analyze problems and to find solution

1.3 Statement of the problem

As we have collected requirement from WKU student union, the current WKU student union used manual election system and distribute information about election process by manual system such as write a collection of sheets paper and to post on to different place on boards and on block of

walls. The existing system is used a manual registration of candidate, election committee and voters so this will increase covid19 and the system has The following problems

Lack of security: When we see the process of election There is miscounting of ballots for each candidate like cheating and frauds of the number of election card to win the election for example when voters vote their representative someone can increase the number of sound for some candidates. who wants to elect. So as to tell the result for voters and candidates it will take from 2-3 days so as to arrange election results as a result there is a wide condition for cheating.

Time and resource consumption since the system is manual They lose 3 days for processing the election ballot and they waste papers. Both voters and candidates must meet at the same area therefore not only time and resource they lose also amount of money. To collect election result from voter's more than 3 days are wasted not only time material resources are also required.

Lack of information WKU student union election process, advertisement, report result and strategies of candidates are not addressed in free, fair and regularly for students and candidates because the system is manually.

During the election time there is crowded of voters in order to vote, they must wait and spent their time so as to give their voice.

communications: There is lack of communication between election committee, voters and candidates when candidates want to address their strategies for all students, voters want to receive full candidate's information to estimate and plan to vote their leader.

Advertisement students are addressed the election period by scattering sheet of paper on different boards, blocks and cafeteria therefor most students are not addressed because most students does not have a habit of reading those papers. Voters and candidates does not have evidence to check who were winned the election simply. They accept the approval of election committee.

1.4 Objective of the project

1.4.1 General objective

The main objective of this project is to develop an automated election system for student union of Wolkite University.

1.4.2 Specific objective of the project

In order to achieve the general objective, we perform some specific objectives which are used to solve problems in the statement of problem

- To study and analysis the Existing system
- To identify functional and nonfunctional requirements.
- To Design front end and back end of proposed system
- To implement front end and back end of the system with easy user interface for end users
- To test and evaluate the proposed system.

1.5 Feasibility analysis

The feasibility study aims to provide answers to a number of issues such as is it easy to operate? Does the return on investment justify the project and running costs? Is the system easier for maintenance? Is the system compatible with the legal, political and social requirements of society?

1.5.1 Economical feasibility

The current existing system we used for student union election results in enormous expenditure on prices of paper, pen, time and other costs due to improper mechanism to deal with the customer information. Therefore, we have proposed a new automated system to solves additional requirements and expenditure. Therefore, the new system is economically feasible. The purpose of studding economic feasibility is to identify the financial benefit and cost associated with the development of new project. Economic feasibility addresses some benefits

Tangible benefit

- It Increase speed of activities and cost reduction.
- The automated system reduces error occurrence during election and counting of ballots
- It simplifies managing process.

Intangible benefit

- Initiate employee moral effectiveness of work flow
- It reduces the work load of employee

1.5.2 Operational feasibility

The proposed system is operational feasible because we have obviously interviewed some of the students (voters), student union and election committee are happier on our proposed system based on decreasing work load on them and saving their time to vote quick and easy and they promised to support and to stand on our weak side on developing this proposed system

1.5.3 Technical feasibility

The proposed system is technical feasible because the requirement that we used for proposed system is from the existing system and our proposed system is possible to access one server by electronics device .in additional our team choices the language html, css, java script and php this language make our proposed system technical feasible

The system is available for students with their electronics devices like mobile and computer. Group members are technically familiar with programming language (php), for design interface (html), for style sheet css and for information database MySQL. The system is available for windows.

1.6 Scope and limitations of the project

1.6.1 Scope of the project

The scope of the proposed system is an automated and computerized voting system for WKU student union.

The scope that the proposed system works are:

- Candidates and voter's information are stored by system's database
- The system allows voters to register and create their account
- Election committee will be registered on in the system by themselves
- The system count balloon and display the result
- The system able to set the starting and ending date of the election by the admin
- It displays the result of winner candidate

1.6.2 Limitations of project

The proposed system does not support the following things

- The system does not support People that do not have wolkite university students Id
- The system does not support federal election
- The system does not support mobile phones that can't browse website

1.7 Significance of the project

There are many significances of our proposed system some of them are listed below

- It reduces time for ballot counting
- It reduces resource usage registration, posting report and advertisements will take by the system
- It could be secure, faire, free, and periodic for security we will use md5 algorithm
- Since voter's candidates and committee are on their own environment, it reduces chance of conflict
- All system users are not mandatory to meet together so it decreases spread of covid19
- It reduces cheating and prevent voters who try voting more than once because voters are registered on database so admin will check who votes in election process
- The system can validate candidates and voters with their full information

1.8 Beneficiary of the proposed system

There are many people who will be benefited from the system such as

- Candidates can know the election is legal so they will be benefited because cheating will be minimized
- The student union save money and time to establish the process of election
- The student union can advertise election date online
- Developers will be benefited from this project to improve ability of requirement gathering, design the system coding skill
- Students have benefited from proposed system since they can elect without any loss of time and resource

1.9 Methodology of the project

We would follow the following procedures to achieve our proposed system in considered time and cost this same of the procedures are listed below:

1.9.1 Data collection techniques

In order to get good requirement of the existing system we used different method of the data collection same of them are listed below:

Document analysis: we use earlier document to achieve the proposed system easily and to get more information about the project (MoE, 2004). According to MoE candidates have the following business rules must have CGPA 2.75 and above, free from any discipline problems and think as rationally

Interview: we interview 15 class representatives (voters) and 3 members of student union to get the basic information about the problem associated with that environment (kinfe, 2021).

1.9.2 System analysis and design

There is different system analysis and design methodology. From those we are selected object oriented system development methodology because our proposed system has many benefits from them some of them are listed below

Increase understandability: the system structure is easy for developers because we have used object oriented model and tools used to represent real world objects

Increase Reusability: The system gives opportunities to reuse based on the concept of inheritance, polymorphism, encapsulation, modularity, information hiding, coupling and cohesion

Increase Extensibility: The classes have both attributes and methods when a new feature is added to the system required to make changes in only one place that is application class.

Improved quality: quality systems have several quality measures in terms of time, budget and exceeding user expectation

Modification: modification of the object implementation is easy because objects are loosely coupled

1.9.3 System development model

From different software development models, we will use iterative model

Because if any new requirement comes from users we can go back to add any new feature easily. Therefore, we follow the following steps

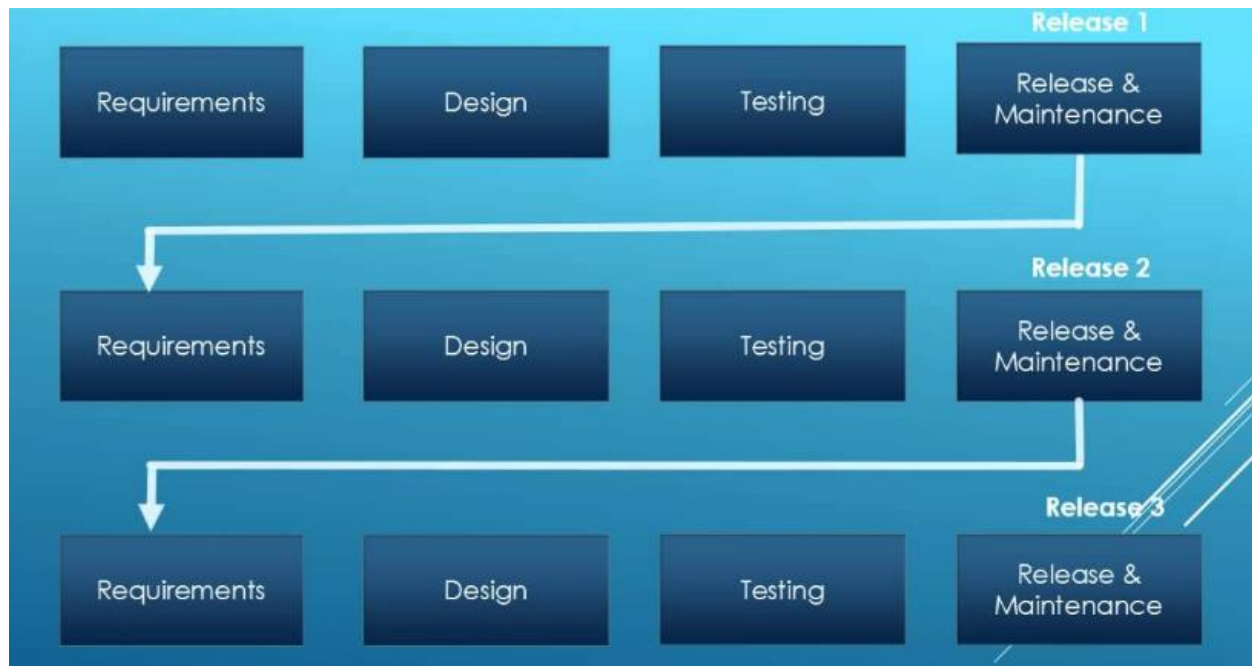


Figure1. 1 Iterative model

Requirements: In this step we gather requirements from wolkite university student union members and university class representatives and analysis those requirements.

Design: Based on new requirements we modify the design without affecting the first requirements and designs. When we are at design phase and some requirements are available then we will turn back to requirement phase

Testing: Since we follow iterative model and perform some modifications, we test the developing system using unit testing.

Maintenance: we update and maintain the proposed system if some new features are available

1.9.4 System testing methodology

1.9.4.1 Unit testing

This testing is done at source code level for programming errors such as bad syntax, logic errors, or to test particular functions or code modules. In unit testing we will test like

Check whether the return type of functions is correct.

Check the efficiency of code with respect to the memory and CPU time.

Check how the sub procedures or functions are called correctly.

Check if the correct output is produced for different inputs

1.9.4.3 System Testing

In this process we will test how the sub systems work together to achieve the desired goal

1.9.5 System development tools and technologies

1.9.5.1 Front end technologies:

Table1. 1 Front end technologies

No	Name	version	Reason
1	html	5	• It promotes accessibility • It supports video and audio. It allows for improved interaction
2	Bootstrap	4	• Adding navigation customization options • Adding responsive spacing and sizing utilities • Improved form styling, buttons, drop-down menus, media objects and image classes

1.9.5.2 Back end technologies

We will use PHP7 because it improves performance twice than oldest versions, it reduces memory usage, it consists 64bit support and we will use MySQL server version 3.0.6 software so as to store data because it is technically easy for group members because members are familiar with php and MySQL

1.9.5.3 Documentation and modeling

We have used word 2016 for writing a document, power point 2016 for making presentation excel 2016 using gannt chart for making time schedule, and Enterprise Architecture for modeling

1.9.5.4 Deployment environment

After completion of the system we will deploy for Wolkite university student union

1.11 Document organization

The proposed system contains five chapters each chapter describes their own content

Chapter one includes introduction, background of organization, statement of problems, objectives of the system, feasibility, scope and limitation, methodology and budget

chapter two this chapter will describe that the existing system will looks like who will use the existing system major functions and drawback of the existing system

Chapter three this chapter will describe in detail about the proposed system functional and nonfunctional requirements of the new system

Chapter four it will describe analysis of the proposed system, use case model with description of use case and dynamic model of the system

Chapter five System design which includes overview of the system, design consideration, design goal, design tradeoff, the architecture of the system, subsystem decomposition, persistent data management and user interface design

Chapter six implementation or coding of proposed system

CHAPTER TWO

2. DESCRIPTION OF THE EXISTING SYSTEM

2.1 Introduction of existing system

The existing system of Wolkite university students' union voting system is still processing its election activities through manual way. They use writing a collection sheets of the papers to post on different place in the campus like on the boards, a block of walls and in the cafeteria to distribute the information to voters and candidates during the election. After reading the distributed information candidates can register for competition.

During the election, wku students' union uses a manual registration of candidates in order to get president, vice president and the main secretary, registration of election committee in order to protect the process from early time until the release of result and registration of voters in current case these are representative of each class in the campus in order to vote their leaders.

After accomplishing above all, the election is performed in one hall which must contain voters (representative of each class in the campus), election committee (they are seven election committee three of them are from student union, one of them is from deal of girls and the rest of them are from parliament) and candidates (they are eight candidates each of them advertise their strategies to the parliament in the hall). After knowing their strategies, the voters take the ballots to choose what they want. And then election committee collects the ballots to count who win the election. Counting this is very boring and tedious to election committee. After knowing who win the election they posted all candidates results in manual around the campus after three or more days. The candidate whose result is first higher he/she will be president, the candidate whose result is second higher he/she will be vice president and the candidate whose result is third higher he/she will be secretary.

2.3 Major functions of existing system

In Wolkite university most offices work manually from those parts Wolkite university student union, system can be performed manually such as, register voters and candidates, cast vote, display result and generate report all those activities are performed manually. Some functionalities are listed below: over all voting related registration, information exchange and announcement can be announced through manual by using hard copy. During voting day, the voter can appear on election

and vote the student he/she want, candidate mostly can announce themselves on the voting day in the form of presentation, After the voting time is ended the election committee can count the voter sound and display the result after the election complete to the student community in the university, finally the candidate which win the voting can serve for two consecutive years the student community in the university. There are a number of activities that need to be preserved. Those activities are listed below

Registration: Wolkite university student union registers election committee, candidates and voters for election of wku student union representatives

Election committees: they are members of parliament who are registered by student union administrator. They must fill some business rules and have experience before

Candidates: they are regular students who are registered by election committee based on the given criteria's

Voters: they are class representatives from all colleges who are selected by students in the class and the become members of the parliament and they elect candidates based on their strategy

Announcement and result

Post the result: after the amount of voting result is counted, election committee announce the result and who are selected as a leader of student union. The first winner approved as president, the second winner selected as vice president and the third selected as secretary.

Announce candidate and election date: Announcements are imposed for both election committee and election administrator. They post the news that announce the student and voting day, the day, the registration day is started and ended.

Cast vote: The voter who are registered to vote are cast vote on the day of voting by going to station that voting can be held.

2.4 Forms and other documents of existing system

There are a number of forms and documents for existing system which shows the number of candidates and elected candidates which are listed below. The first figure indicates that the process of election performed by voters, the second figure indicates the number of candidates who are

come to the parliament and to be elected based on their strategy, the third figure indicates the three main representative's president, vice president and main secretary who are elected from figure 2.2

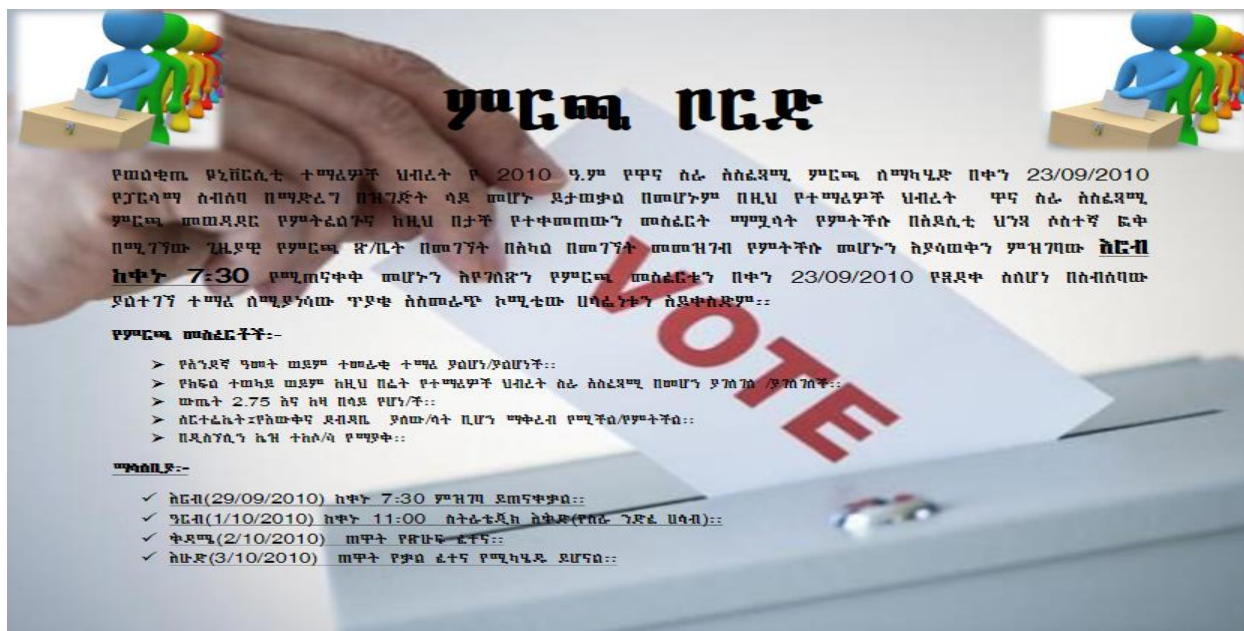


Figure2. 1 Election form



2.5 Drawback of existing system

Since the existing system is manual, it is much time consuming to perform activities such as to register the voters, to cast vote, to display result, to candidate announcement and to give feedback this is not suitable for a user with high ambitions. The existing system take high cost of creating physical archives, buying resources and archiving materials that are needed for voting environment this is drawback of existing system.in additional it has the following drawback:

- Use more human power: -because the system is not computerized so, it uses more human power to give service.
- There is duplication of data: -because of the data is not well organized and structured.
- Searching and getting available information for the user is difficult, it takes long time to get and it is boring to search.
- The data may be expired after a long period of time since it is simple put on hardcopy.
- The existing system need cost of creating physical archives., cost of photocopying and fax, cost of managing and archiving documents in physical environment, and cost of buying writing materials such as pen, paper, and etc.
- When mistakes are made or changes and corrections are needed, the action must be redone rather than updating it. This leads the work efficiency to low.
- Fraud and cheating occur during the voting, because of poor security system since one can get easily the document and change whatever they want and loss of information etc...
- The current voting system of WKU student union elections are lack of distribution of information for all voters equal. In existing system, the distribution of information is done on different place in the campus like on boards and on block of walls, but most of the students could not have the habit of reading notice or accessing information from board.
- There is crowded of voters in order to vote they must be waiting and spent their time in order to give their voice. Multiple voter cannot cast vote simultaneously on the same ballot box. As a result, there is one operation at a time.

2.6 Business rules of existing system

Business rules are any principles that a system perform or actors perform to establish the goal. In our system candidates, voters, committee and admin must fulfil some business rule we list those rules for each actor

Business rules for election committee

- They must register to process the election
- They must be free from any corruption
- They count the result clearly and carefully

Business rules for voters

- Voters must be students of Wolkite university
- First they must be registered in the system
- They are class representatives
- The voter must come in the given schedule to register and cast

Business rules for candidates

To participate as a candidate, they must full fill the following criteria

- They must be class representatives or former executive officer of the union
- The candidate CGPA must be equal to or greater than 2.75
- They must be free from any discipline records
- They must communicate at least two languages English and Amharic
- The candidate must be equal to or greater than two years excluding graduate students

Business rules for Administrator

The administrator should manage the system and give accesses users as per their priority and privilege to the system and update the password.

CHAPTER THREE

3. DESCRIPTIONS OF PROPOSED SYSTEM

Proposed system is the system that we are developing it. This is automated and computerized system which replaces the manual existing system so as to solve most problems of existing system. This proposed system has the following users(actors) who involve on the proposed system.

Administrator: Announces for students to participate as election committee by reporting for all students online. He/ She registers election committee who has experiences and controls users account

Election committee: They are registered by administrator and establish many activities such as they examine candidates written exam out of 10%, interview 10%, certificate 5% and check their strategy out of 15%.

Candidate: Candidates are members of regular university students who full fill all business rules of higher minister of education. They are approved by chairperson of election committee. Students must be registered in the system by election committee so as to participate as candidate browse their strategy in the system.

Voter: These are actors who are applying to vote representatives in the election system and those are regular students that learn in the university. They are registered with the fulfilment of some criteria's. They can view information and the system will allow voters to view on announcement the candidate's information election results, and cast vote

3.1 Functional requirement

Functional requirements are any activities that are established by the system. Actors involve a lower of events or actions we called that functional requirements. They are building blocks of other requirements and they explain and interaction between the system and the users. Simply functional requirements determine what the system can do as well inputs the behavior and outputs of the system. The proposed system has main goal of student union web based voting system. We will follow some steps to accomplish this goal. The requirement specified are helpful to clearly understand the scope and the objective of the system. The proposed system has the following functions.

- **Register:** The system will allow to register election committee and voters based on their perspective web page.

- **Login:** The system allows administrator, election committee and voters to login after they are registered.
- **Post announcement:** The system generate reposts like candidate information, election date, registration date, election result so as to aware for all members of the campus.
- **Mange user:** The administrator controls accounts of actors in the system such as creates, delete, update and search the account to the chairperson, candidate and delete accounts of voter from database after election.
- **Cast vote:** The system allows using users' friendly and dynamically interactive online election system.
- **View result:** The system will allow voters to view posted information after election is completed.
- **Approve chairperson:** The system allows administrator to approve chairperson of the campus.
- **Evaluate:** - chairperson of election committee can evaluate the candidate and fill the value of candidate that he gets from test, certificate, strategic plan and defense from 40%..
- **Logout:** The system shall allow administrator, election committee and voters can logout to the system
- **View notice:** all user of the system are capable to see the notice that released on the system

3.2 Nonfunctional requirement

In these section we will describe the ability of the proposed system how it performs the defined task while doing the task

3.2.1 User interface and human factors

The proposed system will provide easy and understandable user interface for the system user. Because we will design the interface considering the system user skill and their preference. The system will not take long time to training because each element in the interface is labeled with message that will guide the system user what it means when user hover on the button or link. The system will create the default in order to reduce error and burden on the user. The system will create consistency and common user interface elements in order to facilitate efficiency and to make users more attractive and comfortable to get things that done more quickly. The system carefully

thinks humans by taking the correct focus pixel and giving normal style for its interface and elements of interface that means assigning good background color, good contrast and good light.

3.2.2 Hardware consideration

The proposed system will run on a device computer with processor more than 2.4GHz, Ram more than 4GB and smartphone that can browse website.

3.2.3 Security issues

The system provides users access control by means of providing client side login and server side authentication through the data base. And all authentication will be saved on local device for comparison and need user permission to gain access. Access permissions for the particular system information may change by the system's data administrator.

- The system will more secure based on the unique voter id, password and their username.
- The password is not visible to any attacker because it is encrypted by using MD5 algorithms.
- The voters' password should not be less than eight characters it is important to prevent social engineering attacks.
- All field entries are validated before reaching the database.
- The store data is compared with current data to identify authorized voters from those unauthorized voters and to prevent duplication of the voters' id in the database

3.2.4 performance consideration

The system that we are going to develop is web based, which has efficient code manipulation and clear database this data base allows us to use reusable components it renders a lot faster that means not more than 2.5 second.

The delivery response time of the system to voters should be very fast because the system operates in latest version browser like opera, chrome and Firefox. The system announces all information to the system users as soon as posted by administrator.

3.2.5 Error handling and validation

The system prevents error by displaying the message box that warns the users who are going to do wrong activities. It validates users input by allowing limited characters and symbols in client side that means by using front end technology like JavaScript it is important to reduce work load in back end. It will compare stored data with current entries data through session to identify if entered data indicates authorized users

3.2.6 Quality Issue

Reliable: - The proposed system is reliable and will have quality since users check the implementation of this system and they give comments how we can simplify the system for users and it will give correct functional responses to voters without error. It shall perform its intended function adequately for a specified period of time and defined environment without failure.

Available: - The system should be available to access at restriction date and time. The system is available anywhere in the campus but it restricts only students to vote by using their id.

3.2.7 Backup and Recovery

The system will create new database which is copy of original database in order to store data for permanents. It is important to backup and recovery purpose when the system file or data is deleted without users' consent and when the problem is occurred with original database

3.2.8 Physical environment

The system will deploy or install on the server side script but for more feature we recommend that the it will be deployed on Wolkite university server that is free from any disaster.

3.2.9 Resource issues

To use the system users should have to install any browsers on their computer or on their smartphone that enables to connect to the internet.

3.2.10 Documentation

The system document is well defined to use and maintain easily if the system is fail. The system will have contained short and precise file like readme file that will guide(help) the system user how will use the system easily without spending their time on training and in additional the system

document will have included same video about the system to indicate how should it do and the video support the system users by showing the process of how they will have to use the system

CHAPTER FOUR

4. SYSTEM ANALYSIS

System analysis is decomposing a system into separate components for the purpose of studying how well those component parts work and interact to accomplish their purpose of studying a system or its parts in order to identify its objectives. It improves the system and ensures that all the components of the system work efficiently to accomplish its purpose. Analysis model contains three types of models: functional, object and dynamic models. Functional model is described by use case diagrams, object model is described by class diagrams and dynamic model can be described by sequence, state chart and activity diagrams. For this proposed system we are going to analysis the system with functional model, object model and dynamic model using use case diagrams, sequence diagrams, activity diagrams, state diagrams and class diagrams. (R.Bahsoon, 2005)

4.1 System model

System model is the conceptual model as a result of system modeling that describes and represents a system. It is the process of developing abstract models of a system with each model presenting different view or perspective of the system. It is representing a system using some graphical notation, based on unified modeling language(UML). We use these modeling languages to describe the functionality of the proposed system and provides essential representations of software that will be mapped into implementations

4.1.1 Use case model

A use case defines a goal-oriented set of interactions between external actors and the system under consideration. Actors are parties or users outside of the system that interact with the system. Actors may be a class of users, roles that users can play or other systems. A use case is initiated by a user with a particular goal in mind and completes successfully when that goal is satisfied. It describes the sequence of interactions between actors and system necessary to deliver the service that satisfies the goal. Use cases are effective technique for narrating the ways a system works in fulfilling a user story /requirement. Use cases explain what happens when someone uses the system to achieve goal, this will help us understand how student union voting system works graphically.

Each use case explains one or more scenarios that describe how the system should interact with an actor to achieve a specific goal.

- A **scenario** is a narrative that describes what happens within a specific use case.
- An **Actor** is an external agent that interacts with the system
- A **goal** is a specific thing accomplished as a result of executing a use case

The use case model (use case diagram, use case description, use case scenario) is used to define the core elements and processes that make up the proposed system. This use case model describes the functional system components.

4.1.1.1. Use case diagram

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. In the proposed system we identified both actor and use case (service, task or functionality)

So as to clarify the use case structure we must know details about the following

Actor: which is the functionality of the system which directly interacts with the user

Use case: which is the functionality of the system which directly interacts with the user

Relationship: which is the functionality of the system which directly interacts with the user

The proposed system has the following actors

- Admin
- Election committee and
- Voter

Admin: will establish the following tasks

- He/she login to the system and logout from the system
- He/she register election committee
- He/she manage election committee like editing profile when errors occur
- He/she approve chairperson

Election committee: chairperson of Election committee will establish the following tasks

- They can log in into the system and logout from the system
- They can post announcement such as election date, strategies of candidate
- They can register candidate

- They edit profiles of candidate if necessary
- They can receive complain

Voter will establish the following activities

- Register him/herself into the system
- Login into the system and logout from the system
- Cast vote
- View result
- Send compliments for election committee

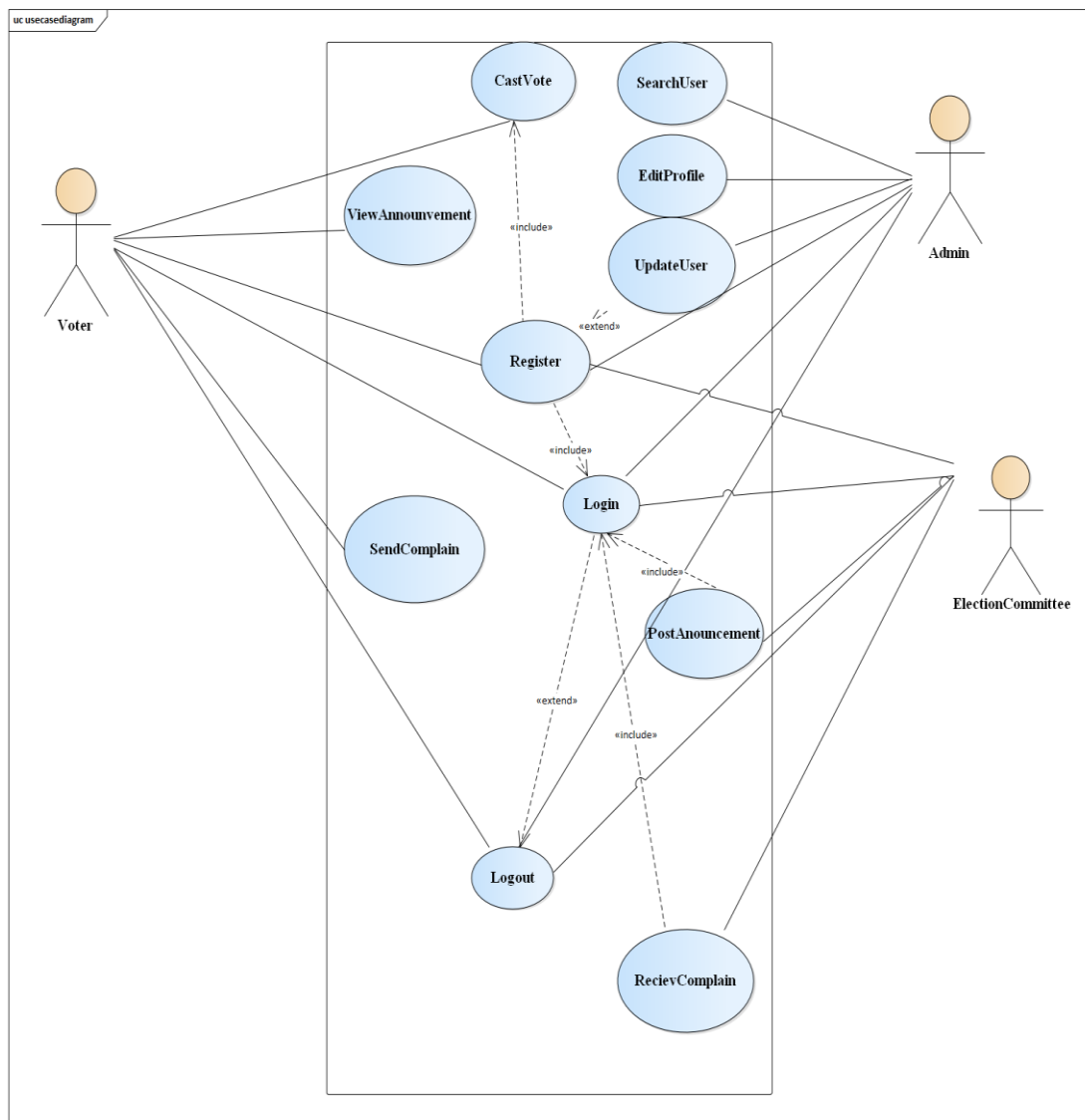


Figure4. 1 Voting system General use case diagram

4.1.1.2 Use Case Description

This description is used to detail description of the use case what and how the use case works in order to perform user and system functionality. In the proposed system, we are going to discuss detail use case description as follows

Table4. 1 Use case description for login

Use Case Name	Login
Use Case Id	UC-1
Description	It describes how the system login into the system
Actor	Admin, Chairperson of election committee and voters
Pre-Condition	Users should be registered before
Normal Flow	1. The user searches the system and clicks on the login button on the home Page. 2. The System displays the login button after clicked by the user 3. User fills the given form by user name and password then click login button 4. The System validates the entered values and processes 5. After the system validates the user then user can access his/her account 6. The System display out the account for him/her 7. Then login use case ended
Alternative flow	3.1The user may fill wrong username 3.2 user may fill wrong password 3.3 The user may fill both wrong username and password then user turn back to step3
Post Condition	User can access his/her account

Table4. 2 Use case description for register

Use case Name	Register
Use Case Id	UC-02
Description	Users of the system who are new for the system will be registered
Actor	Admin, Election Committee and voters
Pre-condition	Search as student union voting system of Wolkite University
Normal Flow	1. New users click “Register” link on the home page 2. After the user clicked, the system will display the registration form then

	3. Then new user fill the required information by the system and click register button 4. The system will receive the filled values from new user 5. The system will register new customer and display registered confirmation as “you are registered successfully”
Alternative Flow	3.1 Users will invalid information 3.2 The system will display the field is empty or invalid information 3.3 User fill the filled again
Post Condition	The system will display “you are registered successfully”

Table4. 3 Use case description cast vote

Use case Name	Cast Vote
Use Case Id	UC-03
Description	It describes how voters vote their leader and voting process by the system
Actor	Voter
Pre-condition	Voters login and click cast vote link
Normal Flow	1. Voters enter his/her Id as username and his/her password 2.If user name and password are correct then the system displays candidates list with their name and image 3. They select their leader and click vote button - The system displays “are you sure” message in with alternative “yes”, “or” button then voters click yes button - The system increase number of sound for unique candidate
Alternative Flow	1.1 If password is incorrect, the system displays incorrect username or password 1.2 users check number 1
Post Condition	The system displays “you are voted successfully”

Table4. 4 Use case description for search user

Use case name	Search user
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Use case Id	UC-04
Voter	Admin
Description	Admin searches users based on their Id for registered users
Pre-condition	Users will register first and they insert their valid campus Id
Normal flow	1 Admin login into the system by his username or password 2 The system displays home page 3 Admin clicks manage –user 4 The "system displays manage user page 5 He/she will search by Id for managing voters like update delete 6 The process ended
Alternative flow	1.1 If admin inserts incorrect username or password the system will display” There is no user by this Id” 1.2 Admin repeat step 1
Post-condition	The system will display “you have found the registered user”

Table4. 5 User description for update user

Use case name	Update user
Use case Id	UC-06
Actor	Admin
Description	• Administrator will manage all users and update after voted for the next election process or if he /she entered the correct information • If registered voter does not fulfil business rules the will be updated by another user
Precondition	The updated user must be first registered
Normal flow	1 admin login into the system 2 admin click update user 3 the system will display the registered student form 4 admin searches the user based on users Id 5 the system displays all user’s information 6 admin edited error information 7 the system will be ended

Alternative	4.1 If admin enters unregistered user Id, the system will display “there is no user for this Id” 4.2 Admin enters registered Id
Post condition	The system will display users account successfully updated

Table4. 6 Approve chairperson use case description

Use Case Name	Approve chairperson
Use case Id	UC-7
Actor	Administrator
Description	Id describes how admin approves chairperson from election committee
Precondition	Admin login into the system and identify the chairperson from election committee
Normal flow	1 First opens Election committee list 2 The system displays the committee list 3 Admin selects member for committee by their performance and experience 4 Admin clicks approve button 5 The system displays” are you sure you want to approve the message” with yes and no button. 6 Admin clicks yes button
Alternative flow	If any complain comes from students then the approved person may be checked again

Post condition	The system will display “you are approved successfully”
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Table4. 7 Edit profile use case description

Use case name	Edit profile
Use case number	UC-9
Actor	Admin
Description	It describes how voters and election committee edit their profile
Precondition	Admin login into the system
Normal flow	1 Admin fills username and password and click edit profile 2 the system displays all information's of that user 3 Admin checks the all information's and edit the error information 4 Admin clicks edit button 5 system gives two alternative with yes or no “are you sure to edit?” 6 Admin clicks yes button if the filled information is correct 7 use case ended
Alternative flow	1.1 if users enter error password then the system display “wrong password” 1.2 if admin enters error username the system displays “Wrong username” 1.3 if admin enters error username or password The system will display “Wrong username or password”
Post condition	The system will display “you are edited your profile”

Table4. 8 Poste Announcement use case description

Use case name	Poste Announcement
Use case number	UC-11
Actor	Admin
Description	It describes how admin post announcements for students like reports, strategies of candidates, and all about advertisements of candidates
Precondition	Admin login to the system

Normal flow	1 Admin clicks post announcement button 2 the system will display file upload form 3 admin uploads the required file to the system 4 systems will display “are you sure to upload” with yes or no buttons 5 if file is required one then admin clicks yes 6 use case ended
Alternative flow	3.1 If admin uploads harm or huge files then the system will display ” the file is not permitted to upload ” 3.2 Admin uploads the valid and efficient file
Post-condition	The system will display “you have uploaded file”

4.1.1.3 Use case scenario

Scenario is real world example of a person or organization interacts with a system. It describes the system events, steps and actions which occurs during the interaction. It describes exactly how an actor interacts with user interface. Therefore, we are going to describes each use case as follows for the proposed system

- Scenario name: Login
- Participating actor: Mr. Michael
- Initial condition: the system will power on and connection must be available
- Normal flow

Step1 Mr. Michael will open the system and clicks login button on home page

Step 2 the system will display login page

Step 3 He will fill his username and password then click login button

Step4 the system validates filled information

Step5 Mr. Michael accesses his account and user information’s

Step6 end scenario
- Alternative flow: the system will display “incorrect username or password” if Mr. Michael may fill wrong username or password therefore he will check step3 in normal flow

Scenario name: **Registration**

- Participating actor: Mr. Michael
- Initial condition: Mr. Michael login to the system using his username and password
- Normal flow
 - Step1: system will display registration form
 - Step2: He will fill all required forms and click register button
 - Step3: The system stores filled information's to the database
 - Step4: The system will display as "you are registered successfully"
- Alternative flow the system will display as "all field is required"
- Scenario ended

Scenario name: **Evaluate:**

Participating actor: Mr. Ashenafi

Initial condition: Candidates will be first registered

Normal flow:

- step1 Mr. Ashenafi will be login to the system
- step2 He will click evaluate button
- step3 he will see list of candidates
- step4 he evaluates candidates from list
- scenario will be ended

Alternative flow the system will display "incorrect information" if Mr. Ashenafi will fill incorrect information

Scenario name: **Cast vote**

Participating actor Mr. Ephrem

Initial condition: Voters will be first registered and click on cast vote link on the home page

Normal flow

- Mr. Ephrem enters his id as username and password and clicks continue
- If username and password are correct then the system will display lists of Candidates with their image
- Finally, he can vote one of candidate lists and click vote button
- The system will display "are you sure" message
- If his selection process is correct, then he will click ok button
- The system will display message "you successfully voted"

- Scenario ended

Scenario name: **Search user**

Participating actor: Mr. Michael

Initial condition: Mr. Michael login to the system and users are registered to the system

Normal flow:

- First Mr. Michael clicks manage user
- The system will display crud operations like update, delete and search
- Then Mr. Michael clicks “search” button
- The system will display “enter Id for user”
- Mr. enters id of required user
- The system will display information of the user with that id
- Scenario will ended

Scenario name: Update user

Participating actor: Mr. Michael

Initial condition: Users must be registered first

Normal flow:

- Mr. Michael login to the system and click update user
- The system will display registered students form for election
- Admin searches the user based on users Id
- The system will display all user information who is registered by that id
- Admin edited error information and click “update” button
- Scenario will be ended

Scenario name: Approve chairperson

Participating actor: Mr. Michael

Initial condition: Mr. Michael login to the system and identifies chairperson from election committee

Normal flow:

- Mr. Michael opens chairperson list
- The system will display chairperson list
- Mr. Michael selects members for committee by their performance and experience
- He clicks” approve” button
- The system displays “are you sure” message with yes or no button
- He clicks yes button
- Scenario ended

Scenario name: Post result

Participating actor: Mr. Kinfе

Initial condition: Mr. Kinfе login to the system

Normal flow:

- Kinfе opens the home page
- He will login to the system
- He clicks “post result” result button
- The system gives validation here
- He submits post result button
- Scenario will ended

4.2 Object model

An object model is a logical interface software or system that is modeled through the use of object-oriented techniques. It enables the creation of an architectural software or system model prior to development or programming. Object model is part of the object-oriented programming(OOP) lifecycle. In the proposed system we use class diagram and data dictionary

4.2.1. Class diagram

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure by showing the system's class their attributes, operations (or methods), and the relationships among the classes. so, in WKU SU voting system there will be class that makes the system like voter, candidate, E- Committee, Admin etc. The class diagram with its corresponding objects will be present in the following diagram.

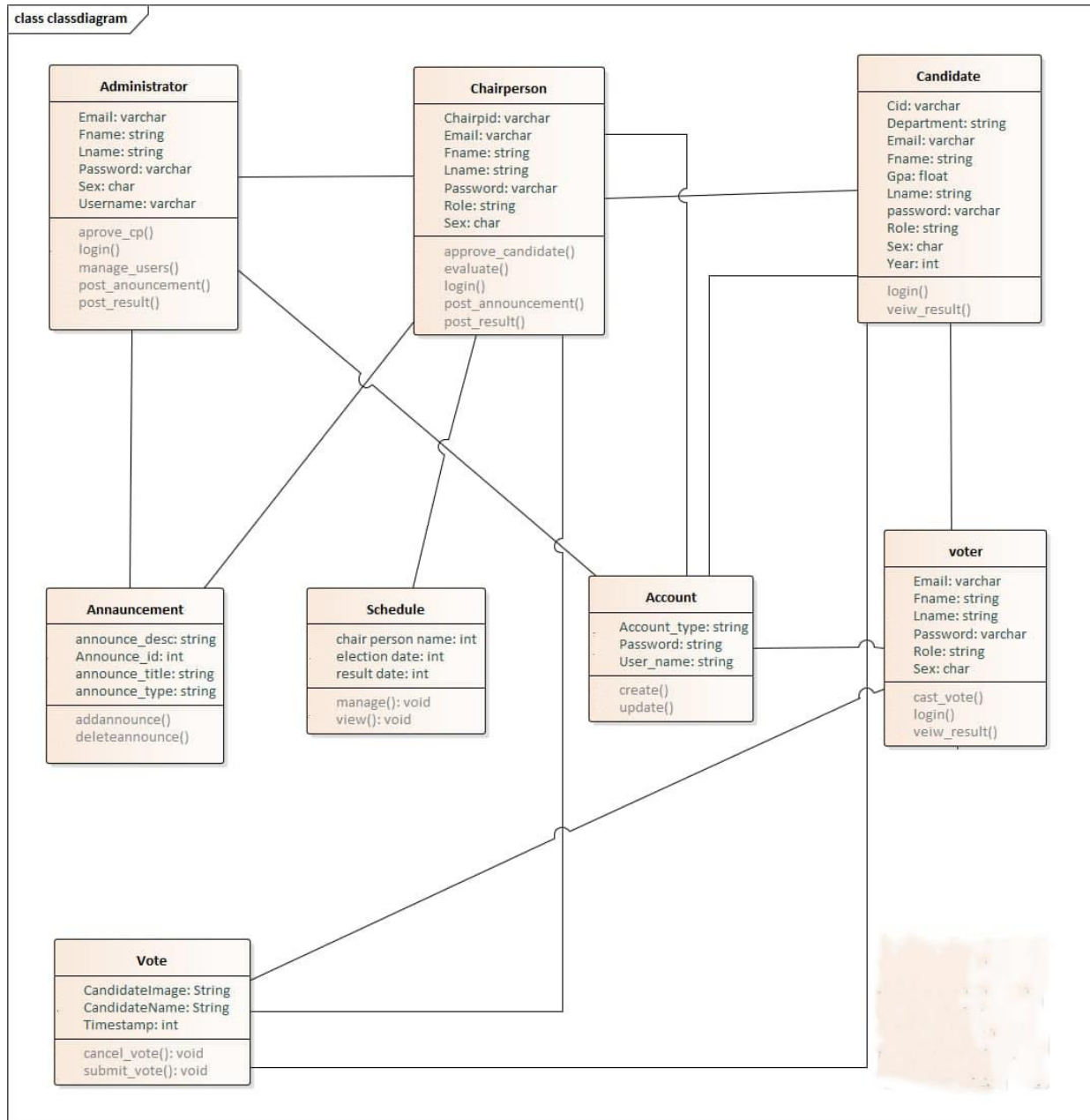


Figure4. 2Class diagram

4.2.2. Data Dictionary

It is a collection of names, definitions, and attributes about data elements that are being used or captured in a database, information system, or part of a research project? and it also provides metadata about data elements. It contains records about other objects in the database, such as data ownership, data relationships to other objects, and other data. In our WKU SU voting system the following table describe data dictionary

Table4. 9 Administrator class data dictionary

Table name: Administrator	Primary key: Admin_id		Description: It is designed to store list of data that is related with administrator	
Attributes	Data type	Data size	constraints	Description
Admin_id	Varchar	50	Primary key	It is assigned to unique identification for administrator, who manage the system
Fname	String	50	Not null	the first name of admin
Lname	String	50	Not null	The last name of admin
Email	String	50	Not null	The email of admin used to share information between system users
Password	String	50	Not null	It is admin password used to login and to make information secure
Phone	Double	15	Not null	Administrator phone number used to contact with admin if there is absence of power or internet
Chairperson_id	Varchar	50	Foreign key	It is derived from chairperson class used to approve them

Table4. 10 Chairperson class data dictionary

Table name: Chairperson	Primary key: Chairperson_id		Description: It is designed to store list of data that is related with chairperson of election committee	
Attributes	Data type	Data size	constraints	Description
chairperson_id	Varchar	50	Primary key	It is assigned to Unique identification for election committee
Fname	String	50	Not null	the first name of election committee
Lname	String	50	Not null	The last name of election committee

Email	String	50	Not null	The email of election committee used to share information between them
Password	String	50	Not null	It is election committee password used to login and make the information secure
Role	varchar	50	Not null	The role he selects election committee from the list
Sex	char	5	–	The sex of election committee
Year	Double	5	Not null	The Year of student stay at the university
Candidate-id	varchar	50	Not null	It is from candidate class used to approve them

Table4. 11 Account class data dictionary

Table name: Account	Primary key: Account_id		Description: It is designed to store list of data that is related with Account	
Attributes	Data type	Data size	constraints	Description
Account_id	Varchar	50	Primary key	Unique identification for Account
Account_type	String	50	Not null	Type of the account
User-name	String	50	Not null	The name of person who create account
Password	String	50	Not null	It is password for account holder

Table4. 12 Voters class data dictionary

Table name: voters	Primary key: Voters-id		Description: It is designed to store list of data that is related with voters	
Attributes	Data type	Data size	constraints	Description
Voters-id	Varchar	50	Primary key	Unique identification for voters
Fname	String	50	Not null	the first name of voter
Lname	String	50	Not null	The last name of voter
Email	String	50	–	The email of voter
Password	String	50	Not null	It is voters password used to login
Sex	varchar	5	Not null	The sex of voters
Role	Varchar	50	Not null	The role he selects voter the time of registered from the list

Table4. 13 Candidate class data dictionary

Table name: Candidate	Primary key: Candidate-id		Description: It is designed to store list of data that is related with candidates	
Attributes	Data type	Data size	constraints	Description
Candidate-id	Varchar	50	Primary key	Unique identification for candidates
Fname	String	50	Not null	the first name of candidates
Lname	String	50	Not null	The last name of candidates
Email	String	50	–	The email of candidate

Password	String	50	Not null	It is candidates password used to login to view the result
Sex	Varchar	5	Not null	The sex of candidates
Role	Varchar	50	Not null	The role he selects candidates the time of registered from the list
Year	Int	–	Not null	The year student stay in the university
Department	String	50	Not null	The department the candidate that study
CGPA	Flouting	–	Not null	The grade the candidate that had scored

Table4. 14 Announcement class data dictionary

Table name: Announcement	Primary key: Announcement-id		Description: It is designed to store list of data that is related with announcement	
Attributes	Data type	Data size	constraints	Description
Announcement-id	Varchar	50	Primary key	Unique identification for announcement
Announcement_ type	String	50	Not null	Type of announcement that send or receive
Announcement_ title	String	50	Not null	Title of announcement

4.5. Dynamic Model

The dynamic model of web based election system represents flow of functionalities for proposed system based on their object and their general system flow. The sequence model represents the

sequence of action by system users controlled and validated by database and controller. Activity diagram represents work flows of activities by voting system users like admin, election committee and voters supported by iteration and choice. State chart diagram represents action performed by system users in each state of the system. this state is changed by their events.

4.5.1 Sequence diagram

In this section, we illustrate (diagrammatically) a sequential logic, in effect, and the time ordering of messages. From a business process perspective. How the business model is executed? A sequence diagram shows object interactions arranged in time sequence. It depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario. The proposed system sequence diagram for each use cases are as follows:

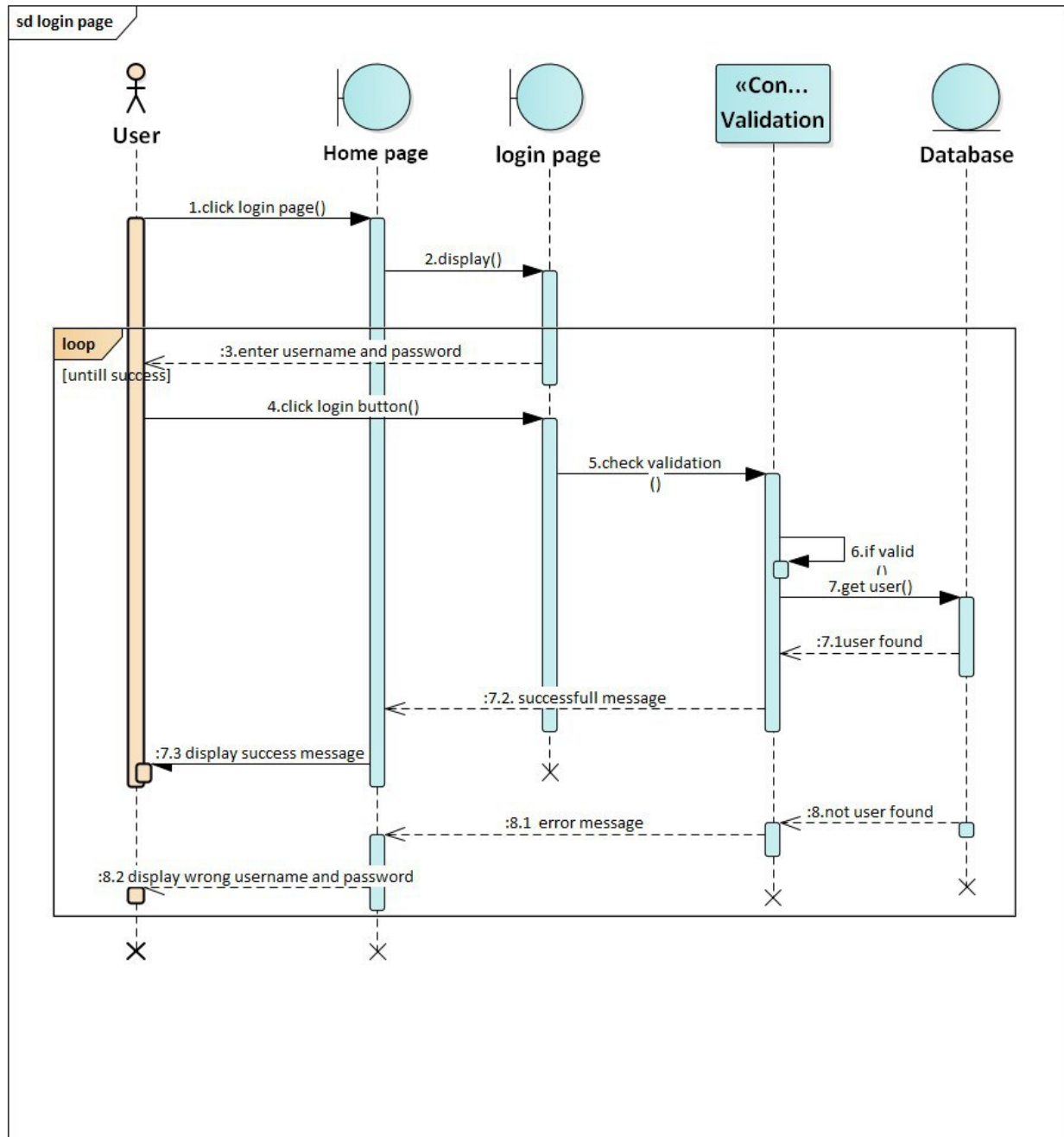


Figure4. 3 Login sequence diagram

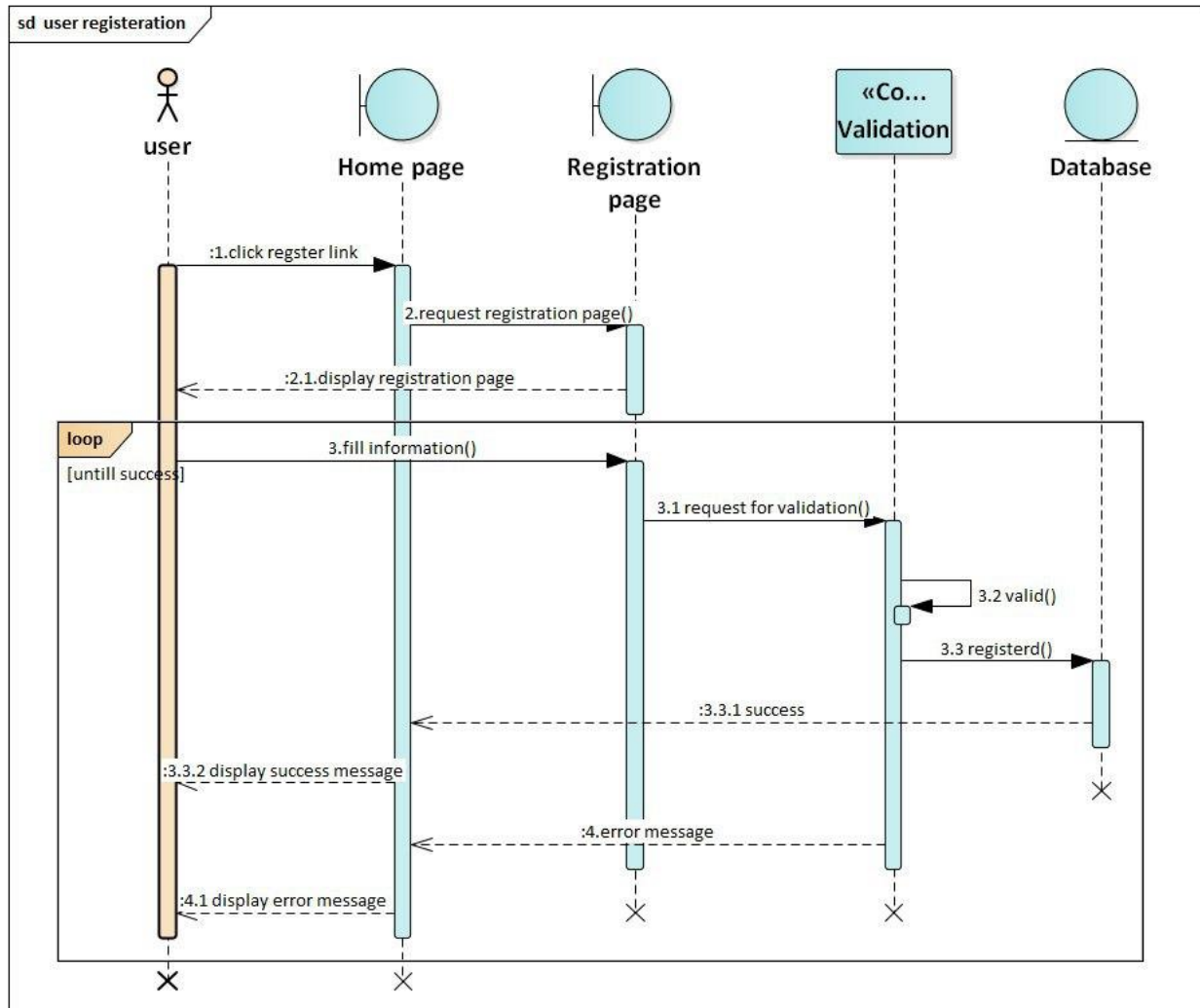


Figure4. 4 Registration

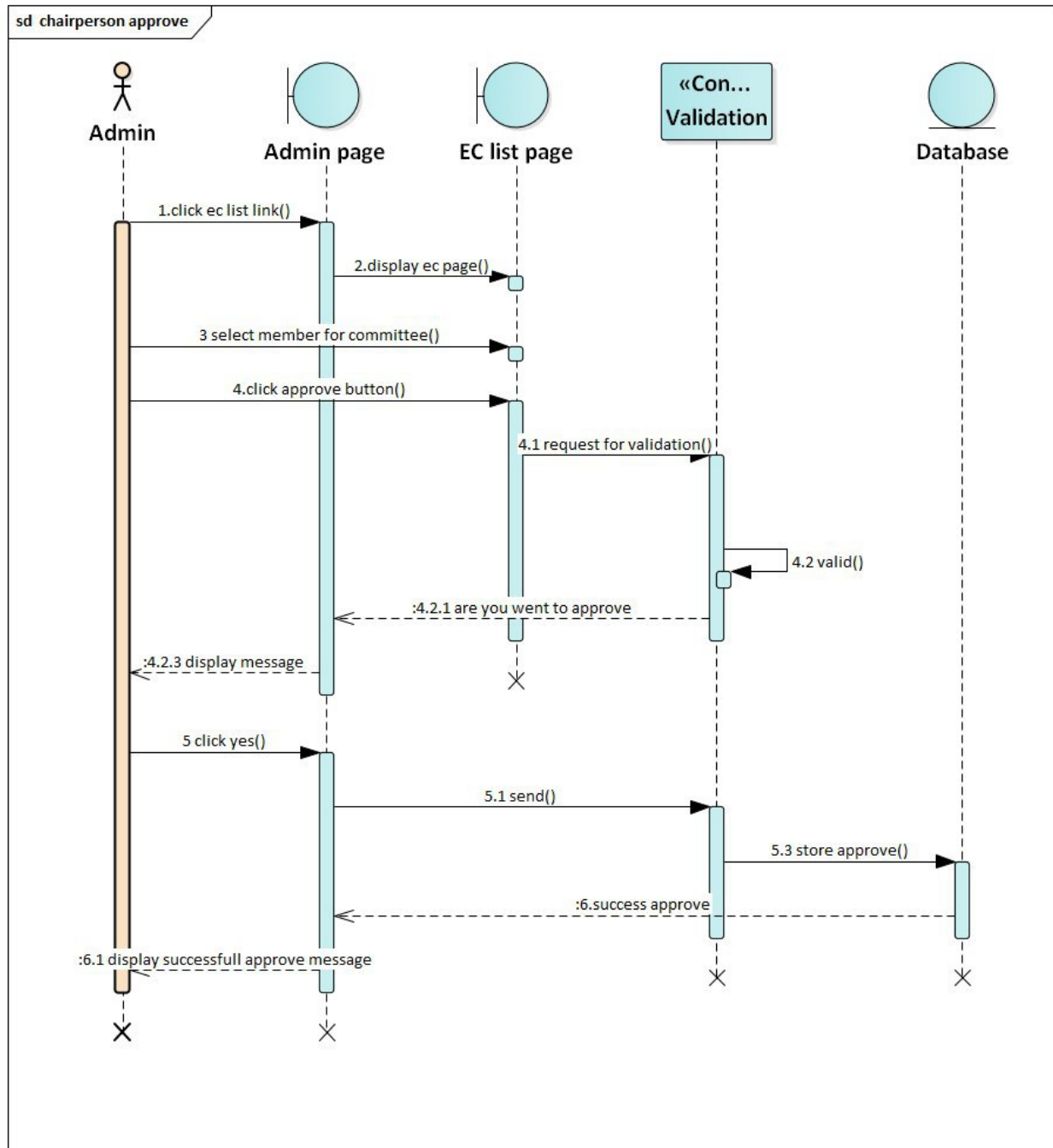


Figure4. 5 Approve chairperson sequence diagram

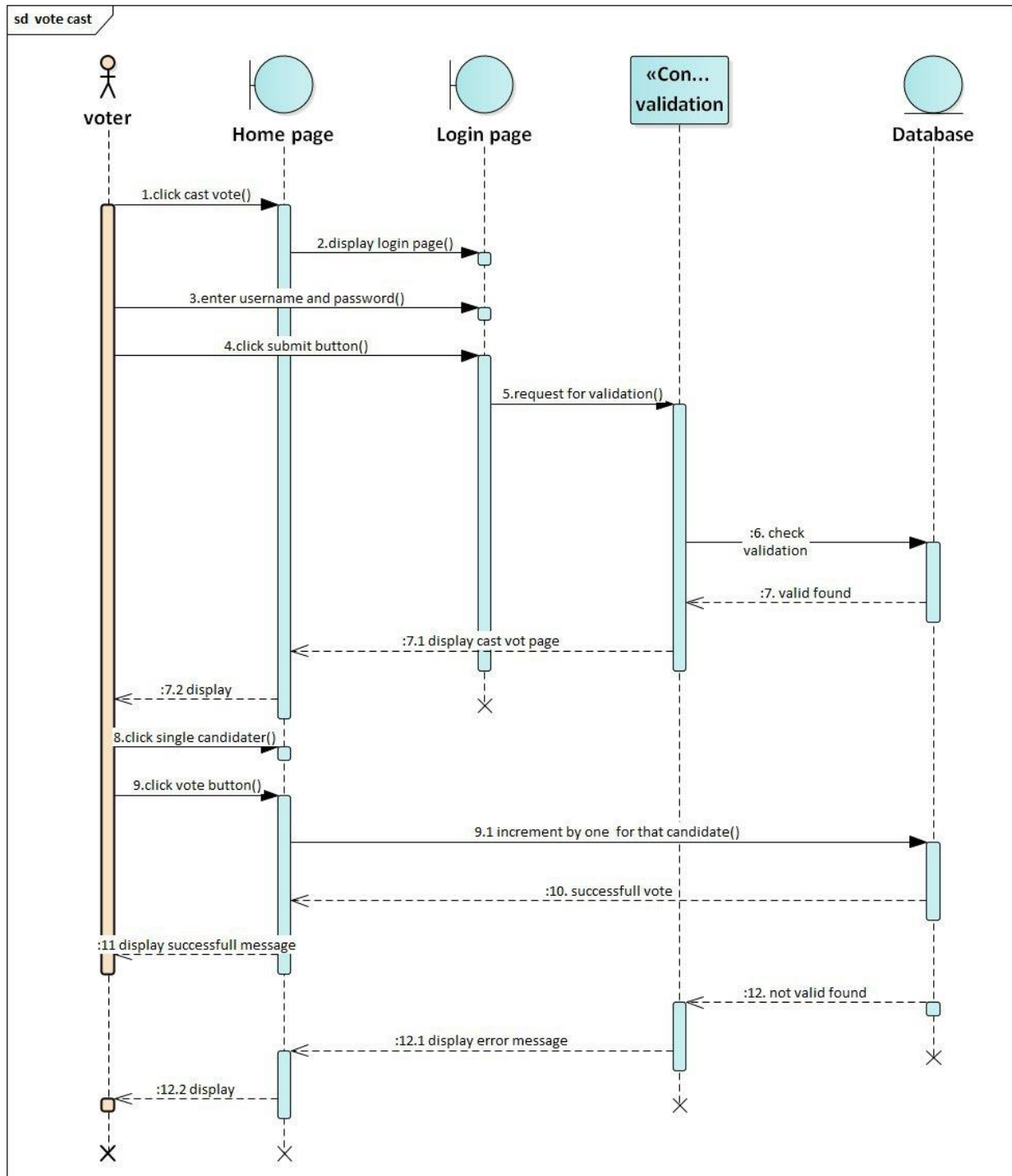


Figure4. 6 Cast Vote sequence diagram

4.5.2 Activity diagram

The activity diagram is a flow chart to represent the flow from one activity to another activity. It describes how activities are coordinate to provide a service. UML activity diagrams are used to

document the logic of a single operation/method, a single-use case, or the flow of logic of a business process. The activity diagram for this proposed system is used to describe how admin, election committee, voter and candidate perform actions and will reply by the system.

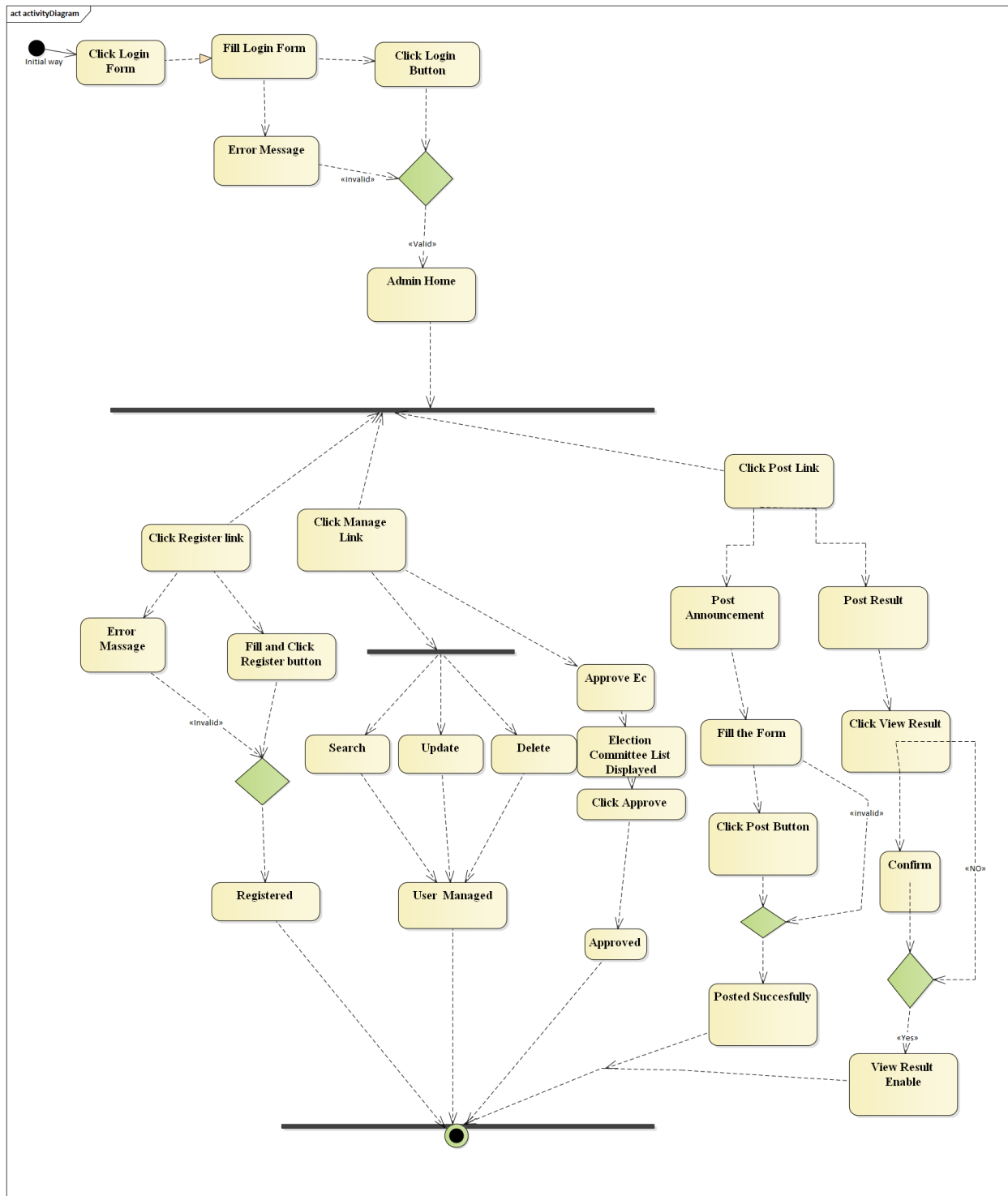


Figure4. 7 Activity diagram for admin

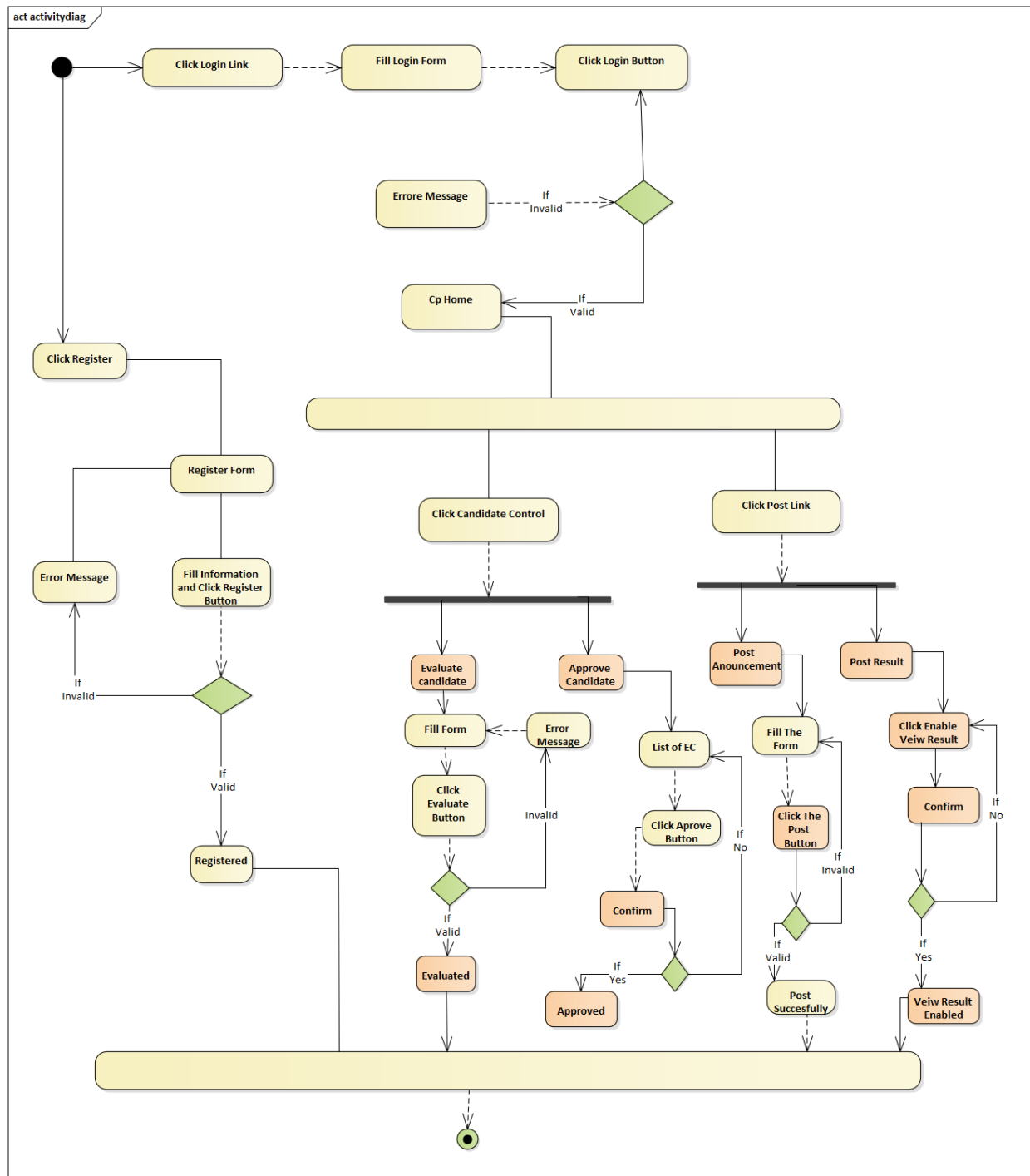


Figure4. 8 Activity diagram for chairperson

Activity diagram for chairperson

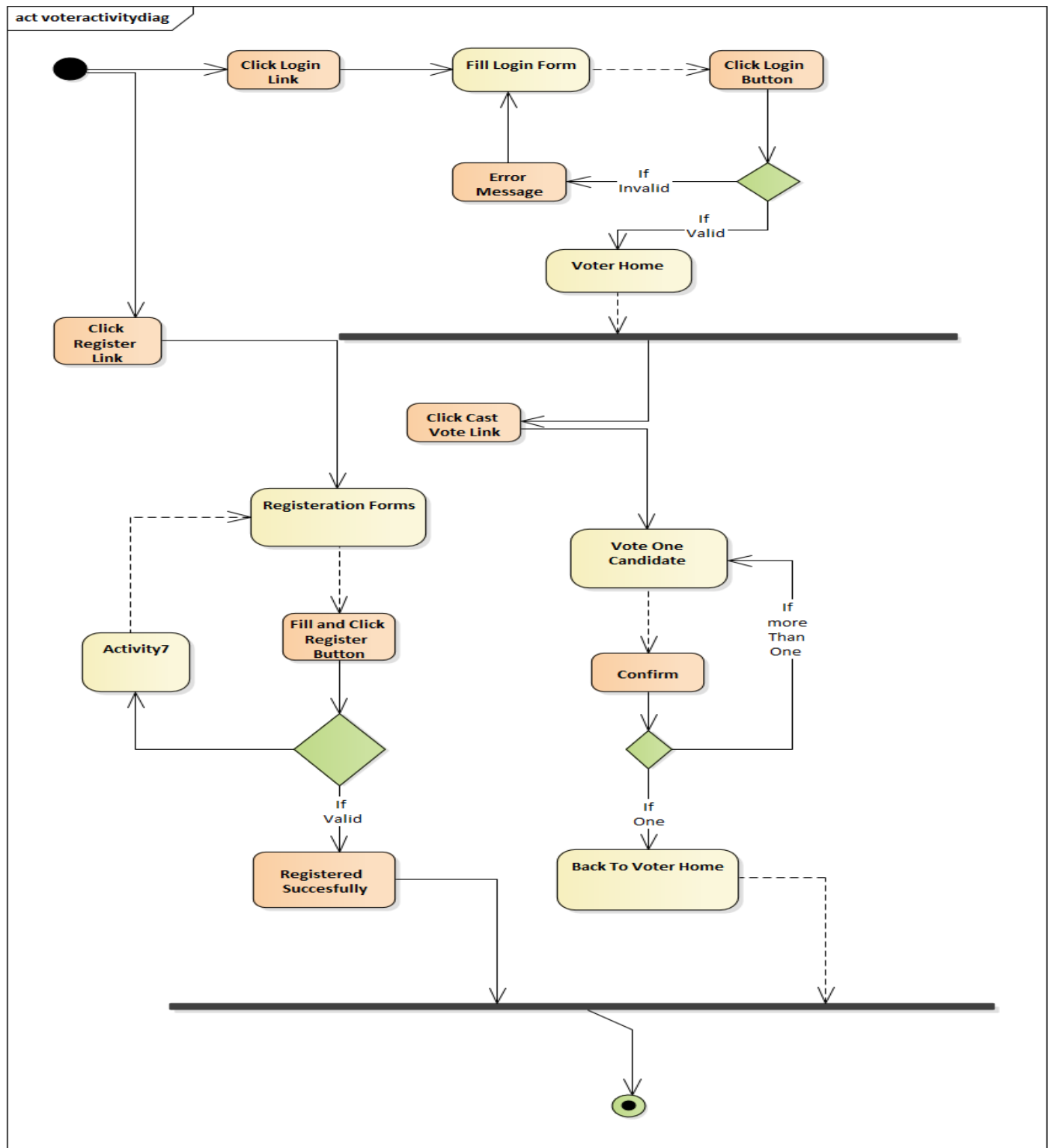


Figure4. 9 Activity diagram for voter

4.5.3 State chart diagram

State chart diagram describes the flow of control from one state to another state. States are defined as a condition in which an object exists and it changes when some event is triggered. So, the most important purpose of State chart diagram is to model life time of an object from creation to termination whenever performing different activities there will be some states that are included in activities so in WKU SU voting system.

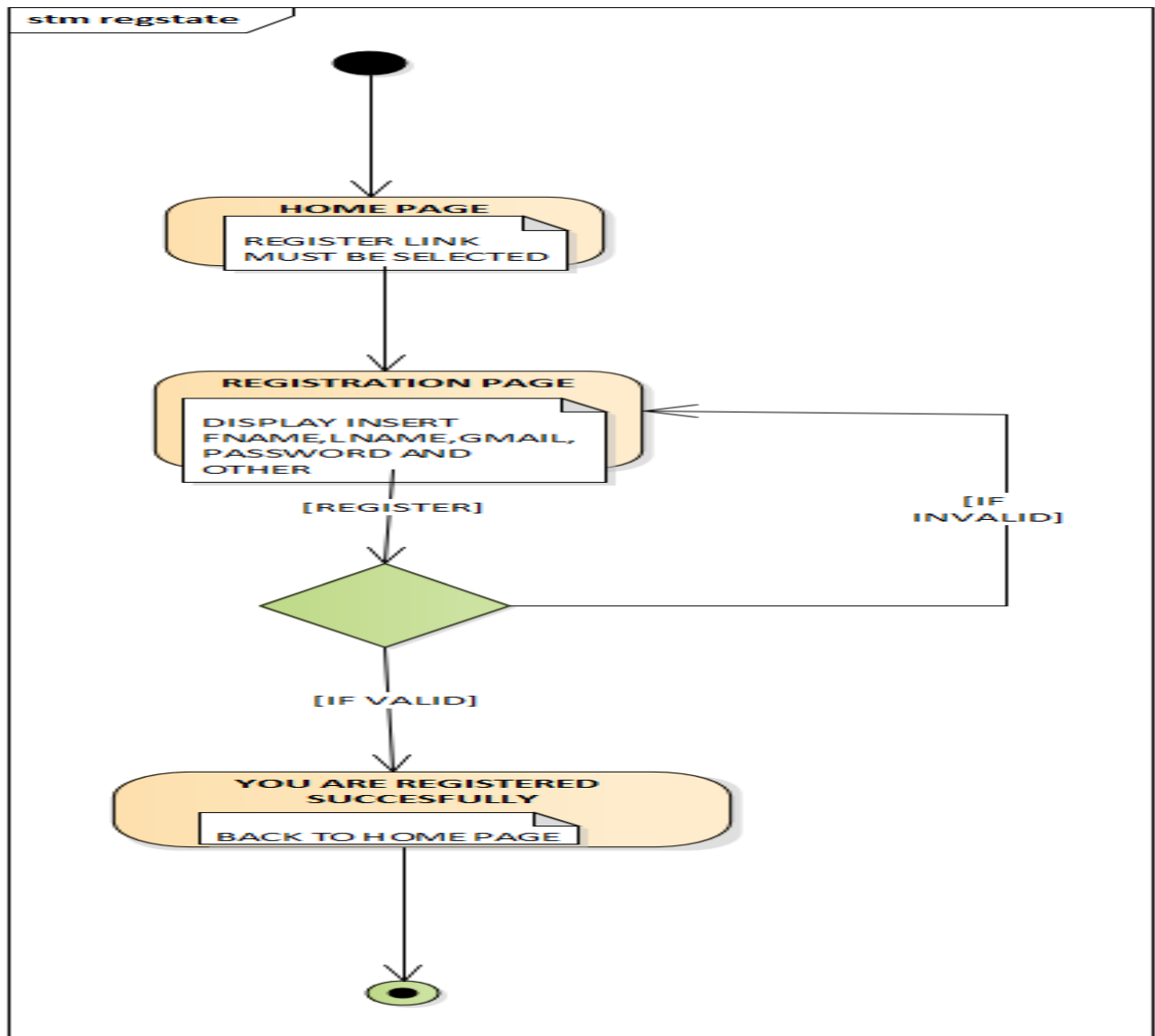


Figure4. 10 State chart diagram for registration

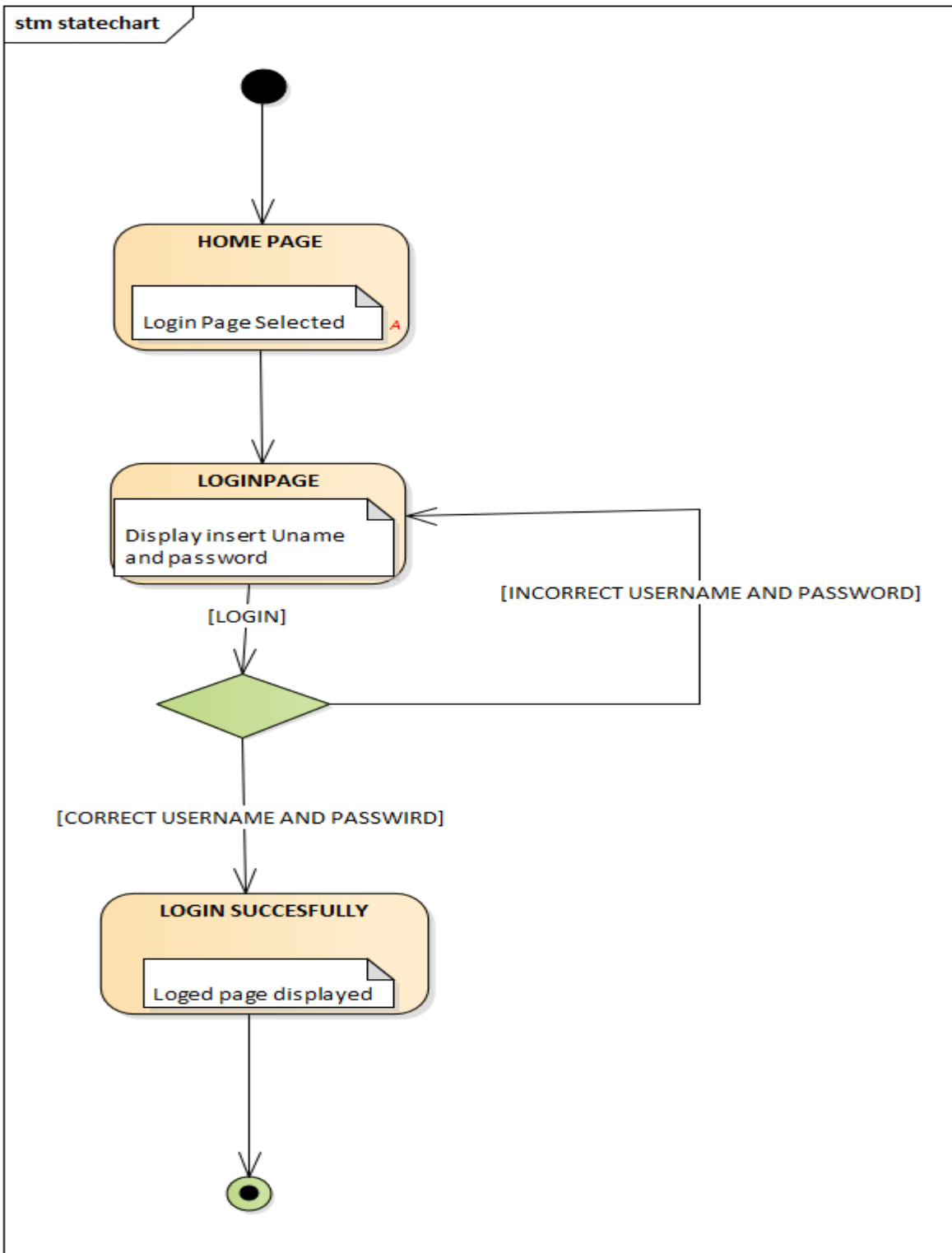


Figure4. 11 State chart diagram for login

CHAPTER FIVE

5. SYSTEM DESIGN

System design is the transformation of the analysis model into a system design model. Design is the process of describing organizing and structuring of the system components at architectural design level and detailed design level. From understanding of wolkite university student union voting system we are going to design new proposed system design.

5.1 Design goals

The purpose of designing is to show the direction of how the system will build and to obtain clear information needed to drive the actual implementations of the system. The design goal is derived from non-functional requirements of proposed system, which are listed in chapter three in this document. They describe on what the system should focus on.

User interface: we should design user interface of the system, which will be easy to understand for each user with a little training. The proposed system interface will contain different buttons which guides the users on what they need to click and fill form to enter user's information. The proposed system will contain also icons, frames and colors to make the interface more attractive. The interface information flows of the system and show where users are going to click in the system.

Security: Normal users are not allowed to edit their information which are stored on database, only users that are allowed by the admin can use the system and edit their information. Only legal person who has an account can login to the system using their username and password. Their username includes their id there for we can say that our system is secured.

Fault tolerance: The system will able to give response as error message when the user enters incorrect input. If user enters incorrect data like user name, password and other form inputs then then the system will display error message that inform the user to enter the correct data, to do so, we apply validation using JavaScript and md5 algorithm.

Dependencies: since we are going to develop a new voting application, it is dependent on webserver application software, and on database management. Clients have only basic knowledge

on how to use the computer application, and they need to know English language since the proposed system is developed using English.

End user criteria: Usability is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. From the end users' perspective, the system should be designed in such a way that it is easy to learn and use efficiently

5.2 Proposed system Architecture

The proposed system is consisting of 3-tier architecture model. The presentation layer is client layer and top most layer of the application. This is the layer we see when we use this system. it is the interface to the system. it is the interface to the system which takes information from the user. The main advantage of functionality of this is to communicate with the application layer. This layer passes the information which given in terms of keyboard action and mouse click to the application layer. Example when user want to login into the system first sees two text box and login button to enter user name and password and click on login. Business logic layer: it is application layer which interacts with data layer and sends information retrieved from database toward to presentation layer. it acts as the mediator between presentation layer and data layer. From above example once, the user clicks on login button application layer interacts with the database and send information towards to presentation layer. The third one is data layer which used to store data entered by the user. In general client of the system use browser to access the system using the internet.in this case when the user enters input and takes certain action application server process client request to interacting with the database server.

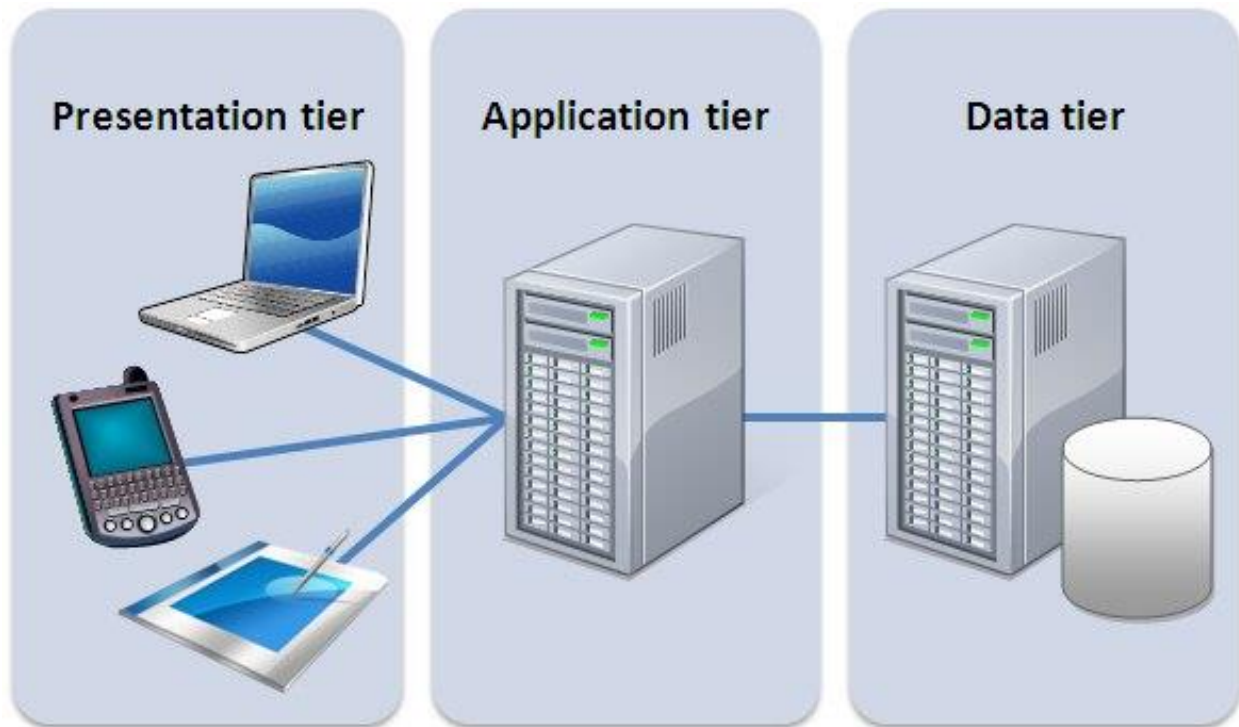


Figure 5. 1 Proposed system architecture

5.2.1 Sub system decomposition and Description

Subsystem decomposition is the process of dividing the system into manageable subsystems from the analysis model of the proposed system. The goal of the system decomposition is to reduce the complexity of design model and to distribute the class of the system into large scale and cohesive components. Components are generally units of computation or data stores in the system. A component has a name, which is generally chosen to represent the role of component or the function it performs. The different components of a system are likely to interact while the system is in operation to provide the service expected of the system. In our system the following subcomponent is available.

Administrator subsystem: responsible for handling action that administrator performs.

- Login
- Manage User.
- Approve chairperson.
- Post announcement

Voter subsystem-- responsible for handling action that voter performs.

- Register
- Login
- Cast vote.
- View result.

Chairperson

- Register
- Login
- Approve candidate.
- Evaluate
- Post result
- Post announcement

Candidate

- Register
- View result

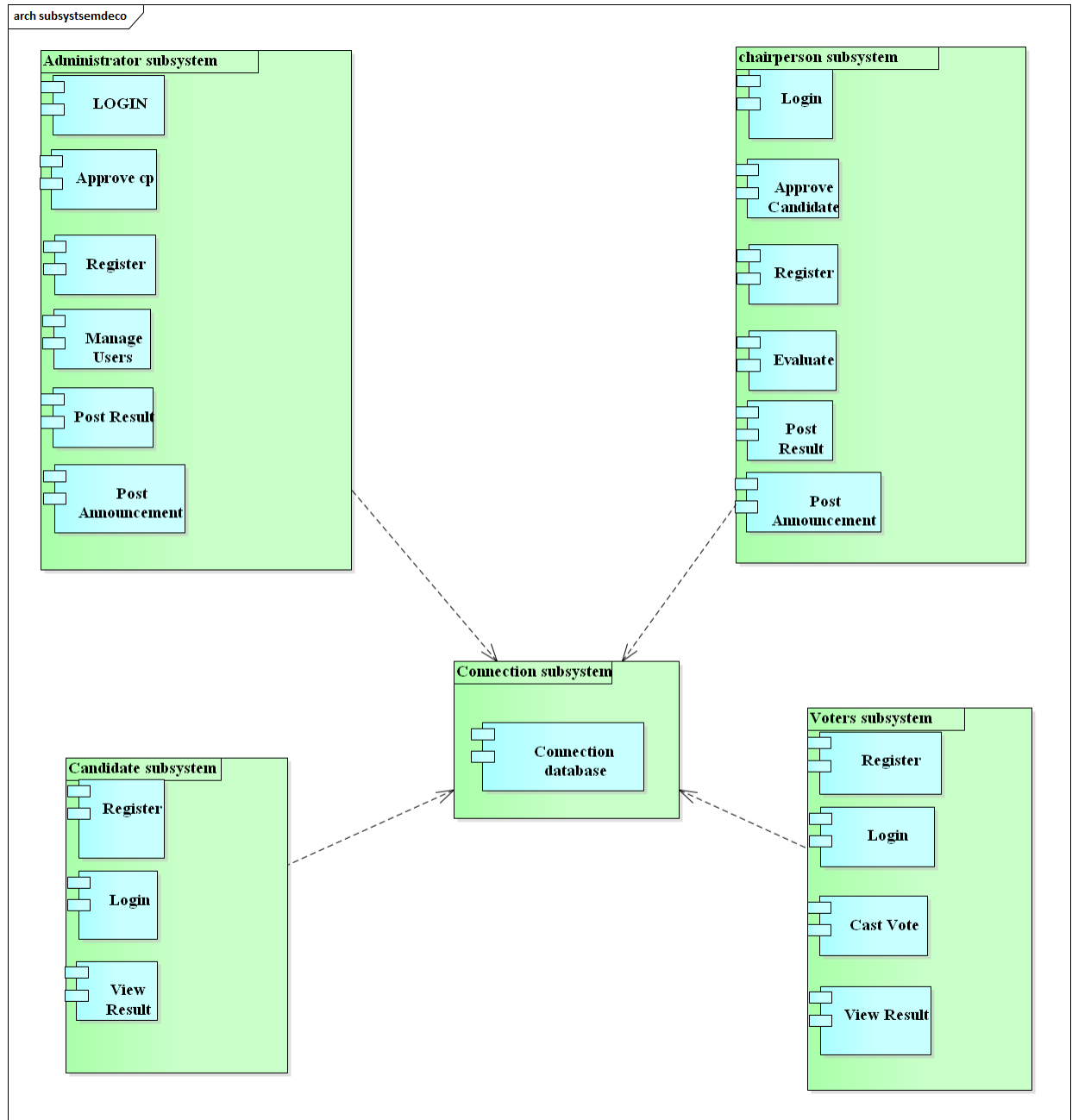


Figure 5. 2 Subsystem decomposition

5.2.2. Hardware/Software Mapping

Deployment diagram depicts a static view of the run-time configuration of processing nodes and the components that run on those nodes. In this mapping we are going to show the hardware configuration during deployment of this proposed system. This is used to connect separate machines which are used for configuration purpose. It shows the hardware and software work together.

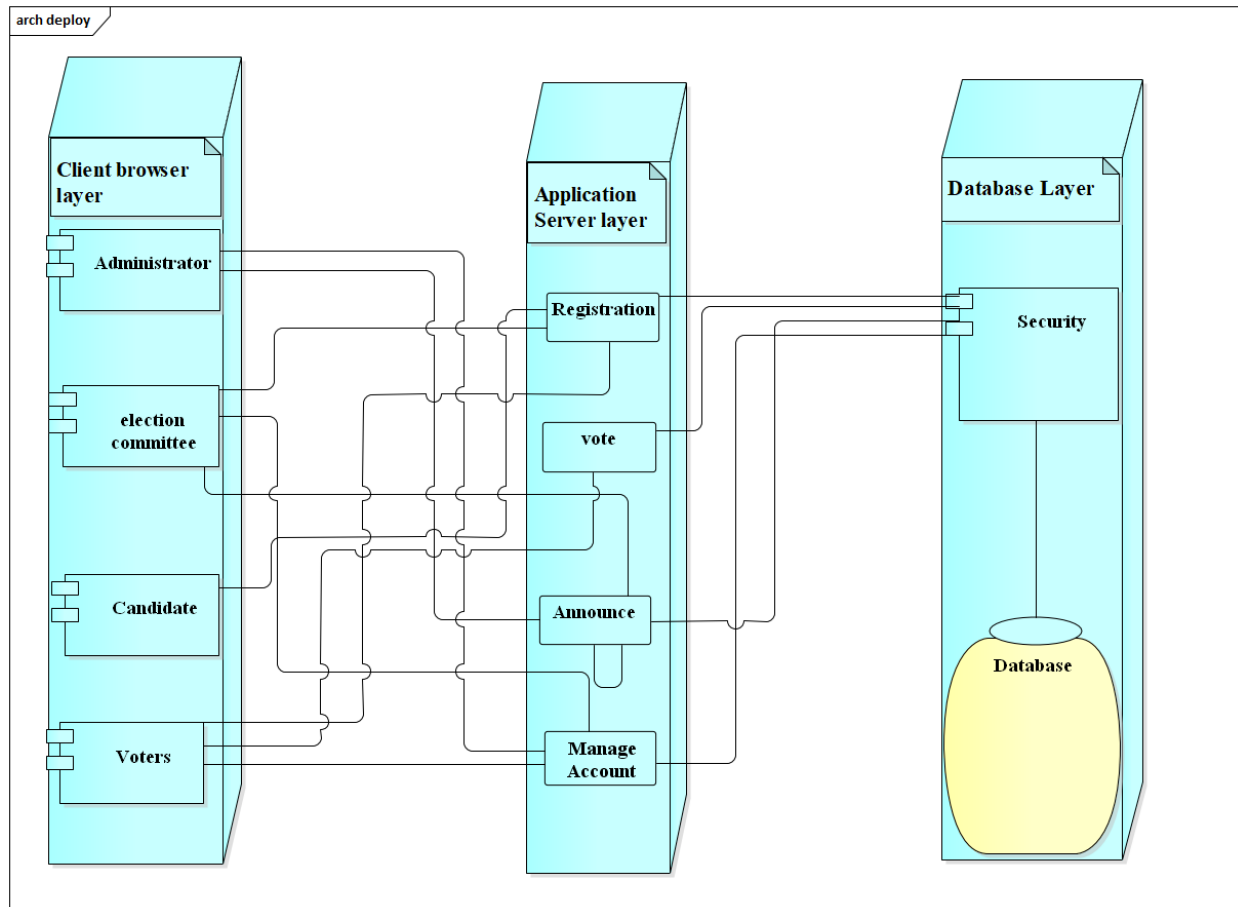


Figure 5. 3 Hardware software mapping

5.2.3 Detailed Class Diagram

In this section we are going to show, classes, attributes, methods, attribute data types, visibility

Of public, private and protected of attributes and methods, inheritance, association, aggregation, composition, dependency of the system The following table shows the detail class diagram of our system.

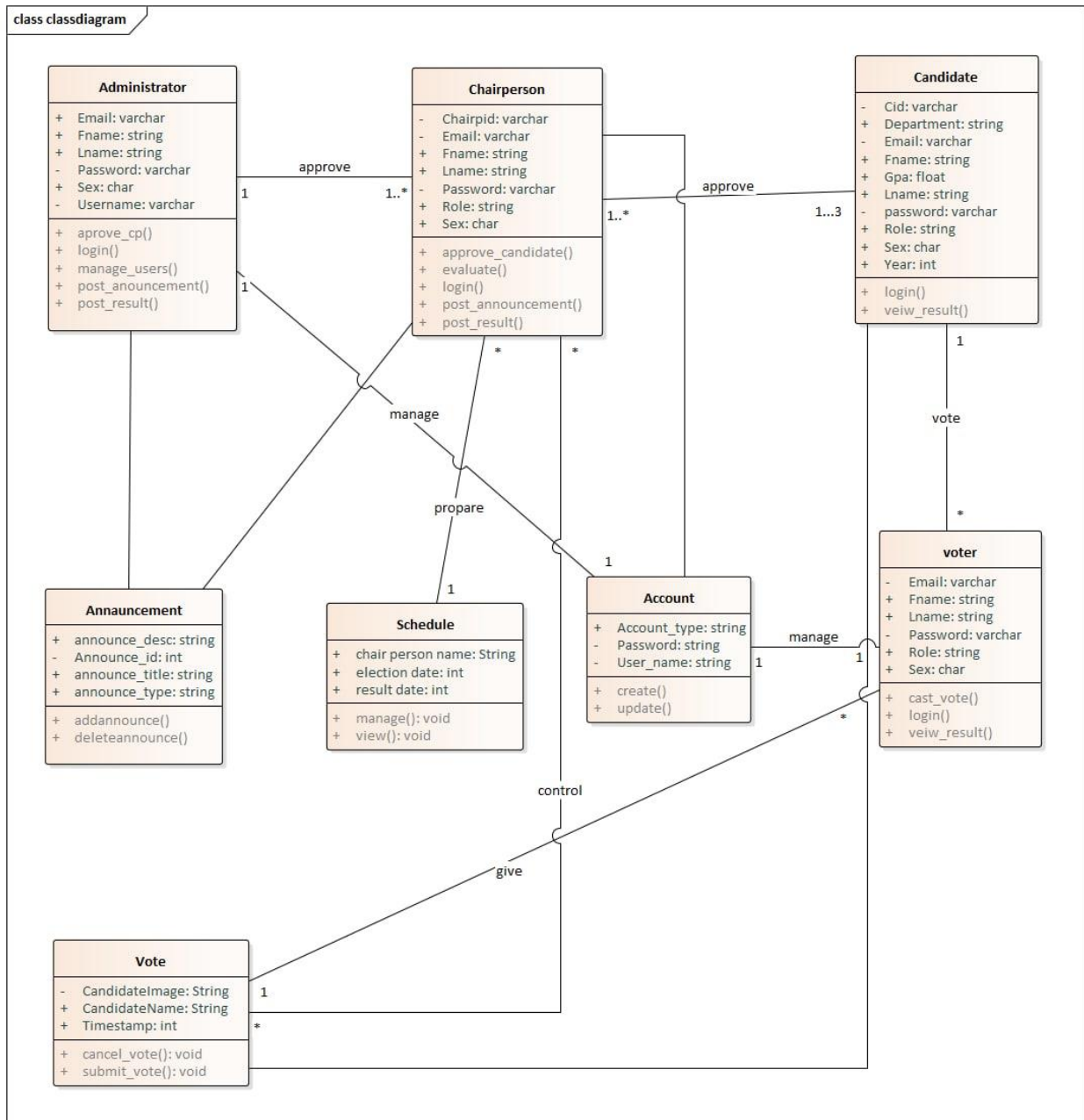


Figure 5. 4 Detail class diagram

5.2.4 Persistent Data Management

Persistent data management describes for the proposed system persistent data will be stored by the system and the data management infrastructure required for it. This section typically includes the description for data schemes, the selection of database, and description of the encapsulation of the database.

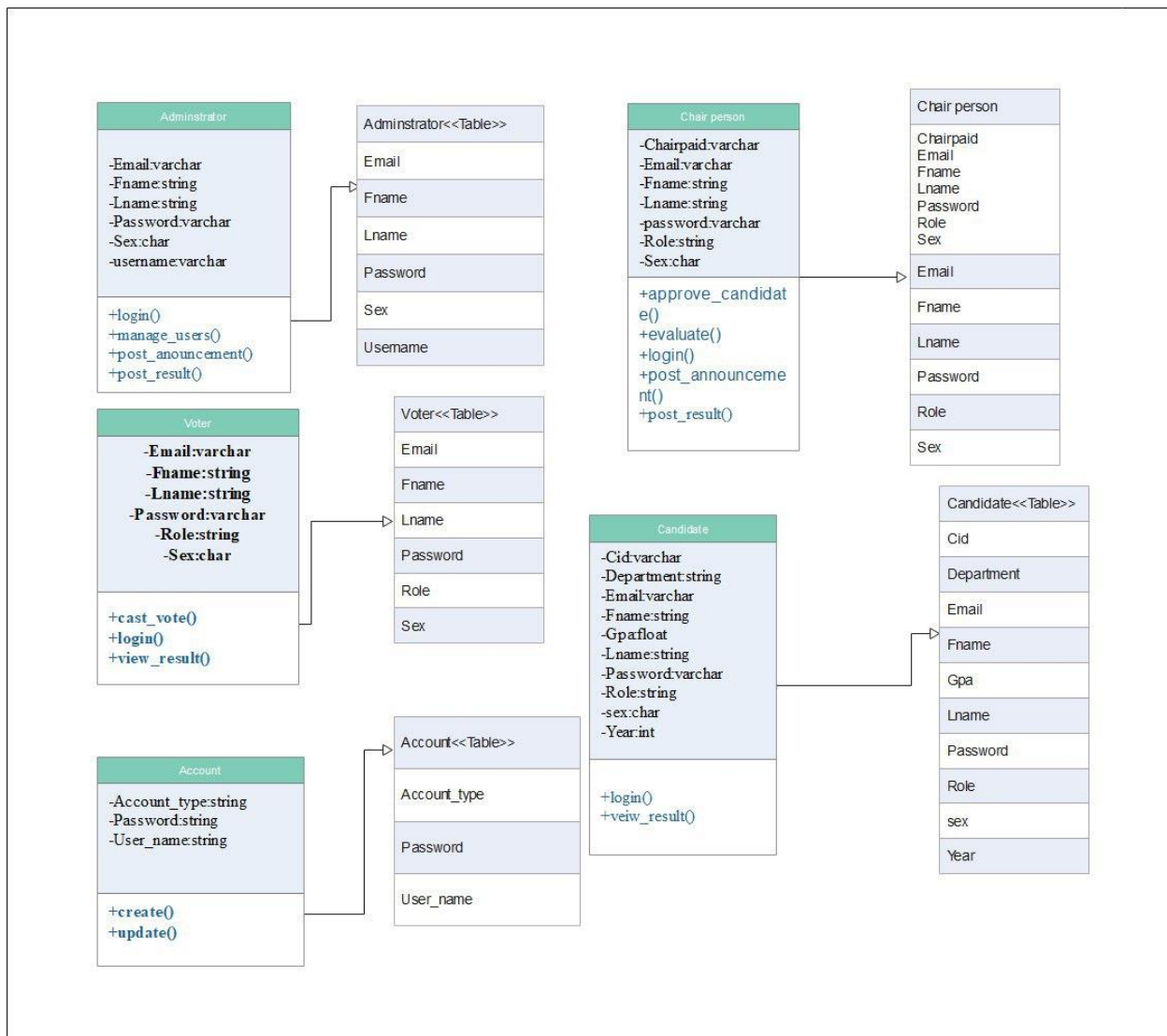


Figure 5. 5 Persistence diagram

5.2.5. Access Control and Security

Access control is a security technique that regulates who or what can view or use resources in a computing environment. Its objective is to ensure that only authorized individuals gain access to information or systems services necessary to undertake their duties. In the proposed system, different actors have access to different information and data. Access control and security specify what the user can access or what cannot perform by some users. This access control is verified by a username and password. Then the proposed system will have: -

Confidentiality: Only authorized persons can see the information. Private data is kept private; personal privacy is respected

Integrity: There are limits on who can change the data in this system

Availability: The system is available at all times to authorized users during election.

5.3. Packages

This section describes the decomposition of subsystems into packages and the file organization of the code. This includes an overview of each package, its dependencies with other packages, and its expected usage. Here, use UML package diagram to diagrammatically depict your packages.

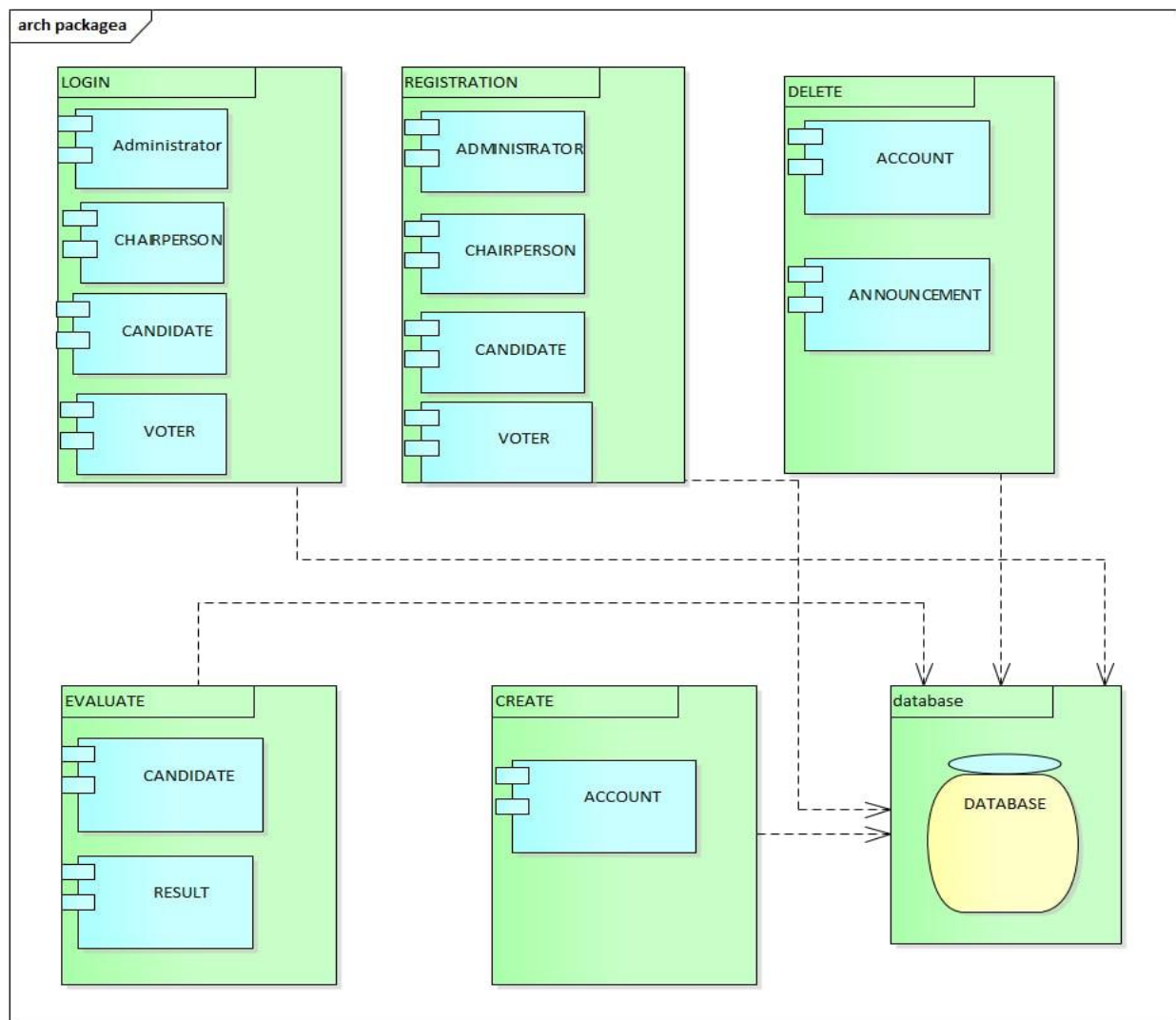


Figure 5. 6 Package diagram

5.5. Algorithm Design

Algorithms are designed to show the flow of programs in the system. It shows the flow and steps of logic in each function. This design part is important in the coding part of the implementation. Some of the algorithms are listed below. Example:

Login:

- Home page displayed.
- User click on login in link
- System display login form.
- User enters username and passwords. If username and password are correct, then

If user is voter, then system displays private voter page:

Else if user is chairperson, then system display chairperson page:

Else if user is admin, then system display admin page:

Else if user is candidate, then system display candidate page:

Else username and password are not correct, then the system displays the wrong username or password message and stays in login form.

Register

- Home page displayed.
- User clicks on register
- System display register form.
- User fulfills its information.

If the entered information is correct, then:

If the email is verified, then user information registered (an account created) successfully:

Else email is not verified, then system display your email is not verified message and in the register form.

Else user information is not correct, then the system displays your input is an incorrect message and stays in the register form

If the entered information is correct, then:

If the phone number is verified, then user information registered (an account created) successfully:

Else phone number is not verified, then system display your phone number is not verified message and in the register form.

Else user information is not correct, then the system displays your input is an incorrect message and stays in the register form

5.6 User Interface Design

User interface design or UI design generally refers to the visual layout of the elements that a user might interact with a website or technological product. User interface designs must not only be attractive to potential users but must also be functional and created with users in mind. The goal of user interface design is to make the user's interaction as simple and efficient as possible, in terms of accomplishing user goals. Therefore, in the proposed system we have designed user interface that increase the user experience

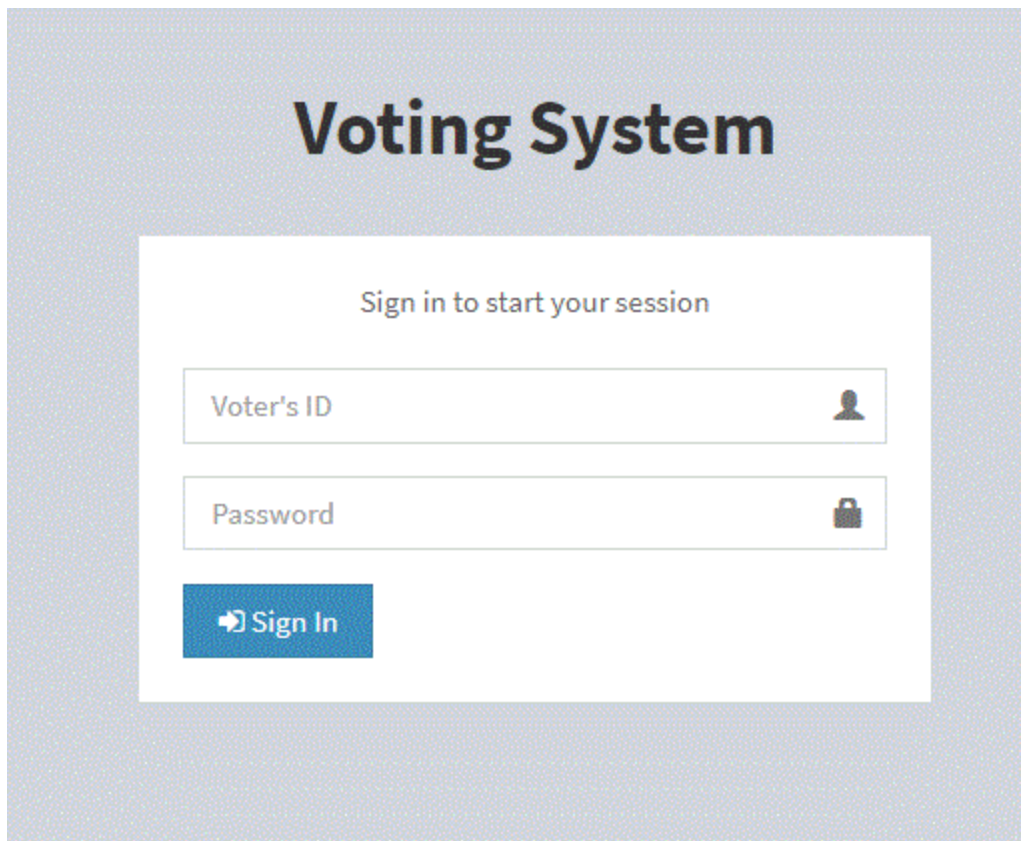


Figure 5. 7 Login user interface for voter

Admin Login

Log in to start your session

Username 

Password 

Sign In

Figure 5. 8 Login user interface for admin

References

- Ermiyas Birhanu, W. M. (2019). *wku Industrial Project Guideline Version 2*. wolkite: Ermiyas Birhanu,Worku Muluye,Zerihun Mulugeta.
- kinfe, m. (2021, march 20). interview. (w. Niguse, Interviewer)
- MoE. (2004). *stu election guideline*. wolkite: MoE.
- R.Bahsoon. (2005). *Fundamental of software engineering*. University of Bermingam: R.Basoon.

Appendix

As we describe in the methodology part we use the methodology of interview, observation, and get answer from interview, documentation, observation and introspection.

Question addressed to the students' union president:

- When this university did was established?

- Who is responsible for control of during election time?

- How the system trustable during election?

- How the administrators control the process?

- How do you whether the candidate s fulfill the requirement or not?

- What kind of mechanism do you use to protect welfare of the election?

Question addressed to the students' union Secretary:

- How to register the candidate?

- How to register the voters?

- How the students elect their representative?

- How do you know what is candidates' promise?

- What is the mechanism you use to the announcement of new candidate to the students?

- How you find the profile of candidate from the correct database?

Question addressed to the students' union vice President:

- How the technique for controlling once voting cannot vote more than once?

- What do you do for participate the all student in the vote time?

- How the voters vote their candidate during Election Day?

- What kind of mechanism used to count the student's vote?

- What do you do, if an error is occur during counting the vote?

list of candidates for election:

ሰተማራዎች ህብረት ሞና ስራ ስስፈጃሚ ሰመመዳደር ሰፓርሳሚ የቀረቡ ስሙዎች

1



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ተፈሪ ወንድሙ

3



አንዋር በሽር

4



ቴዎድሮስ ስዎሴው

ሸርብ ማታ 12:30 ሰዓት ሳይ

የክፍል ተወካዮች (ወንድና ሴት) በመመረቂያ ስዳራሽ

5



አበበኝ ሀዳር

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ዝናው ስስቻሰው

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አማረ ንማኒ

8



ሙዝኪር በድሩ



13/10/10

CHAPTER SIX

6. IMPLEMENTATION AND TESTING

In this chapter we are going to use testing procedure so as to check and analyze the developed system component to detect the deference between specified and observed behavior.

6.1. Implementation of the Database

Table 1 user

No	Column name	Datatype	Primary keys	Check Constraint	Unique Constraint
1	Id	Int(50)	✓		
2	Name	varchar(50)		Not null	
3	Lname	Varchar(50)		Not null	
4	Studentid	Varchar(50)			✓
5	Email	Varchar(50)		@	
6	Password	Varchar(50)		>=6	
7	Mobil number	Varchar(15)		[0-9]{10}	
8	Voted	Int(5)			

Table 2 Admin

	Column name	Datatype	Primary keys	Check Constraint	Unique Constraint
1	Id	Int(11)	✓		
2	Username	varchar(50)		Not null	
3	Password	Varchar(50)			
4	Firstname	Varchar(50)		Not null	
5	Lastname	Varchar(50)		Not null	
6	Photo	Varchar(150)		Not null	
7	CreatOn	Dat			

Table 3 Candidate

No	Column name	Datatype	Primary keys	Check Constraint	Unique Constraint
1	Id	Int(11)	✓		✓
2	Name	Varchar(50)		Not null	
3	Lname	Varchar(50)		Not null	
4	Email	Varchar(50)		@	
5	Photo	Varchar(300)		Not null	
6	Contact	Varchar(150)		[0-9]{10}	

7	Votecount	Int(11)		Not null	
8	Images	Varchar(450)		Not null	

Table 4 Election committee

No	Column name	Datatype	Primary keys	Check Constraint	Unique Constraint
1	Id	Int(11)	✓		
2	Name	Varchar(50)		Not null	
3	Studentid	Varchar(50)			
4	Password	Varchar(50)			
5	Mobilenumber	Int(50)		[0-9]{10}	✓
6	Image	Varchar(250)		Not null	

Table5 Election committee

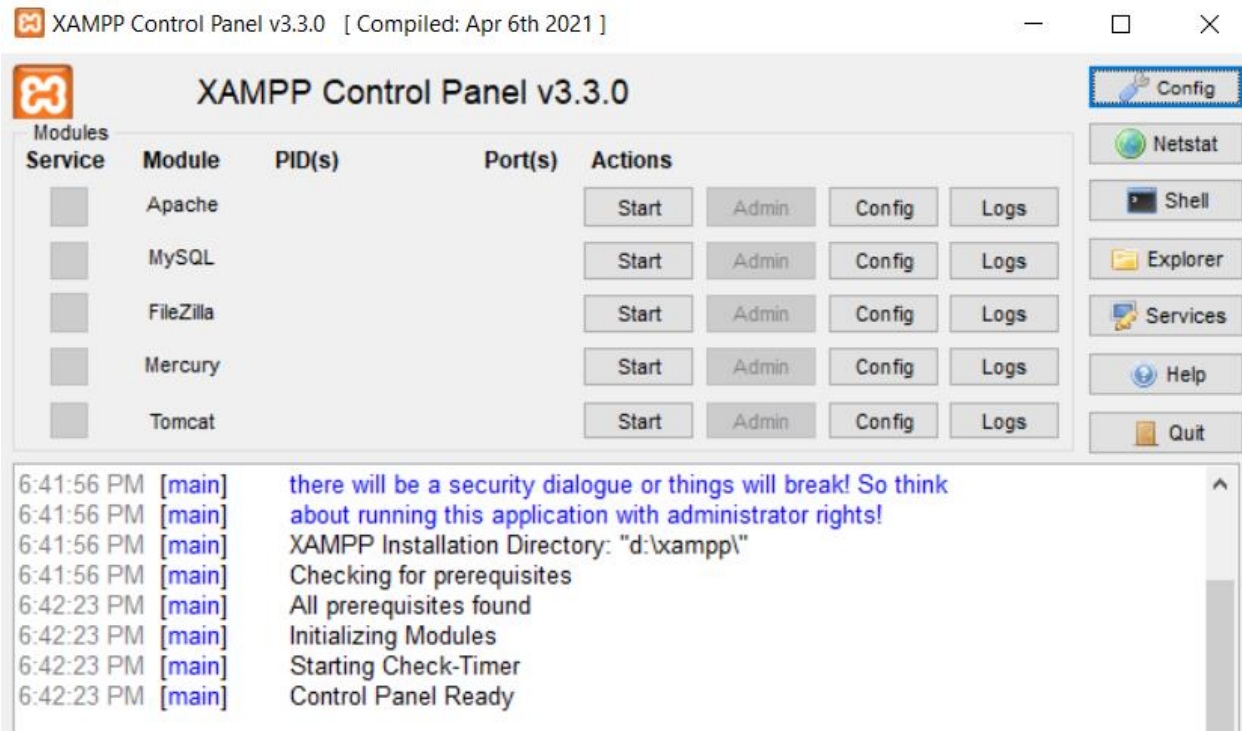
No	Column name	Datatype	Primary keys	Check Constraint	Unique Constraint
1	Id	Int(50)	✓		
2	Voter_id	Int(50)		Not null	✓
3	Candidate_id	Int(50)		Not null	
4	Position	Int(50)			

Configure a schedule of database backup

The system uses SQL database with 8 tables and size 160 KB data. Since student election takes in every two years' database will be updated and new data will be added.

6.2 Configuration of the Application Server

To develop this system, we have downloaded, install and configure with its own port 7882 to our machine or computer. Also this local server is easy for team members we can download and configure easily from google.



picture 1 xamp server

6.3 Configuration of Application Security

So as to secure the system we have used some procedures all input forms, password, and phone numbers are secured for instance for text field input values insert value is mandatory and for phone numbers as the system is used for student's phone number must be Ethiopian phone number 10 digits and input value is mandatory. For users who registered to the system they must create password but the password must be strong and between 4 and 8 digits. The interface is as follows. After users registered to the system they must login to the system by their appropriate username and password so we have also secured login pages

- Validation of login system
- Validation of incorrect input
- Validation of both incorrect username and password

```

<script>
function validateForm() {
    let x = document.forms["myForm"]["name"].value;
    if (x == "") {
        alert("Name must be filled out");
        return false;
    }
    let y = document.forms["myForm"]["lname"].value;
    if (y == "") {
        alert("please fill last name");
        return false;
    }
    let w = document.forms["myForm"]["pass"].value;
    if(w == "") {
        alert("password must be required");
        return false;
    }
    let z= document.forms["myForm"]["email"].value;
    if(z == "") {
        alert("email must be required");
        return false;
    }
    let i = document.forms["myForm"]["sid"].value;
    if(i == "") {
        alert("student id must be required");
        return false;
    }
    let p = document.forms["myForm"]["contact"].value;
    if(p == "") {
        alert("phone must be required");
        return false;
    }
}
</script>

```

Implement encryption

For the security purpose to encryption password of users we have used md5 password encryption method so all user password is in unreadable format in database.

```

$pass1 = $_POST["pass"];
$pass = md5($pass1);

```

So by calling a function which is called md5()and pass the input from the field as a parameter, the input will be encrypted to cypher text and saves to database.

			id	name	studentid	pass_word	mobileNumber	images	cpass
☐				68	eferem	12345	827ccb0eea8a706c4c34a16891f84e7b	910321435	all_images/imeg.jpg
☐				69	wondimu	317	5b8add2a5d98b1a652ea7fd72d942dac	982321732	all_images/hellocashlogo.png
☐				70	wollo	0000	4a7d1ed414474e4033ac29ccb8653d9b	956456343	all_images/imeg.jpg
☐				71	mamo	21345	e347d981d19e6088b67f640ce48c4c32	892322708	all_images/imeg.jpg
☐				72	wondo	8888	cf79ae6addba60ad018347359bd144d2	910321435	all_images/imeg.jpg

In the developed system we have used the following roles

The system will support two different types of roles and administrator by his or her own page. and each role has their own privileged pages and the access is determining by their roles.

User can login to the system as: -

1. User and
2. Election committee

```
<li class="nav-item dropdown">
  <a class="nav-link dropdown-toggle" href="#" id="dropdown04" data-bs-toggle="dropdown" aria-expanded="false">Login</a>
  <ul class="dropdown-menu" aria-labelledby="dropdown04">
    <li><a class="dropdown-item" href="ElectionC/Eclogin.php">Election Committee</a></li>
    <li><a class="dropdown-item" href="Voter/voterlogin.php">Voter</a></li>
  </ul>
</li>
```

To secure each actor page we have used session page and included in each page as

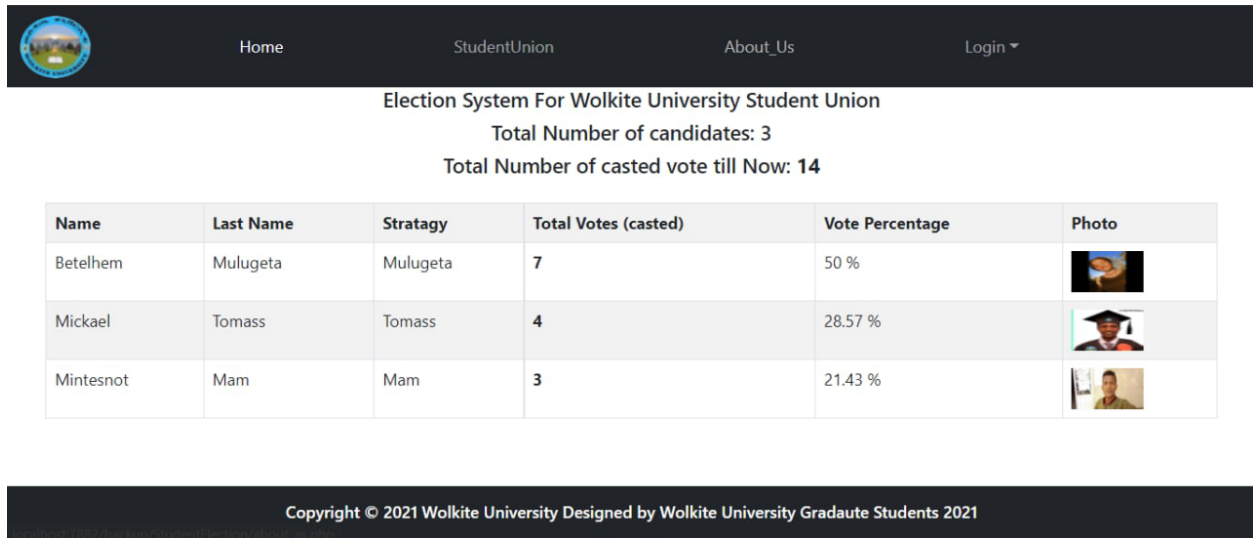
```
<?php
    session_start();
    include 'includes/conn.php';
    if(!isset($_SESSION['admin']) || trim($_SESSION['admin']) == ''){
        header('location: index.php');
    }
    $sql = "SELECT * FROM admin WHERE id = '".$_SESSION['admin']."'";
    $query = $conn->query($sql);
    $user = $query->fetch_assoc();
?>
```

We have checked none functional requirements as

- The system is portable with smartphones
- The system is easy to use for students
- Based on environment it does not check priority it works everywhere in the campus

6.4 Implementation of user Interface

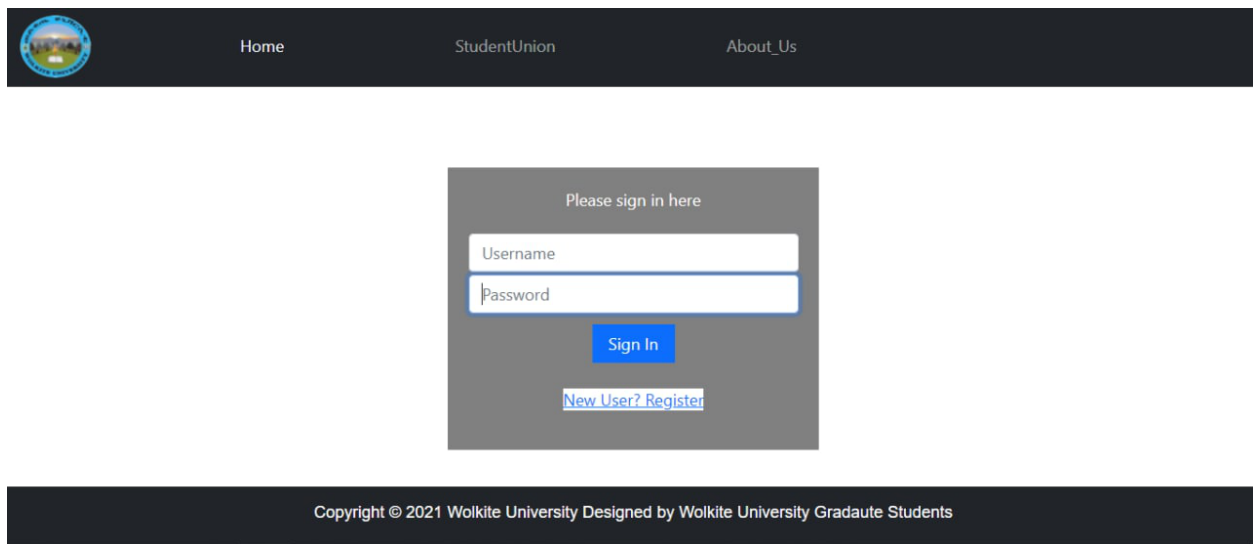
We have used three actors in the developed system from whom the two actors login to the system with the same login page as follows but administrator login by his/her login page.



The screenshot shows the 'Users home page' of the 'Election System For Wolkite University Student Union'. The page has a dark blue header with a logo on the left and navigation links: 'Home', 'StudentUnion', 'About_Us', and 'Login'. Below the header, the title 'Election System For Wolkite University Student Union' is centered, followed by 'Total Number of candidates: 3' and 'Total Number of casted vote till Now: 14'. A table displays the election results for three candidates. The footer contains the copyright notice: 'Copyright © 2021 Wolkite University Designed by Wolkite University Gradaute Students 2021'.

Name	Last Name	Stratagy	Total Votes (casted)	Vote Percentage	Photo
Betelhem	Mulugeta	Mulugeta	7	50 %	
Mickael	Tomass	Tomass	4	28.57 %	
Mintesnot	Mam	Mam	3	21.43 %	

Figure 1 Users home page



The screenshot shows the 'Login Page' of the 'Election System For Wolkite University Student Union'. The page has a dark blue header with a logo on the left and navigation links: 'Home', 'StudentUnion', and 'About_Us'. In the center, there is a white box with the text 'Please sign in here'. Below this text are two input fields: 'Username' and 'Password'. A blue 'Sign In' button is positioned below the 'Password' field. At the bottom of the white box, there is a link that says 'New User? Register'. The footer contains the copyright notice: 'Copyright © 2021 Wolkite University Designed by Wolkite University Gradaute Students'.

Figure 2 Login Page

Please vote your candidate.

☐ ID: 87 , Name: Betelhem , Email: bety.40@gmail.com

☐ ID: 90 , Name: Mickael , Email: micky.@gmail.com

☐ ID: 99 , Name: Mintesnot , Email: minte.317@gmail.com

☐ ID: 119 , Name: Awel , Email: amste.@gmail.com

Vote Now

Copyright © 2021 Wolkite University Designed by Wolkite University Gradaute Students 2021

Figure 3 cast vote

6.5 Testing

Unit Testing:

From the types of testing we have used unit testing and system testing. In the process of developing this election system in most of time we have used unit testing so as to check errors in the source code and the correctness of the system that we have implemented in each day and after finding errors in the implementation we have debugged from the source code and take correction.

Table 6 login page

Unit test= Authentication of login page			
Assumption=login to the user's appropriate page			
Test data= username, password (empty, valid, invalid)			
Step to be executed	Test data	Expected result	Actual result
Empty username and password	Username="", Password=""	Enter username and password	Both fields empty
Invalid username or password	Username="ephrem" Password="password"	Please enter valid username and password	One of field empty
valid username and password	Username=software Password=software	Successful logged in to the system	Dashboard display

Unit test= Authentication of registration page			
Assumption=registration to the user's appropriate page			
Test data= username, password (empty, valid, invalid)			
Step to be executed	Test data	Expected result	Actual result
Empty username and password	Username=" ", Password=" " Phone number=" "	Enter username ,password and phone number	Both fields empty
Invalid username or password	Username="ephrem" Password=" password" Phone number="er0948193148"	Please enter valid username , password and phone number	One of field empty
If valid username and password	Username=software Password=software Phonenumber="0948193148"	Successful register in to the system	Dashboard display

Table 7 Election committee

Table check voting or not

Unit test= check voting			
Assumption=login to the user's appropriate page			
Test data= Id (if voted or not)			
Step to be executed	Test data	Expected result	Actual result
Logged in id	id	Vote here	Vote here or you have already voted
User voted	Voter id	Vote here or not	You have already voted
Users not voted	Voter Id	Vote here no not	Vote here

After voters click "vote here" then election page will have displayed and we have checked that if voters click submit button or not if they miss submit button then they will also vote again else they do not come to election page.

Voter logout

Table 5 Election committee

Table 8 logout

Unit test= Check logout			
Assumption=user logout from the system			
Test data= session			
Step to be executed	Test data	Expected result	Actual result
Left to click logout button	Session	Other user do not enter to the page	Users can enter to cast page without password
Click “logout”	Session	Never change election process	User turn to home

System Testing

We have checked system testing by accessing with computers and smart mobile phones.

In this process we test the sub systems work together to achieve the desired goal

Table 9 System testing

System test= Authentication of login page		
Assumption=Redirect to home.php		
Tast data ✓ Username (empty, valid, invalid) ✓ password (empty, valid, invalid)		
Step to be executed	Test data	result
Empty username and password field and click login button	Username=” “, Password=” “	Password and user name please fill in this field
Enter Invaid username or password	Username=”ephrem” Password=”password”	Your account is invalid please check your username and password
Trying to access page by directly writing the path	http://localhost:7882/backup/StudentElection/admin/home.php	Please login frist to view this page
Enter valid username and password and Click Login button	Username=software Password=software	Redirect to user.php

Please sign in here

Username

Password  Please fill in this field.

[Sign In](#)

[New User? Register](#)

Table 10 Election committee

Unit test= Authentication of registration page		
Assumption= Redirect to home.php		
Test data ✓ username, (empty, valid, invalid) ✓ password (empty, valid, invalid) ✓ phonenumber(empty, valid, invalid)		
Step to be executed	Test data	Actual result
Empty username and all other filled and click register button	Username=" ", Password=" ", Phone number=" ", Enter id=" "	All field say please fill in this field
Enter Invalid phonenumber and click register button	Phonenumber="0948193"	Please match the format requeste
All field with valid data and click register button	All field with vaild data	Candidat Successful registered

A candidate registration form with the following fields: "First Name", "Enter Id", "Passsword", "Phone number", and a file upload section with a "Choose file" button and "No file chosen" text. An error message "Please fill in this field." with an orange exclamation mark icon is displayed over the "Enter Id" field. A blue "Submit" button is at the bottom.

Figure 5 candidate registration form error

A candidate registration form with the following fields: "ret", "43543", "", "020202", and a file upload section with a "Choose file" button. An error message "Please match the format requested." with an orange exclamation mark icon is displayed over the "Choose file" button. A blue "Submit" button is at the bottom.

CHAPTER SEVEN

7. Conclusion and Recommendation

7.1. Conclusion

In this chapter we are going to conclude how we developed the system. Developing either application or web based system is not easy it is difficult and requires a great deal of scarifying effort, time and budget mainly. Not only this some facilities which are used for developing the system were not comfortable there were some conditions which were obstacles for the team members but we have passed those conditions by the help of God. By solving those problems, we have developed this “web based election system for wolkite university student union” This web application is used for voting president, vice president and union main secretary. We have tested that It is easily accessible with desktop and laptop computers also with mobile phones which can access web sites with URL in this system we have checked that by writing server name its port number and ip address of the local internet the system is accessed easily. Students where ever found inside the campus they can access either with their own computer or mobile phones and they can register to the system after they registered by using their username and password they can visit candidates, and they can elect one of the given registered candidates.

7.2. Recommendation

To deploy this system, we recommended that when students come to university committees must register them to the system including their mother name and university Id. To ensure the security of this system. The upcoming students who will modify this system should include some functionalities such us face recognition or finger print, then the system will be more secure than developed system. To deploy the system, the server must have good performance and allow multi users simultaneously in short, it must have good performance.

