Online Voting System

Final Year Project

Session 2017-2021

A project submitted in partial fulfilment of the

COMSATS University Degree

of

BS in Computer Science / Software Engineering (CUI)

Department of Computer Science

COMSATS University Islamabad, Lahore Campus

28 December 2020

Project Detail

Type (Nature of project)	[ ] **D**evelopment	[ ] **R**esearch	[ ] **R&D**	
Area of specialization				
Project Group Members				
Sr.#	Reg. #	Student Name	Email ID	*Signature
(i)	**SP17-BSE-164**	**Areebah** (Group Leader)	Areebahajmal77@gmail.com	*Areebah*
(ii)	**SP17-BSE-023**	**Chandka iftikhar**	SP17-BSE-023@cuilahore.edu.pk	*Chandka*

*The candidates confirm that the work submitted is their own and appropriate credit has been given where reference has been made to work of others

Plagiarism Free Certificate

This is to certify that, I am _Areebah. S/D/o __Muhammad Ajmal Abid__, group leader of FYP under registration no CIIT/__Sp17-bse-164__/LHR at Computer Science Department, COMSATS Institute of Information Technology, Lahore. I declare that my FYP proposal is checked by my supervisor and the similarity index is __2__% that is less than 20%, an acceptable limit by HEC. Report is attached herewith as Appendix A.

Date: _28th December 2020_ Name of Group Leader: _Areebah_ Signature: _Areebah_

Name of Supervisor: ___Miss Sana Rizwan__ Co-Supervisor (if any):__Miss Sobia Usman_

Designation: _Assistant Professor_ Designation: _Assistant Professor___

Signature: __Sana Rizwan___ Signature: __Sobia Usman___

HoD: _____

   Signature

Project Abstract

Nowadays E-government is facing many problems across heterogeneous organizations and institutions in information integration. Particularly E-government faces several different problems in achieving interoperability and integration taking into account all the rules and regulations according to different administrative services in different situations. To solve such issues we are going to design a Web-Based Online Voting System which will provide a much better platform than the traditional paper-based polling system, to organizations to conduct elections according to their own needs and requirements. Our Online Voting System will provide the easiest platform to conduct inter and intra- organizational elections eliminating not only the risks of mistakes and corruption but will also reduce labor work and paper cost as well. Votes won't need to go too far off places to cast votes but will now be able to cast votes by just a single click after entering their verified credentials. Voters who are out of stations can easily cast votes by just having the availability of any of the internet-connected device's web browser like chrome, fire-fox, etc. There will be no chance of fake casting of votes because we are designing this system in such a way that high-level security techniques are being implemented. To avoid fake casting of votes and corruption multilevel security checks are being implemented in the intelligence system. We have eliminated the chances of wrong counting or duplication of votes by making the intelligence system secured by two-factor authentication and refund security techniques. This online voting system has provided proper interfaces to votes so that voters won't find any difficulty in the casting of votes. Votes will be cast with verified credentials and data will be stored in the database storage memory. Evaluations will be done under the intelligence system. Our Online Voting System will be the most fast, efficient, and accurate platform to conduct online elections. We'll be designing our Project by using web-based languages like React and Node mainly, and javascript and MongoDB if required. Our Project will be evaluated under COMSATS University, Lahore Campus

Contents

Table

Table of figures

Chapter 1

1.1. Introduction

Many developed countries have already come out of the traditional paper-based polling systems and are now moving towards Online election systems making use of modern technology. Our goal by developing this Online Voting system is to make this trend also applicable in organizations of Pakistan to help people and organizations with the solution to all the problems they face with the traditional paper-based polling systems.

Our online voting system will not only help organizations to save many valuable resources such as time, cost and labor work but will also help in management of elections as well. Our Online Voting System give freedom to organizations to manage and decide the purpose /topic of elections, eligibility and limit of participants, Time and date for the elections to be performed, symbols for the representation of candidates, updation of any kind of changes required etc

We have tested our designed prototype in COMSATS University, Lahore Campus, where voters can cast votes with the help of their verified ID 's and passwords.

While developing our project security was our main focus. High security techniques with Multi level authentications factors are being used in the system to avoid duplications and fake casting of votes. By using Online Voting System votes will not need to cast votes in outside party pressures, every participant will vote according to their own will without having the fear of any outside pressure or corruption. For two factor authentication "knowledge factor" (which includes user's Id, password and user's personal information which only the concerned user knows) is being used in the system. In this way users will need to answer the questions correctly in order to pass the authentication process. "Code Generator" is also being used for registration. A security code will be send to the user via email or contact number which the user will need to enter to get registered.

Our security system verifies the user from all possible aspects to avoid any kind of corruption.

Overseas votes can also easily cast votes by just one click, all they just need to have is their internet connected device. Participants will also be able to submit complaints and suggestions anonymously.

1.2. Objectives

- We have developed an Online election system.
- Our Online voting system will help organizations to save their time, cost and labor effort from wastage.
- To provide people the ease to vote according to their natural rights of making decisions and preferences.
- We have developed this system to eliminate the threats of corruption and third party pressure which the voters face during elections.
- We are ensuring security with the help of two factor authentications.
- Securities keys with verified credentials.
- Use of Code generators to verify the voter.
- We have developed this system to give liberty and freedom to organizations and participants to conduct elections according to their own requirements.
- To eliminate duplication and fake casting of votes

- To provide a platform where everybody can vote without having to rush to any specific place for the purpose of election.
- Making the user information secure by adding encryption methods.
- Personal information and votes data are encrypted.
- Reducing labor work by automated counting of votes and compilation of results.
- Even the organizational heads won't be able to give results of their choice rather the elections will be completely democratic.

1.3. Problem Statement

There were several factors which are behind our idea for the development of Online Voting System. All those factors combined to motivate us for making the proposed project. One of the main factors was that most of the developed countries have switched to electronic systems for elections, but Pakistan has not introduced any such thing. Pakistan is still taking elections on the traditional paper-based polling system. But the ways of corruption are not the traditional ones rather are increasing day by day.

So in order to solve all those issues which people of Pakistan face in every election, we had decided to give an advanced platform to the organizations of Pakistan. Online Voting System provides a platform where there will be no chances of corruption and wastage of resources. On the other hand, in the previous election system, manual counting of votes, sometimes used to take several revisions of counting, which not only wasted time but also increased the labor cost. Misplacement of votes (mistakenly as well as for corruption purpose) was a major issue.

Pakistan is a developing country and needs eligible candidates to be selected in elections of all organizations, Not only in national level elections but for organizational seats(posts) as well. Paper based polling system never allowed democratic elections. To resolve all those issues in the organizations of Pakistan we have developed this Online Voting System.

1.4. Assumptions and Constraints

- In the case the application or software is not installed in the device the User won't be able to use the facility.
- In case the user doesn't enter the required information correctly, he/she won't be able to submit the vote.
- Vote can only be submitted once, irrespective of anything done wrong by mistake.
- As it is an Online Voting system so, In case of non availability of proper internet connection, the user won't be able to access the system.
- If the internet connection is very poor the vote might not get submitted within the given time frame, so in this way the vote might be wasted.

- If the participant has not his/her phone or Gmail account available at the moment he won't get the security code so he/she won't be able to get registered as Code generator has applied to ensure security.
- This Online Voting system cannot be used offline.

1.5. Project scope

- Our motivation and scope behind developing this system is to encourage democratic selections of candidates in organizations of Pakistan.
- We have developed an Online election system where organizations can easily manage the conduction of votes with minimal efforts, satisfying all their requirements.
- This Online Voting system also provides the ease to update settings of relevant accounts.
- Our Online Voting system is providing an efficient and secure platform for the conduction of elections with advanced security features.
- This Online Voting system has provided ease for the participants who are out of station due to any reason and cannot go to the relevant organization urgently to cast votes, rather they can easily cast votes from wherever they are by just having an internet connected device.
- Other than the votes, complaints and suggestions can also be given using this portal.
- Results are compiled automatically, and the participants can easily view the no of votes which each candidate got through each department.

2.Chapter No 2

2.1. Requirements Analysis

2.2. Literature Review:

There are various already developed applications which have a few functionalities similar to our application. The functionalities are not exactly similar to our Project rather each of them has limitations in certain areas. Some of the major web-based applications are:

2.2.1. Election Runner

This is a mobile based application for online elections. [1] Election Runner is a very efficient application for phone voting, managing nominations and ballots through emails etc. It is available on ITunes and google play to download for free. This is an IOs and android application and provides a very convenient way to conduct elections for organizations. The users can login to the system for using election runner. Accounts settings can also be done by clicking on to the settings button provided at the top menu bar of the dashboard. By clicking the toggle this app can be easily enabled or disabled. Our feature of management of elections is similar to this application. [2]

2.2.2. Critical analysis

For using Election runner participants don't need to use mobile phones necessarily as it is a web-based application. Rather participants can easily use the application by using any of the internet connected web browsers e.g., Firefox, safari etc. One of the main benefits of this application are if the admin sends email invitations to the participants, they don't need to download the application but can also access the portal by clicking on the link provided in the email invitation. [16]

2.2.3. OpaVote

OpaVote (now called fair Vote) is an online portal which provides a platform for ranked and choice(preference) voting.[5] This application is a bit different from other online voting applications, but it provides a platform to educate people to vote in an interactive way. This feature of OpaVote is a bit similar to our idea of providing a voting guide for the new participants. [15]

2.2.3. Critical Analysis

This online application provides many features like featured, ranked and choices voting. Review and suggestions can also be given while using this application. It also enables both off site and on-site conduction of votes. This application is mainly used for strike planning's, political parties and other streamline decisions. It also provides the feature of single use voting links via emails. [18]

2.2.4. Pool Gateway:

Pool gateway is a well-known advanced mobile, web and window's-based application. [3]. This application is the most beneficial for business services and entrepreneurial operations. This application provides features like managing Candidate profiles, nominations, SMS voting, ranked and choice voting etc. There is another feature which is pool gateway wizard which can be used

to secure user access, creation of new policies and user registrations. This application also provides interaction among people through emails and SMS.[14]

2.2.5. Critical Analysis

This application provides a very secure platform for voting. Security codes, unique citizen codes and biometric authentications are being used to enhance security levels. Our feature of Code generators is similar to their security codes features. Another advanced feature of this application is AI which is used for the detection of exceptions and illegal users. [17]

2.3. Stakeholders

- The Users (Voters, Candidates, managers)
- The Development team.
- The Admin
- Final project supervisors
- Final year project committee of CUI
- The Market Competitors.

2.4. Requirements Elicitation

2.4.1 Functional Requirements

FR01: Login

Req. No	Functional Requirements
FR-01-01	System must allow the users to enter usernames and passwords.
FR-01-02	System should allow the user to access the dashboard when the login is successful.
FR-01-03	System should prompt the user to re-enter username and password if login is not successful.

Req. No	Functional Requirements
FR-01-04	System should allow the users to recover their passwords by clicking the forget password option.
FR-01-05	System should allow the user to save information by clicking the given "remember me" checkbox.

Table 1 FR01: Login

FR-02: Sign up

Req. No	Functional Requirements
FR-02-01	The system must allow the Users to sign up.
FR-02-02	The system should allow the participants to sign up to the system by clicking the given "signup" button
FR-02-03	System must prompt the user if the email address or ID is already taken by someone.
FR-02-04	System should lead the user to the dashboard when sign up is successful.

Table 2 FR-02: Sign up

FR-03: Create ballot

Req. No	Functional Requirements

FR-03-01	When login is successful, system should allow user to create a ballot by the given "Create ballot" button.
FR-03-02	System must allow the organizer(user) to enter the required details for the creation of the ballot.
FR-03-03	System should notify the user when the ballot is successfully created.

Table 3 FR-03: Create ballot

FR-04: Send Notification

Req. No	Functional Requirements
FR-04-01	The system will popup the notification bar when each functionality is successfully performed.

Table 4 FR-04: Send Notification

FR-05: View details

Req. No	Functional Requirements
FR-05-01	When the user successfully login the system, the system should allow him to view details.
FR-05-02	The system must display the details list when the user clicks the given "view details "button.

Req. No	
FR-05-03	The system should notify the user if there are no details available at the moment.

Table 5 FR-05: View details

FR-06: Count Votes

Req. No	Functional Requirements
FR-06-01	System will automatically count the votes after verification from the database.
FR-06-02	System will display the final results when the user will click the given "display results" button.

Table 6 FR-06: Count Votes

FR-07: update account settings

Req. No	Functional Requirements
FR-07-01	System must allow the user to update his account settings by clicking the "edit settings" button.
FR-07-02	System should also send a notification to the user if settings are successfully updated.
FR-07-03	System will allow the user to cancel the proceedings by clicking the given "cancel" button.

Req. No	Functional Requirements
FR-07-04	System should also notify the user if something gets wrong or changes are not successfully updated.

Table 7 FR-07: update account settings

FR-08: Submit Vote

Req. No	Functional Requirements
FR-08-01	System must allow the user to cast a vote by clicking the given "submit Vote" button.
FR-08-02	System should send a notification (or popup notification bar) when the vote is submitted successfully.

Table 8 FR-08: Submit Vote

FR-09: Submit Complaint

FR No	Functional Requirements
FR-09-01	System must allow the user to give a review by clicking the given "submit Complaint" button.
FR-09-02	System should send a notification (or popup notification bar) when the complaint/suggestion is submitted successfully.

Table 9 FR-09: Submit Complaint

FR-10: Voting Guide

Req. No	Functional Requirements
FR-10-01	System should allow the user to reach the voting guide video by clicking the given "helpline" button.

Table 10 FR-10: Voting Guide

FR-11: Access dashboard

Req. No	Functional Requirements
FR-11-01	System must allow the user to Reach the dashboard after the login is successful.
FR-11-02	System should Permit the user to submit a vote by clicking the given "submit Vote" button.
FR-11-03	System must Permit the user to give a review by clicking the given "submit Complaint" button
FR-11-04	System will display the final results when the user will click the given "display results" button.
FR-11-05	System must permit the user to update his account settings by clicking the "edit settings" button.
FR-11-06	System should also permit the user to logout the system by clicking the given "logout" button.

Table 11 FR-11: Access dashboard

FR-12: Logout

Req. No	Functional Requirements
FR-12-01	System must permit the users to get logged out of the system by clicking the "logout" button.
FR-12-02	System will lead the user to the login page when logout is successful.

Table 12 FR-12: Logout

2.4.2 Non Functional Requirements

NFR-01: Performance

NFR- No	Non-Functional Requirements
NFR-01-01	Load time of the pages of the system should definitely be less than two seconds.
NFR-01-02	Processing time required to complete a request must be less than five seconds.
NFR-01-03	The system's mean time of failure must never exceed 60 seconds within 24 hours.
NFR-01-04	Response time of the system must be less than five seconds.

Table 13 NFR-01: Performance

NFR-02: Security

NFR-No	Non-Functional Requirements
NFR-02-01	System should provide access only to the authorized users.
NFR-02-02	The system must never allow any user other than the designated person to update the database.
NFR-02-03	The system should never allow any user to view the encrypted data of other users.

Table 14 NFR-02: Security

NFR-03: Usability

NFR-No	Non-Functional Requirements
NFR-03-01	The system must provide the voting guide and other help documentations about all the functionalities to the new users.
NFR-03-02	The system will have a very easy to understand interface for the non technical and first time users.

Table 15 NFR-03: Usability

NFR-04: Defects Maintenance

NFR- No	Non-Functional Requirements
NFR-04-01	After the release of the system, defects should never be more than 1 in 30 days.
NFR-04-02	After release defects fixing should never take less than 6 hours.

Table 16 NFR-04 : Defects Maintenance

NFR-05: Reliability

NFR-No	Non-Functional Requirements
NFR-05-01	In the case of any server crash or error, all the data should be recoverable within an hour of the event.
NFR-05-02	The system must ensure that there will be no data loss in cases of server/client crashes.

Table 17 NFR-05 : Reliability

NFR-06: Supportability

NFR-No	Non-Functional Requirements

NFR-06-01	This Online Voting System (admin panel) should successfully run on all the internet web browsers like chrome, safari, firefox etc	

Table 18 NFR-06: Supportability

2.5. Requirements Traceability Matrix.

Table 1: Requirement Traceability Matrix

Require ments.	Actor	Team Member	Priority	Use Case ID	Activi ty Diagr am	Use Case diagram.	Test Case	Test case Techni que	Case Status
FR-01	User, Server, Admin	Areebah, Chandkaift ikhar	High	1	50	42	will Users be able to get logged in or not	Use case testing	Pass
FR-02	User, Server, Admin	Areebah, Chandkaift ikhar	High	2	51	47	will users be able to get registere d or not	Use case testing	Pass
FR-03	User, Server, Admin	Areebah	High	3	53	46	will admin be able to create ballot or not	Use case testing	Pass

FR-04	Sever	CHandka Iftikhar	Medium	4	53	43	will server send notification or not	Use case testing	Pass
FR-05	User, Server, Admin	Chandkaiftikhar	Low	5	_	45	Information is visible to users or not	Use case testing	Pass
FR-06	User, Server, Admin	Areebah, Chandkaiftikhar	High	6	52	38	is the result made is accurate or not	Use case testing	Pass
FR-07	User, Server, Admin	Areebah, Chandkaiftikhar	medium	7	54	44	will Users be able to change their acc. settings or not	Use case testing	Pass
FR-08	User, Server, Admin	Areebah	High	8	52	43	votes are submitted successfully or not	Use case testing	Pass

FR-09	User, Server, Admin	Areebah	High	9	_	39	complaints are submitted successfully or not	Use case testing	Pass
FR-10	Server, User	Areebah, Chandkaiftikhar	low	10	_	41	will voting guide be played successfully by users or not	Use case testing	Pass
FR-11	User, Server, Admin	Chandkaiftikhar	high	11	51	39	will the dashboard be loaded fastly or not	Use case testing	Pass
FR-12	User, Server, Admin	Chandka Iftikhar	high	12	53	40	will logging out lead Users to login page or notS	Use case testing	Pass

Table 19 Requirement Traceability Matrix13

2.6. Use Case Descriptions

Table 2: Use case description of Sign Up

Use case ID 001	Use case Name: Sign Up
Priority high	
Actors: User, Administrator	
Use Case Summary	Signing up allows the user to get registered into the Online Voting System.
Pre-condition:	The user firstly needs to open the Online Voting System to get registered to the system.

Normal Flow of Events	Alternative Path
1. Use case starts when the user wants to get registered to the system.	**1a:** In case the user does not confirm registration, he cannot get his account registered.
2. To get registered the user will enter the details like First name, last name, CNIC, security code, contact number, email ID and password.	
3. System will reconfirm the submission of details by popping up a reconfirmation button.	
4. Users will confirm the account registration.	**4a:** User does not confirm registration by clicking the "cancel" button.

5. The system in response to successful registration, notify the user for confirmation of account registration.	
6. Use case ends here.	

Exceptions / Alerts

1. The system will not allow access to users without getting registered first

2. The system will not allow account registration in case of any missed information entered.

Post Conditions

Step#	Description
The user will be successfully registered into the Online Voting System.	

Use Case Cross References

Includes	Cancel Action
Extends	None

Table 20 Use case description of Sign Up

Table 3: Use case description of Login

Use case ID 002	Use case Name: Login
Priority high	
Actors: User, Administrator	
Use Case Summary	Logging in allows the user to access his personal account.
Pre-condition:	If a user wants to login he firstly needs to get signed up into the Online Voting System.
Normal Flow of Events	**Alternative Path**
1. Use case starts when the user wants to login to use the system's functionality.	
2. To login the user needs to enter his ID , password and security code.	
3. The system responds by displaying "Welcome to Online Voting System"	
4. use case ends here.	

Exceptions / Alerts	
1. In case of wrong input, The system will not allow login to access accounts.	

Post Conditions	
Step#	**Description**
The user has successfully logged in to the Online Voting System.	
Includes	Cancel Action
Extends	None

Table 21 Use case description of Login

Table 4: Use case description of Submit vote

Use case ID 003	Use case Name: Submit Vote
Priority **High**	
Actors: User	
Use Case Summary	Submit Vote allows the user to vote one of the nominated candidates.

Pre-condition:	The user firstly needs to login his account.

Normal Flow of Events	Alternative Path
1. This use case starts when the user login to cast a vote to a candidate.	
2. The user needs to press the "submit Vote" button in order to cast a vote.	
3. The system will display the ballot page.	
4. User selects the candidate whom he wants to cast a vote to.	**4a.** The user press "cancel" button.
5. If the user wants to confirm his vote, he'll press the "Confirm" button.	
6. Use case ends here.	

Exceptions / Alerts
1. After the submission of vote, the action cannot be revered.

Post Conditions

Step#	Description
The user has successfully submitted the Vote.	

Use Case Cross References	
Includes	Cancel Action
Extends	None

Table 22 Use case description of Submit vote

Table 5: Use case description Create ballot

Use case ID 004	Use case Name: Create Ballot

Priority	medium	
Actors:	User	
Use Case Summary	Create ballot option allows the organizer(user) to create a ballot page for election.	
Pre-condition:	The user firstly needs to login his account with his authorized ID and password.	

Normal Flow of Events	Alternative Path

1. This use case starts when users want to create a ballot page for elections.	
2. For this purpose, the user will need to press the "create ballot" button.	
3. Users will enter the Title of election, Nominated candidates list, and will select the time frame for election.	**3a.** The user clicks the "cancel" button.
4. The user clicks the "confirm" button to successfully submit the details.	
5. Use case ends here.	

Exceptions / Alerts

1. System will not allow the user to create a ballot if he has not logged in to the system.

Post Conditions

Step#	**Description**
Ballot page has been successfully created.	

Use Case Cross References

Includes	Cancel Action
Extends	None

Table 23 Use case description Create ballot

Table 6: Use case description of View Details

Use case ID 005	Use case Name: View Details
Priority medium	
Actors: User	
Use Case Summary	View details will allow the users to view results, accounts details and candidate details.
Pre-condition:	The user firstly needs to login his account with his authorized ID and password.
Normal Flow of Events	Alternative Path
1.Usecase starts when the user wants to see any kind of information from the portal.	
2. User will need to click the "view details" button.	

3. System will respond by displaying the options like view results, view candidate profiles, view personal account.	
4. Use case ends here.	

Post Conditions	
Step#	**Description**
Concerned information will be shown to the user.	

Use Case Cross References	
Includes	Cancel Action
Extends	None

Table 24 Use case description of View Details

Table 7: Use case description of Change Account Settings

Use case ID 006	**Use case Name: Update Account Settings**
Priority medium	

Actors:	User, Administrator

Use Case Summary	Update account settings allow the user to edit or change any kind of account information and privacy filters.
Pre-condition:	The user firstly needs to login his account with his authorized ID and password.

Normal Flow of Events	**Alternative Path**
1. Use case starts when a user wants to edit some information from his registered account.	
2. For this purpose the user needs to click the "Edit settings" button.	
3. User updates details like phone number, password etc	**3a.** User doesn't want to update any change in account and clicks "cancel" button.
4. User will press "confirm" option from the popped-up reconfirmation bar	
5. System notify the user after changes have been successfully updated.	**5a.** Changes will not be successfully updated.
6.Usecase ends here.	

Post Conditions	
Step#	**Description**
The user has updated the account settings.	

Use Case Cross References	
Includes	Cancel Action
Extends	None

Use case ID 006	Use case Name: Update Account Settings
Priority medium	
Actors: User, Administrator	
Use Case Summary	Update account settings allow the user to edit or change any kind of account information and privacy filters.
Pre-condition:	The user firstly needs to login his account with his authorized ID and password.

Normal Flow of Events	Alternative Path
1. Use case starts when a user wants to edit some information from his registered account.	
2. For this purpose the user needs to click the "Edit settings" button.	
3. User updates details like phone number, password etc	**3a.** User doesn't want to update any change in account and clicks "cancel" button.
4. User will press "confirm" option from the popped up reconfirmation bar	
5. System notify the user after changes have been successfully updated.	**5a.** Changes will not be successfully updated.
6.Usecase ends here.	

Post Conditions	
Step#	**Description**
The user has updated the account settings.	

Use Case Cross References	
Includes	Cancel Action
Extends	None

Use case ID 007	Voting Guide
Priority medium	
Actors: User, Administrator	
Use Case Summary	Voting guide allows the new users to get guideline to vote for their first time
Pre-condition:	Users must firstly need to login to the system.
Normal Flow of Events	**Alternative Path**
1. Use Case starts when the new user doesn't know the procedure to vote.	

2. Users must first need to login to the system.	
3. User needs to press the given "helpline" option to see the voting guide	**3a.** User doesn't want to see the voting guide and press the back arrow button.
4. Use case ends here.	

Post Conditions

Step#	Description

Voting guide will be successfully shown to the user.

Use Case Cross References

Includes	Cancel Action
Extends	None

Table 25   Use case description of Change Account Settings

Online Voting System

Login

Signup

Verification

View
Details

Dashboard

Online
Counter

Territory/Region

Create
ballot

Security

Database

Votes Count

Result

Actor

Actor

Actor
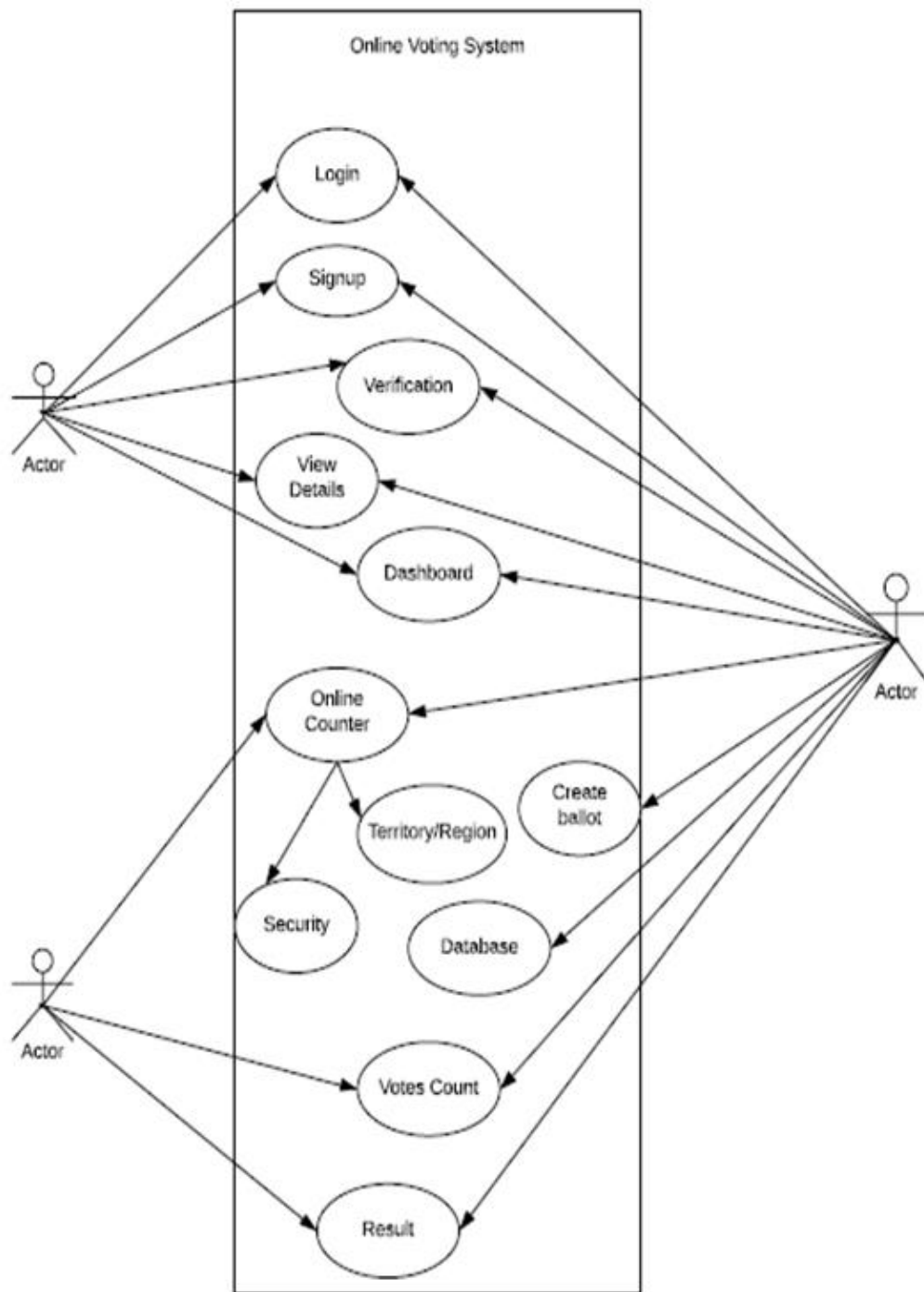
Figure 1 Use Case Diagram of Online Voting System

6.1 Use case for Voter
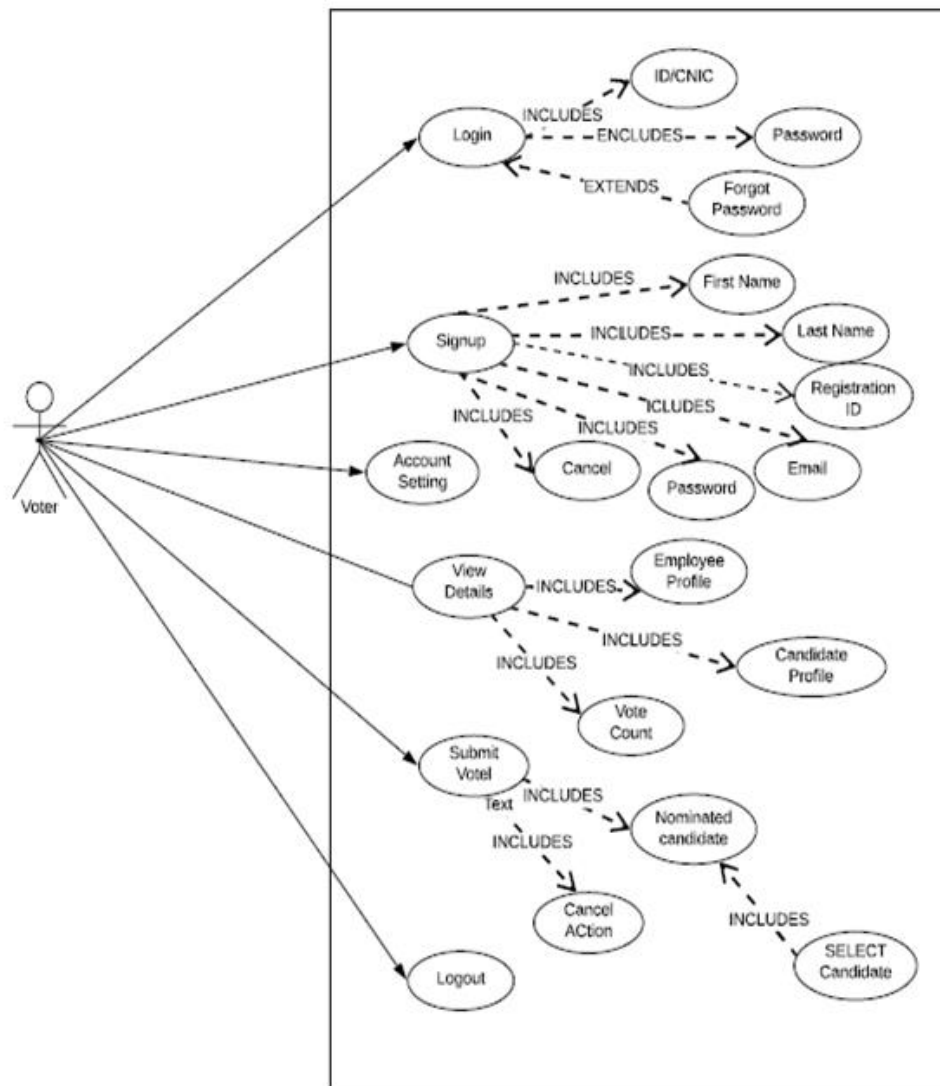
Figure 2 Use Case Diagram of Voter

6.2 Use case for Admin

Figure 3 Use Case Diagram of Admin

6.3 Use case for Server
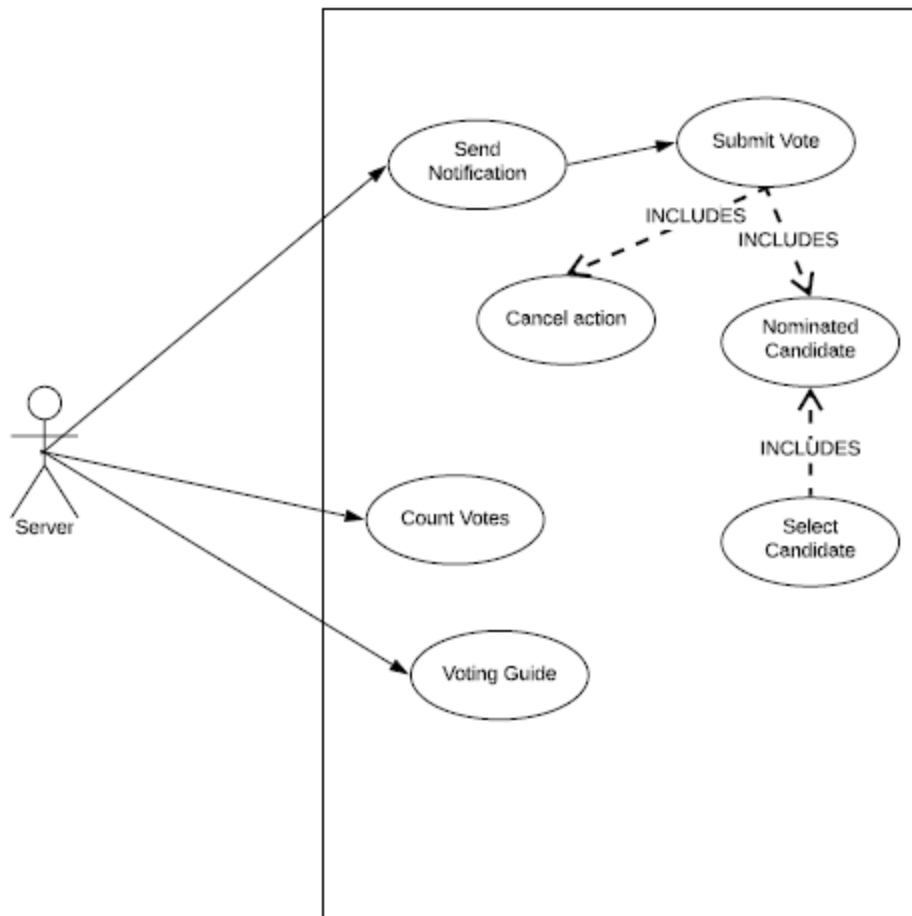
Figure 4 Use Case Diagram of Server

6.4 Login
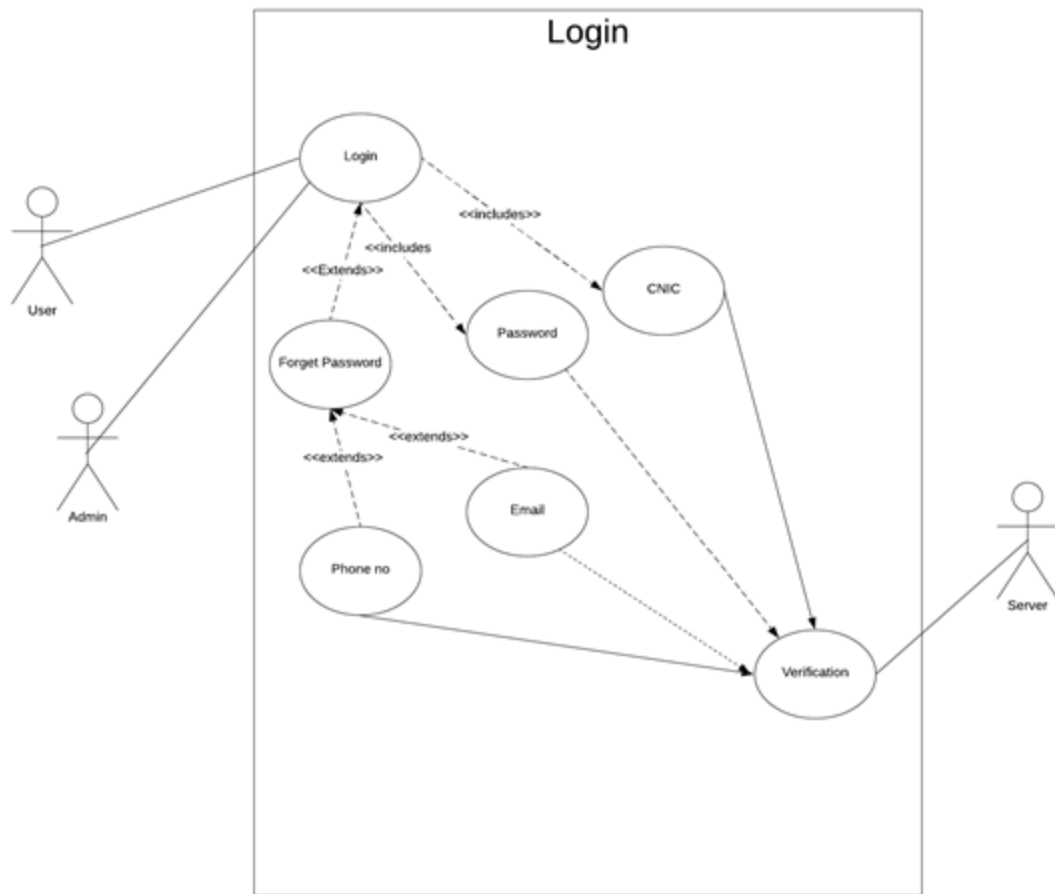
Figure 5 Use Case Diagram of Login

6.5 Submit Vote
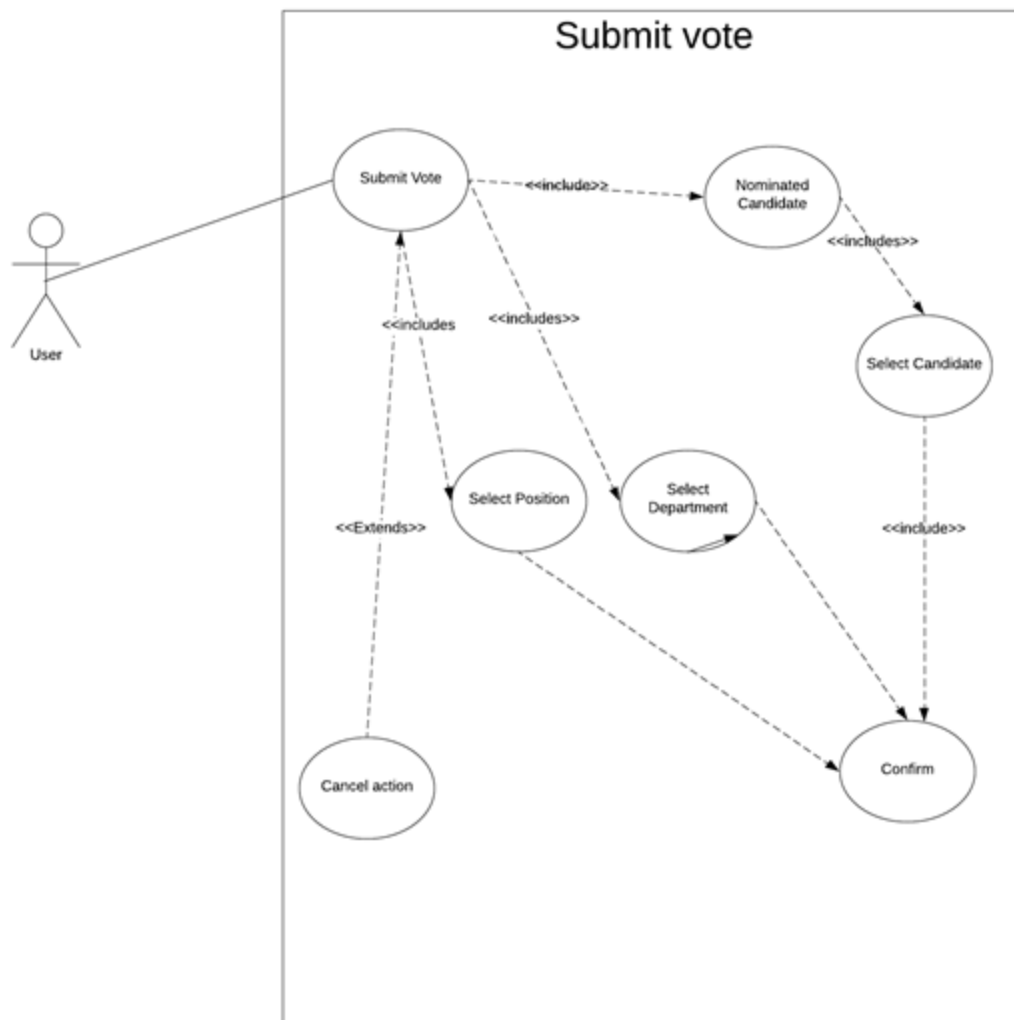
Figure 6 Use Case Diagram of Submit vote

6.6 Update account setting
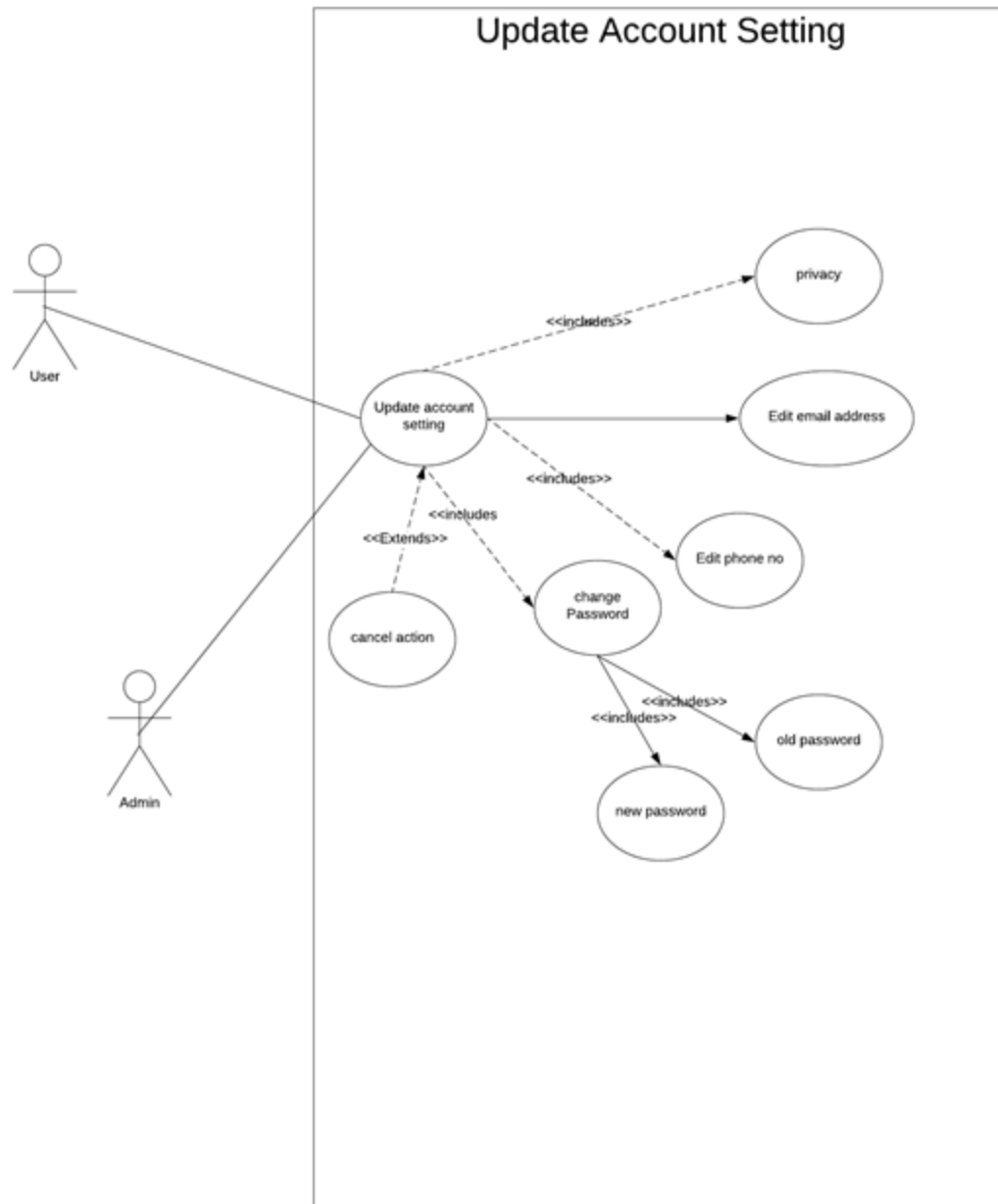
Figure 7 Use Case Diagram of Update Account Setting

6.7 View Details
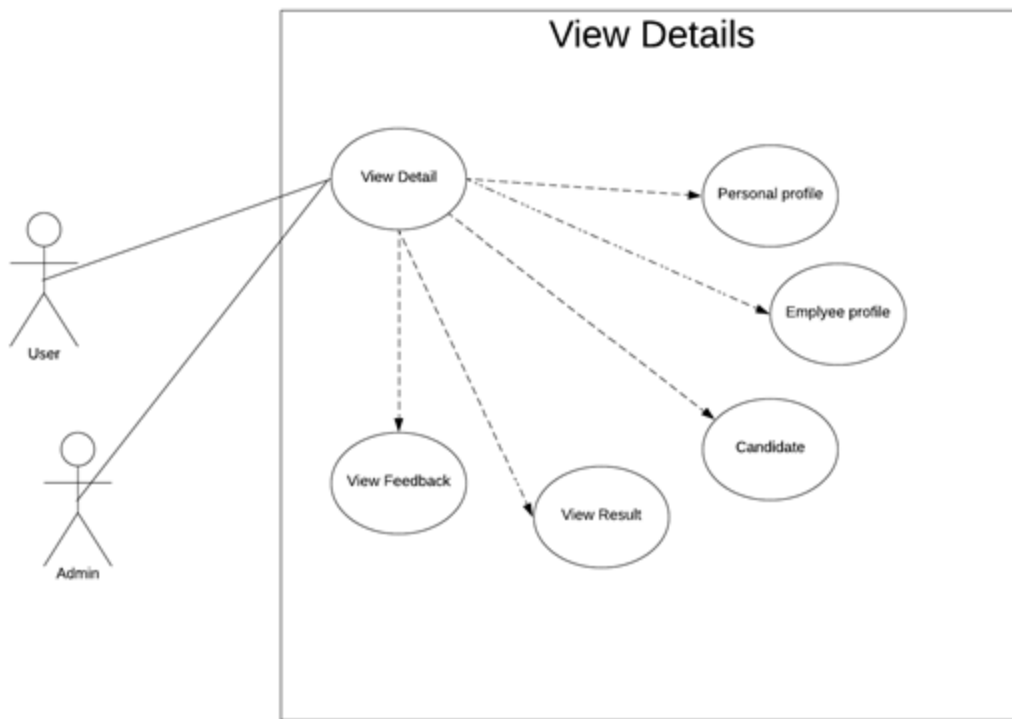
Figure 8 Use case Diagram of view Details

7.8 Create ballot:
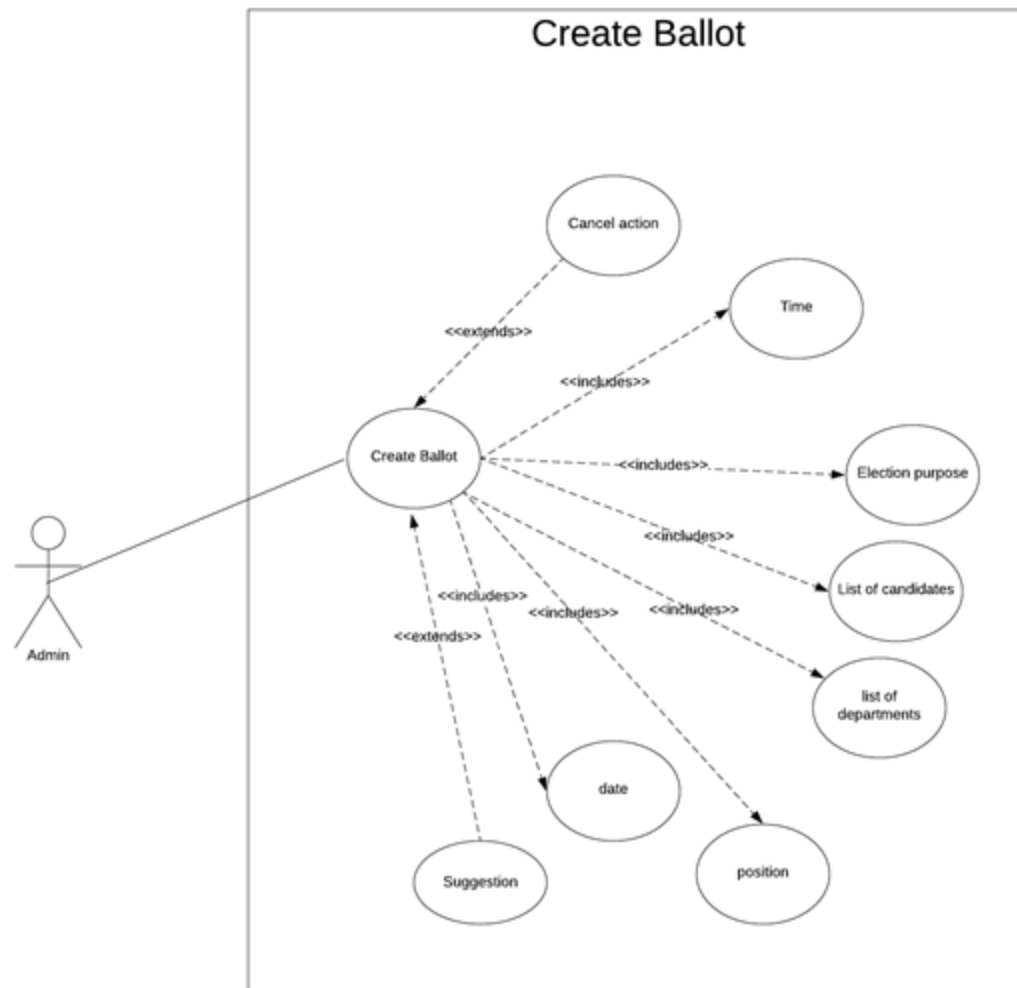
Figure 9 Use case Diagram of Create Ballot

6.9 Sign up
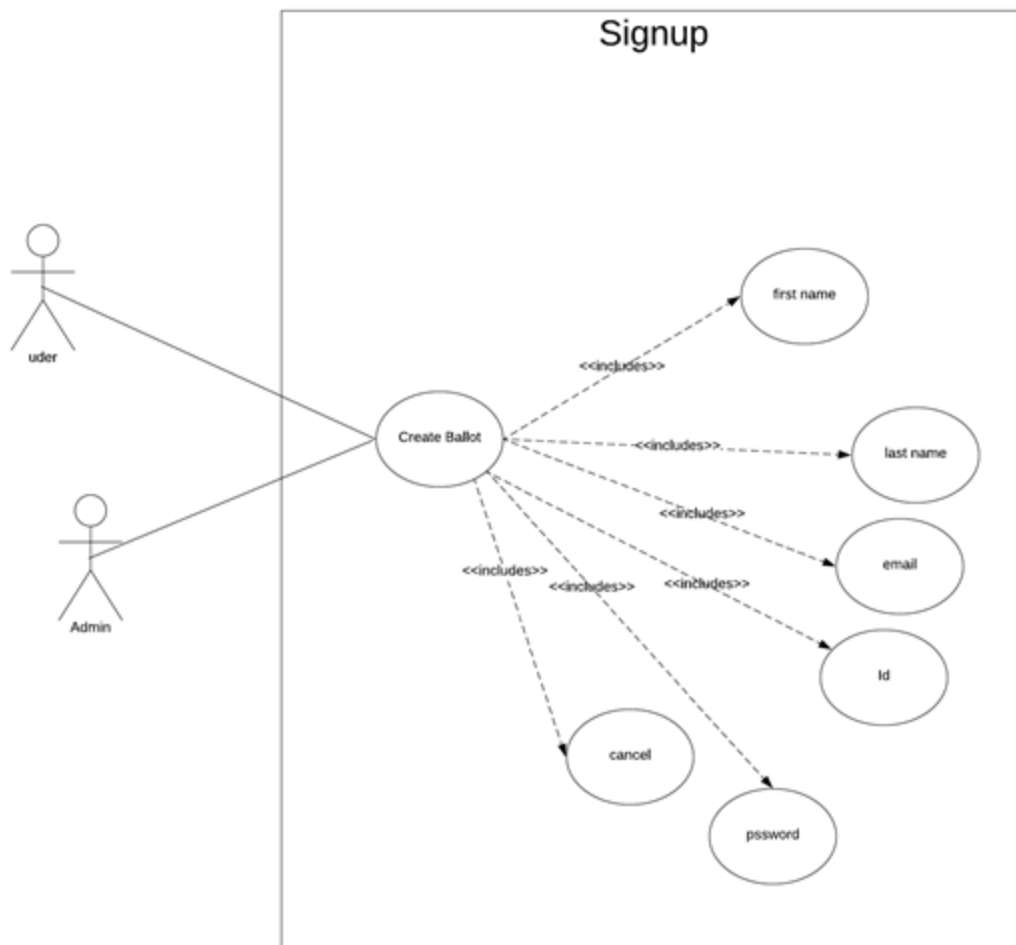
Figure 10 Use Case Diagram of signup

2.7. Software Development Life cycle

Hybrid model

To develop our Online Voting System we have chosen to use a hybrid model. This hybrid model is basically a combination of prototype model and incremental model. We have chosen the Hybrid model because in this way requirements have been divided and broken down into smaller multi level modules and the replication of such modules are being easily implemented. In this way we'll get product results at early stages. This is done during the analysis phase of our project.

Why Hybrid Model

- We are using this model because it gives a quick working system during the software development life cycle in much lesser time.
- To test, debug and integrate smaller modules and iterations is much easier than larger ones.
- By using this model our requirements are broken down into smaller standalone modules.
- The implementation of those smaller modules gives quick outputs. Better and increased user involvements will help also.
- Mistakes and errors can be easily identified and removed while working with smaller sections.
- In this way improved and better requirements specifications will save our time and cost while development.

3.Chapter 3

3.1. Work Breakdown Structure
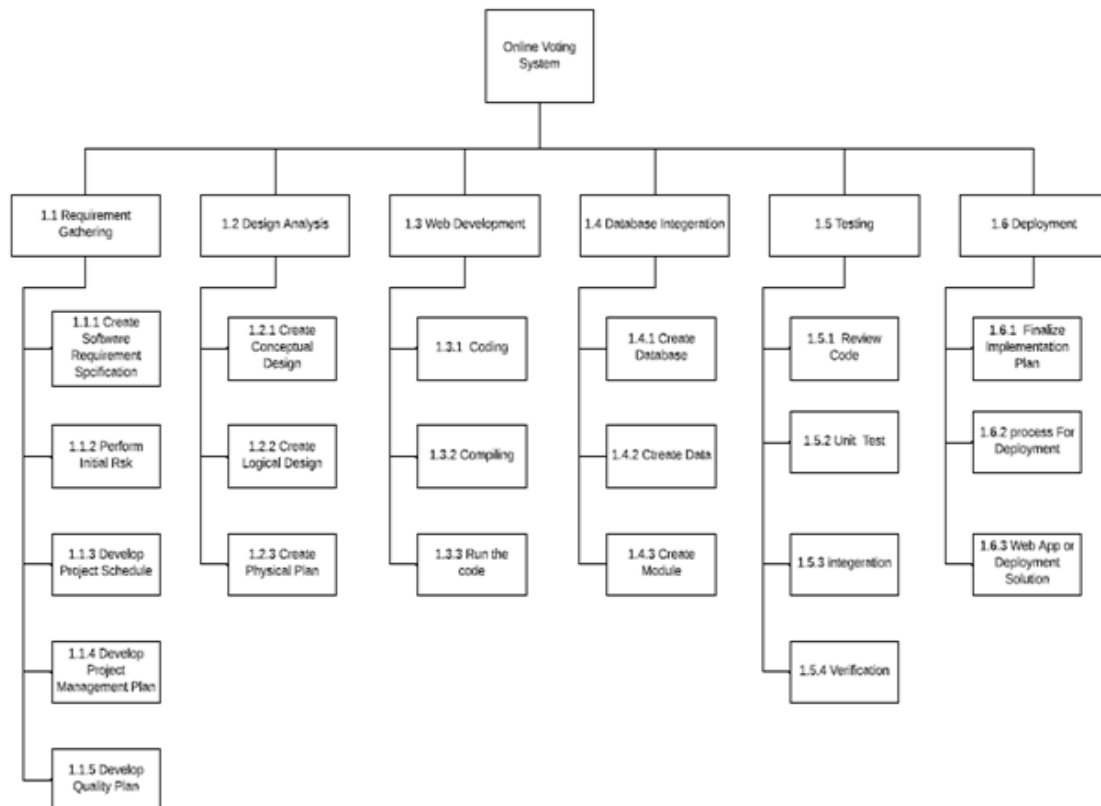
Figure 11 Work Breakdown Structure

3.2. Activity Diagram

3.2.1. Login
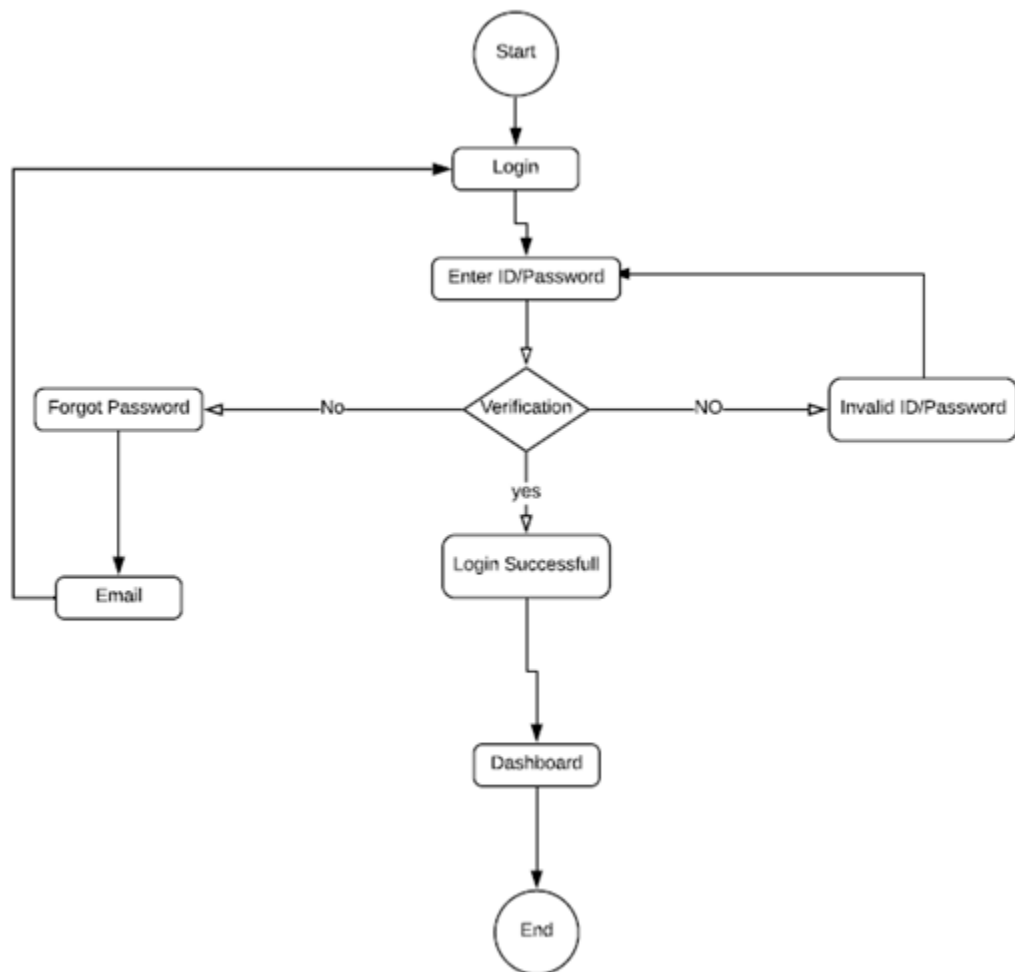
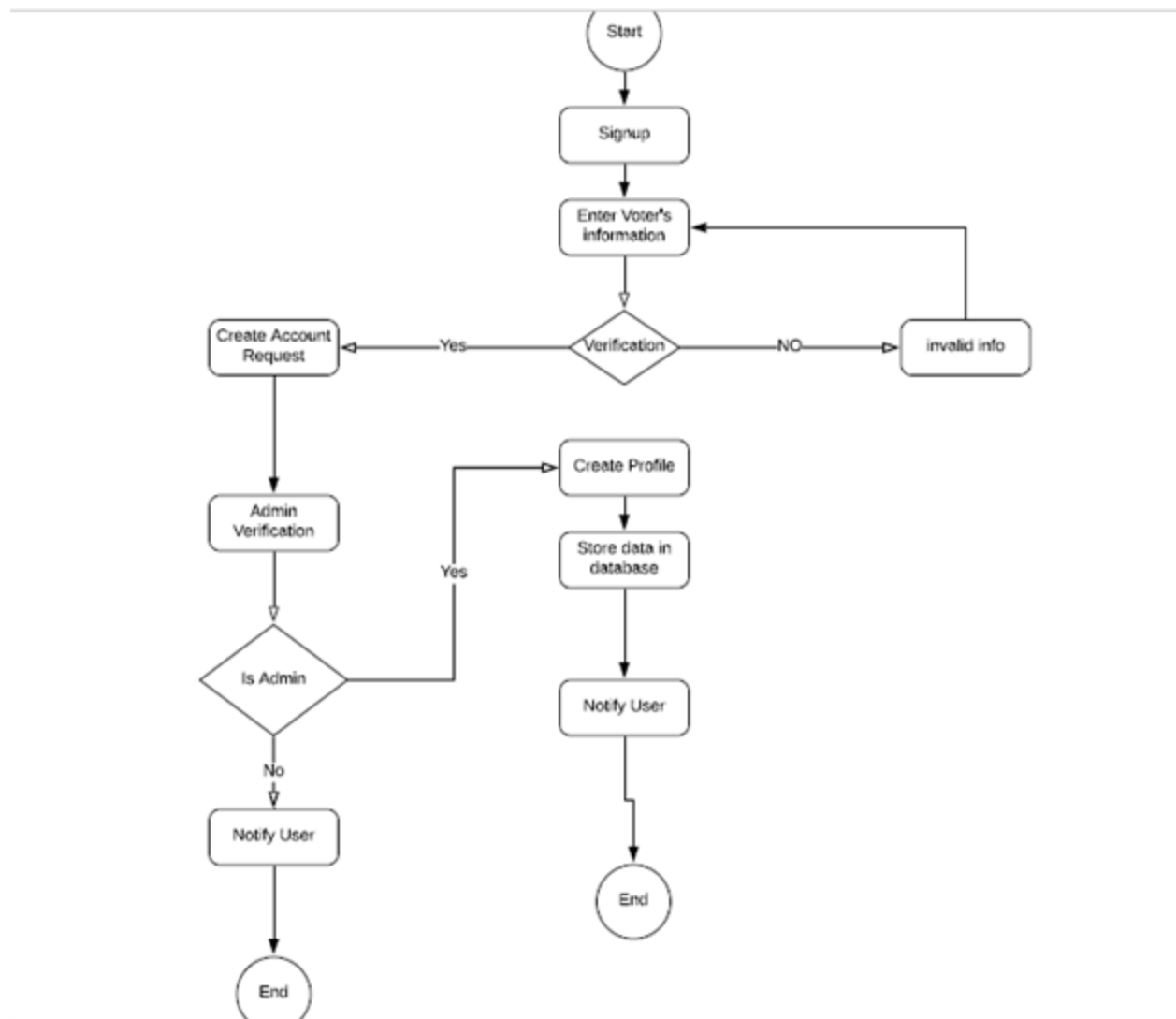Figure 12 Activity diagram of login

3.2.2. Signup

Figure 13 activity diagram of Signup

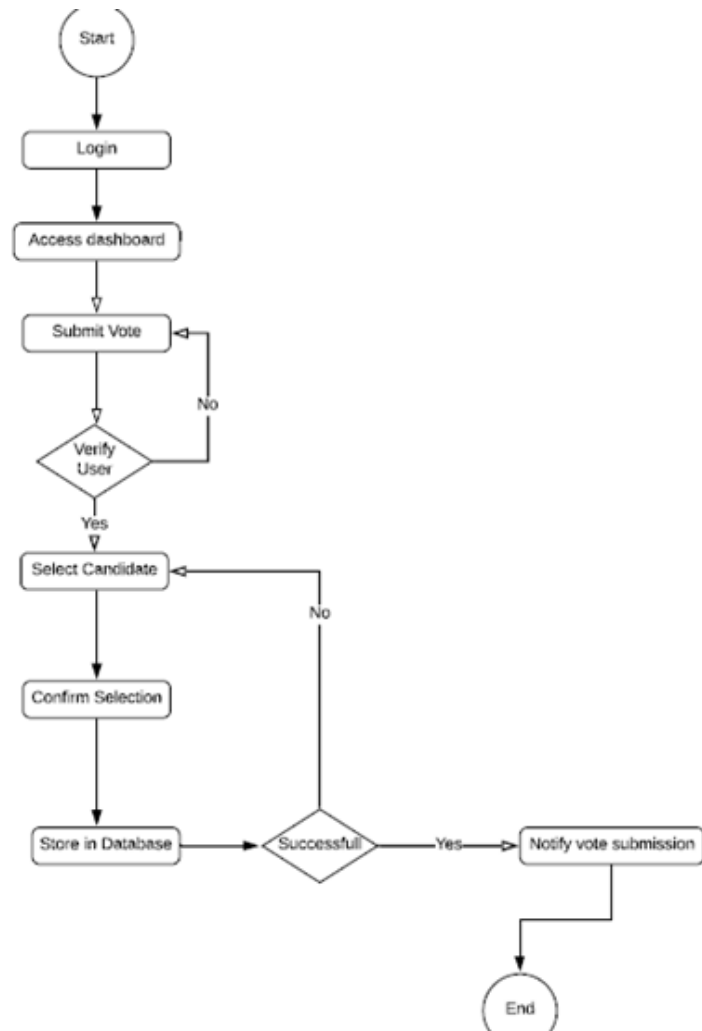### 3.2.3. Submit Vote

Figure 14   activity diagram of Submit Vote
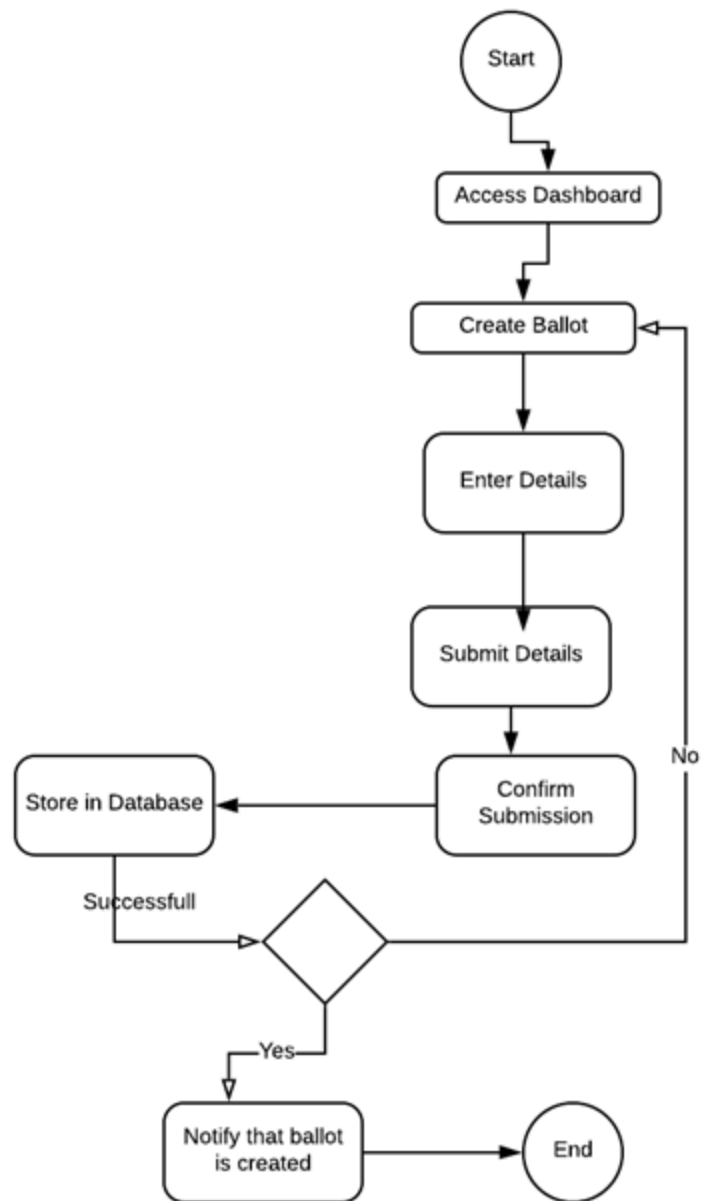
3.2.4.Create Ballot:

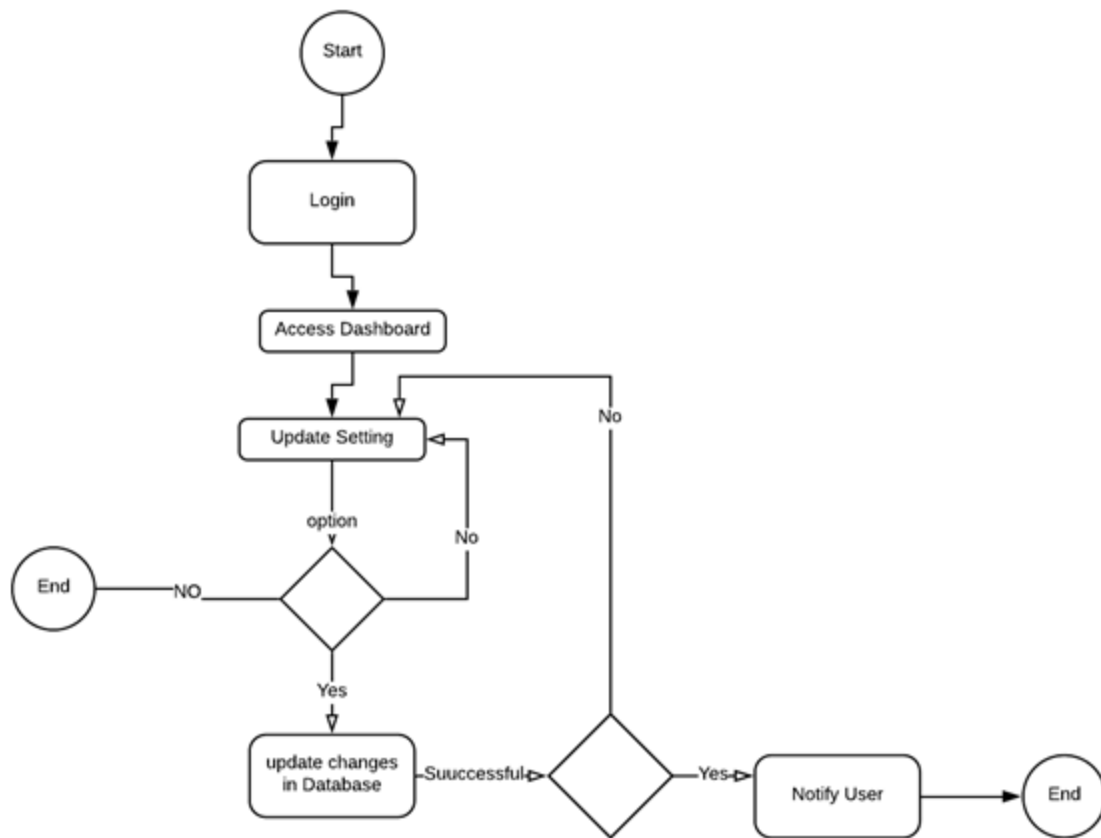Figure 15 activity diagram of Create Ballot

3.2.5.Account Setting

Figure 16 activity diagram of Account Setting

3.3. Sequence Diagrams
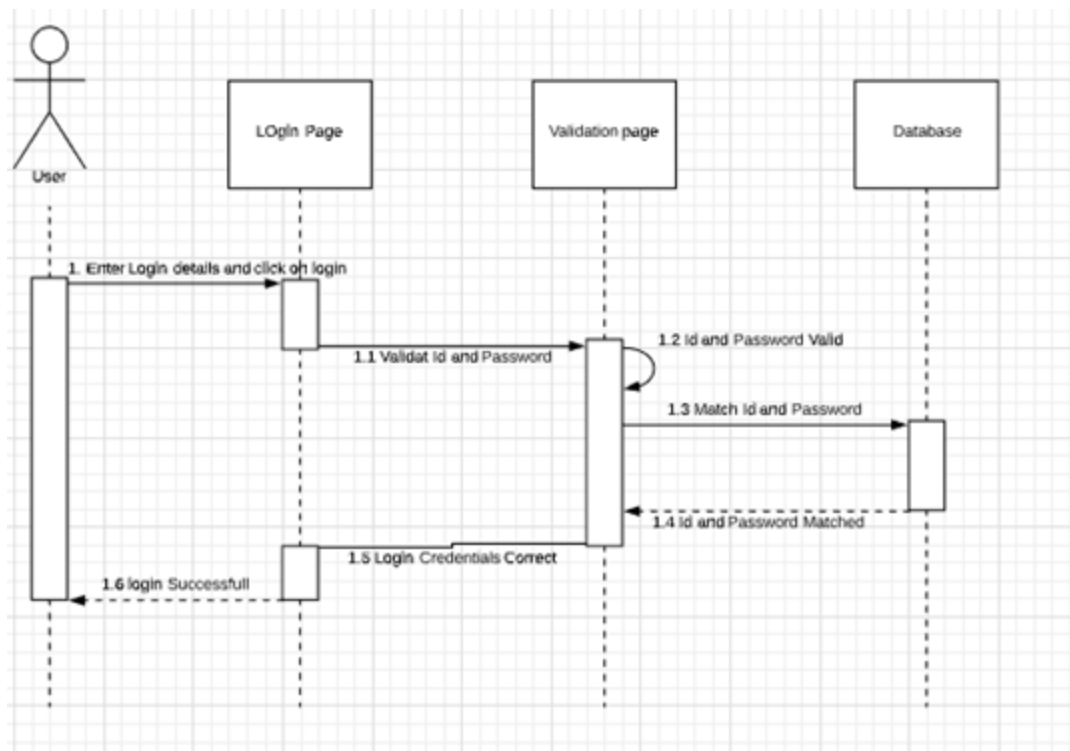
3.1 Login

Figure 17 Sequence Diagram of login
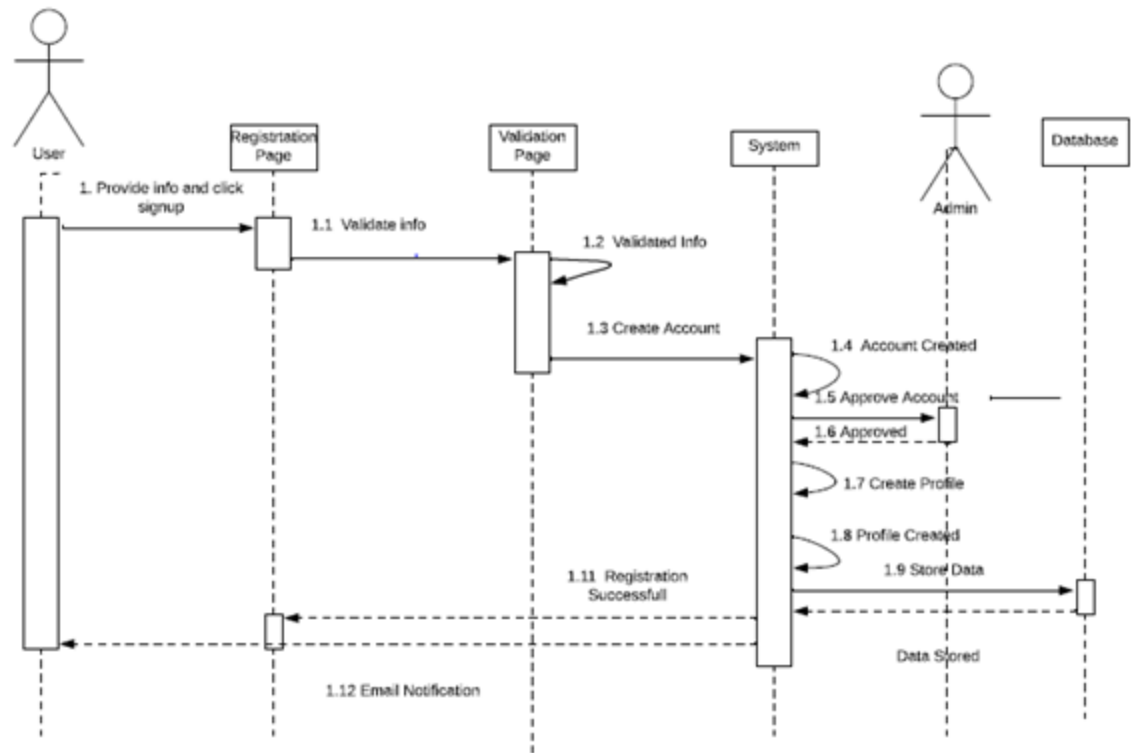
3.2 Signup

Figure 18 Sequence Diagrams of Signup
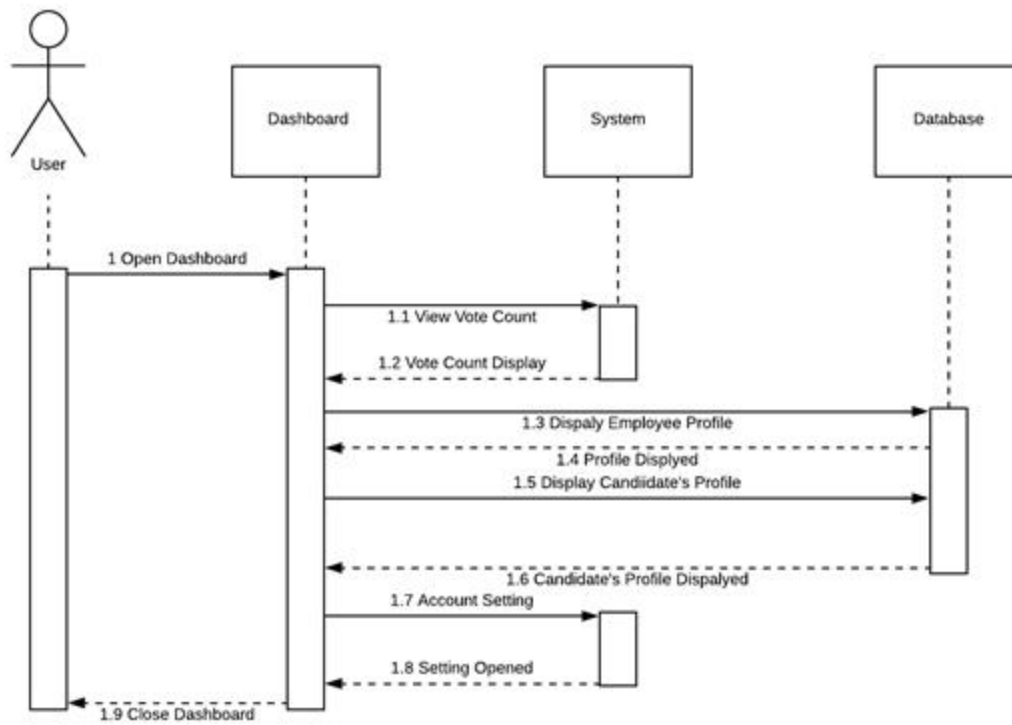
3.3 Access Dashboard

Figure 19   Sequence Diagrams of access dashboard
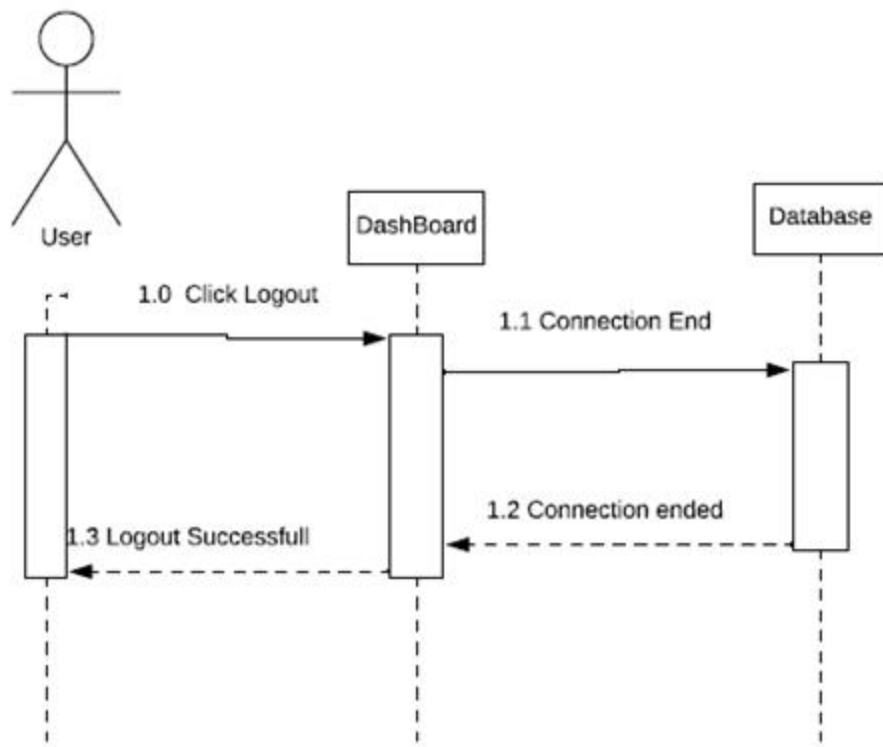
3.4 Logout

Figure 20 Sequence diagram of Logout
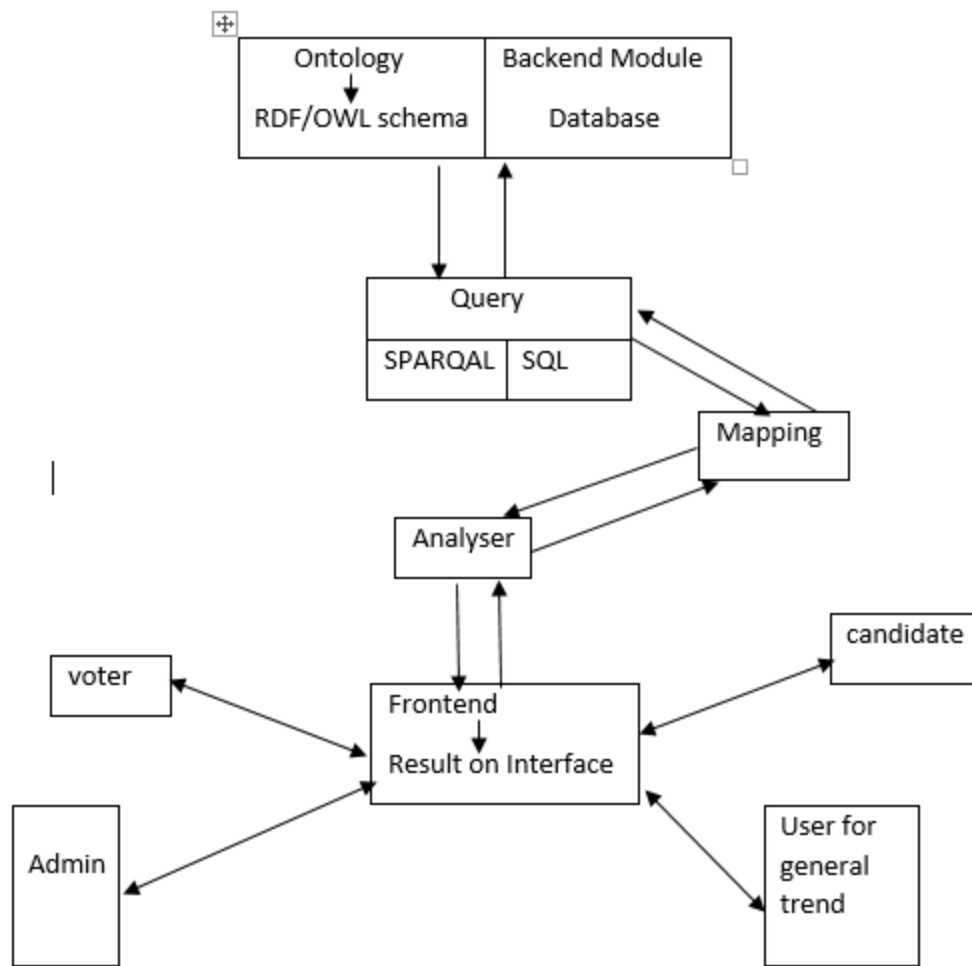
4 System Architecture.

Figure 21 Diagram of system architecture

6 Class Diagram

Figure 22 class diagram Of Online voting System
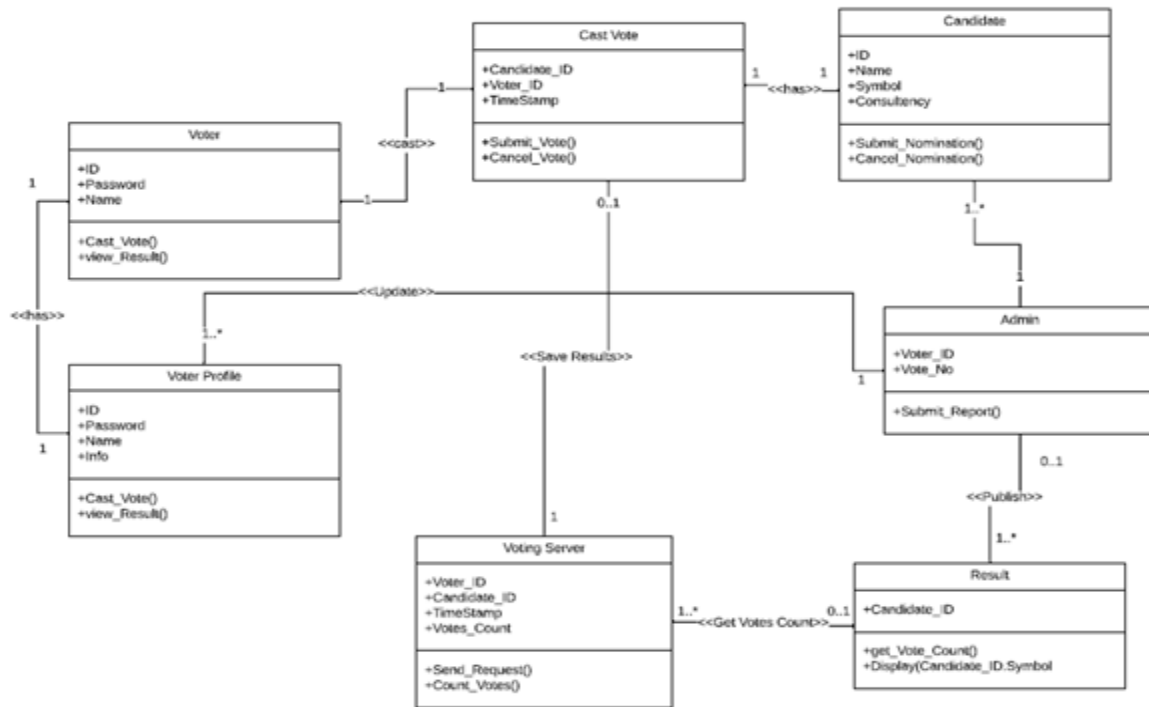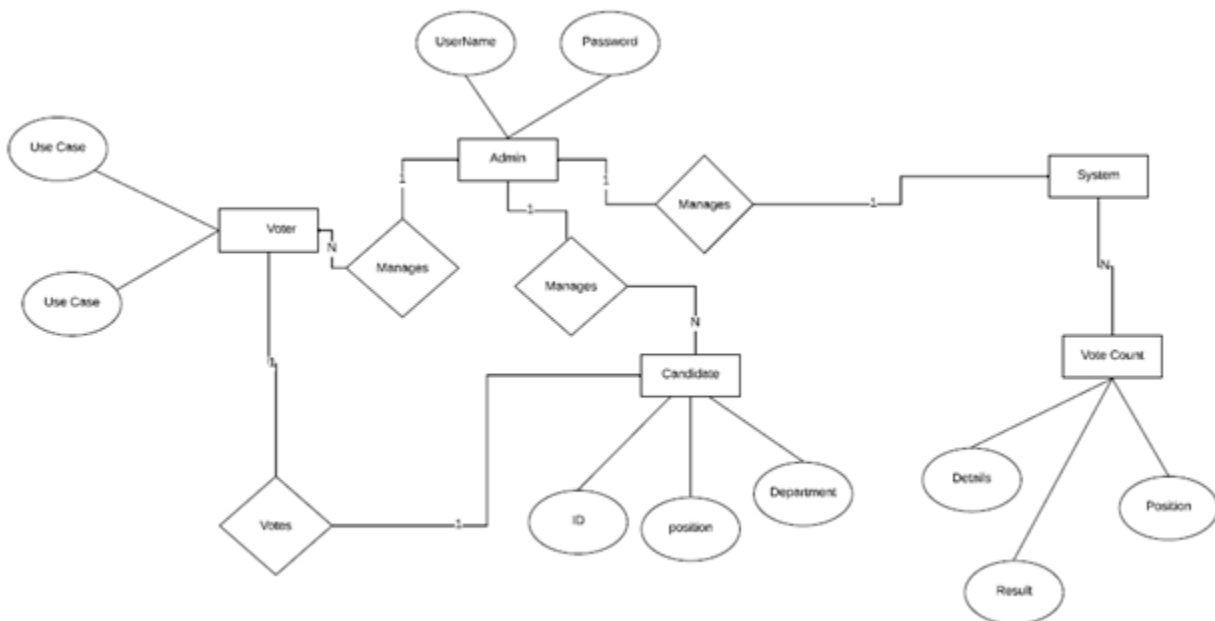

7 Database Diagram

Figure 23 Database Diagram of online voting System

8 Collaboration Diagram
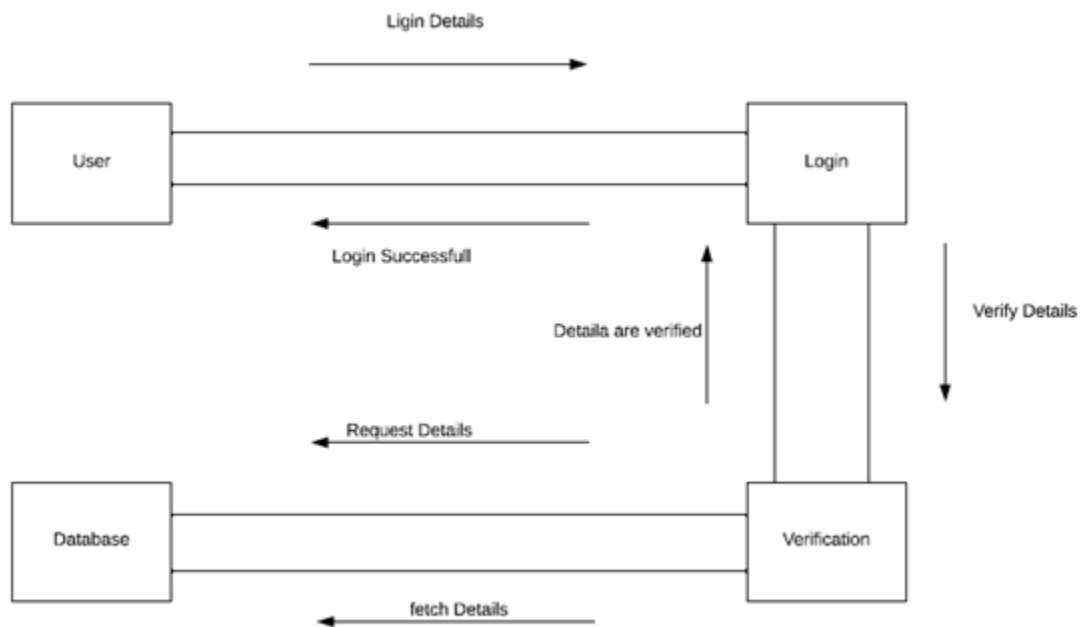
8.1 Login

Figure 24   Collaboration Diagram of login

8.2 Create Ballot
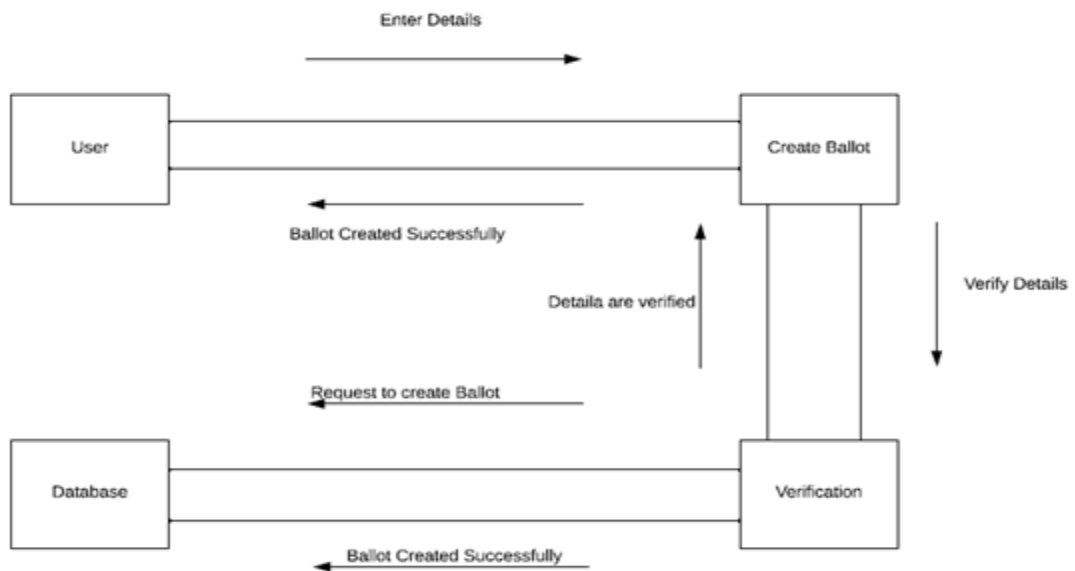
Figure 25   Collaboration Diagram of ballot

8.3 View Details
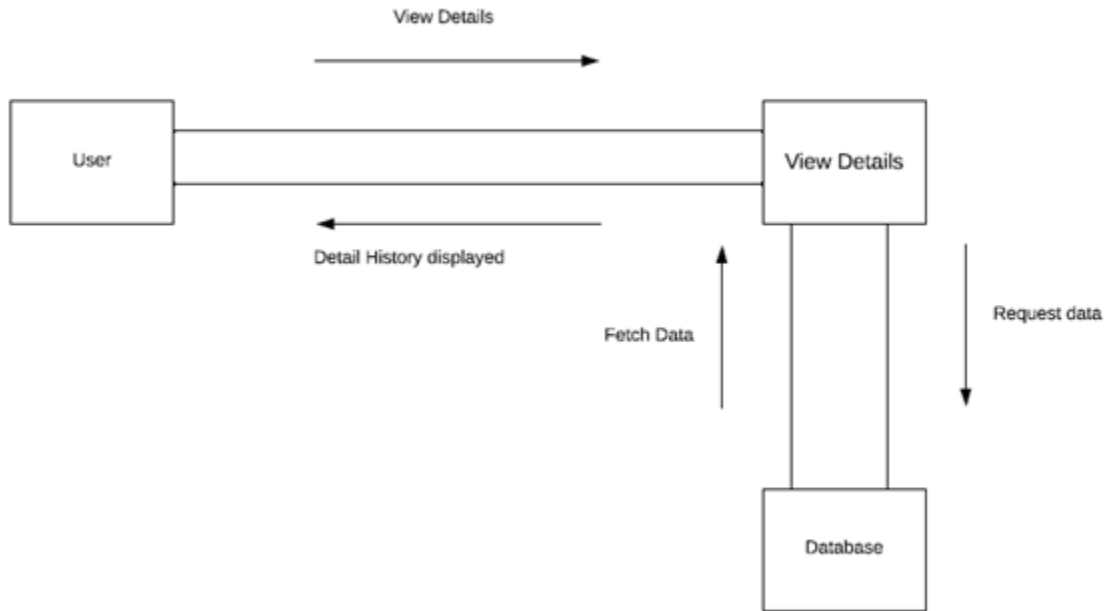
Figure 26   Collaboration diagram View Details

8.4 Account Setting

Figure 27 Collaboration diagram Account Setting
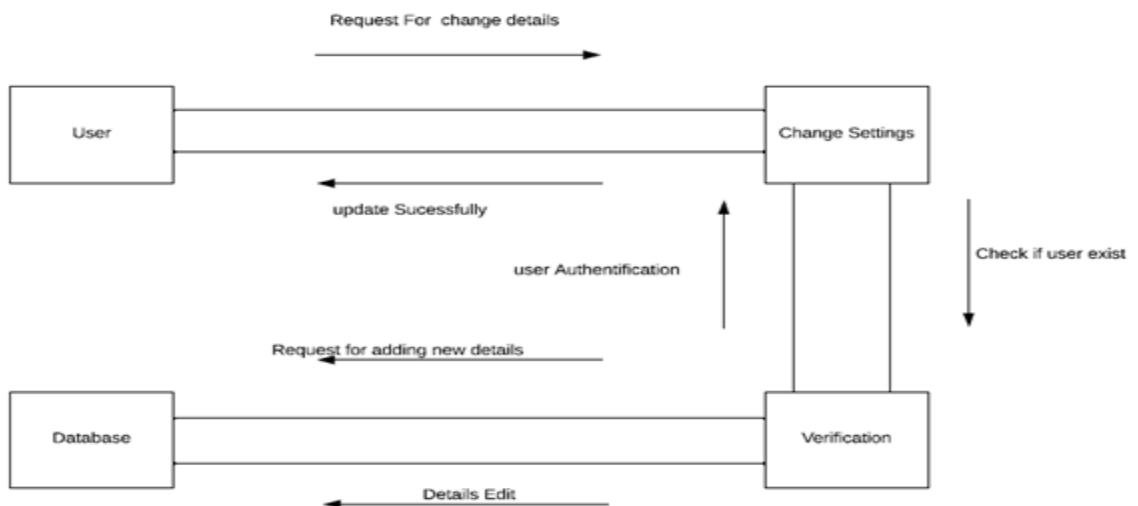
4.Chapter 4

4.1Test cases

Table 8: Test Case for Sign Up

Test Case #: 01	**Test Case Name:** Sign Up

System: Online Voting System

Designed By: Areebah

Executed By: Chandka Iftikhar

Short Description: Signing up allows the user to get registered in the online voting system.

St e p	Action	Expected System Response	Actual Response	Status
1	The user will click "sign up"	The system responds by displaying the following fields. 1.Enter Email Address 2.Enter First Name 3.Enter Last Name 4.Enter Phone number	The system responds by displaying the following fields. 1.Enter Email Address 2.Enter First Name	Pass

		5.Enter password. 6. dept. Id 7.Organization ID	3.Enter Last Name 4.Enter Phone number 5.Enter password. 6. dept. Id 7.Organization ID	
2	User fills the required information i.e email address, first name, last name, contact no, password correctly.	The system verifies if there is any mistake in the format	The system verifies if there is any mistake in the format	Pass
3.	User will press the given "sign up" button.	The system transfers the data to server for verification and will confirm sign up.	The system transfers the data to server for verification and will confirm sign up.	Pass

Post-Condition

1. User will be successfully registered to the Online Voting System.

Table 26 Test Case for Sign Up

Table 9: Test Case for Login

Test Case #: 02   **Test Case Name:** Login

System: Online Voting System

Designed By: Areebah

Executed By: Chandka Iftikhar

Short Description: Logging in will allow the user to access his account and would be able to use the functionality of the Online Voting system.

Pre-Conditions:

User must have Account in Online Voting System

Step	Action	Expected System Response	Actual Response	Status

1	User will click the "login" button on the navigation bar.	The system will respond by displaying the following fields 1.Email 2.Password	The system will respond by displaying the following fields 1.Email 2.Password	Pass
2.	Users will fill the required information in the given fields i.e ID and password.	The system verifies if there is any mistake in the format.	The system verifies if there is any mistake in the format.	Pass
3	User will press the given "login" button.	System will validate the information from database and in response will lead the user to the dashboard	System will validate the information from database and in response will lead the user to the dashboard.	Pass

Post-Conditions

1. User will be successfully logged in to the Online Voting System

Table 27 Test Case for Login

Table 10: Test case to create Ballot

Test Case #: 03	**Test Case Name:** create Ballot

System: Online Voting system

Designed By: Areebah

Executed By: Chandka

Short Description: Create ballot allows the user to create a ballot page to cast votes

---

Pre-Conditions

User firstly needs to login to the Online Voting system.

Step	Action	Expected System Response	Actual Response	Status

				Pass
1	User Will click the given "create ballot" option.	The system will respond by displaying the following fields. 1.Organizational Election 2.Select candidates 3.Department	The system will respond by displaying the following fields. 1.Organizational Election 2.Select candidates 3.Department	
2.	User fills the required fields like Election title, list of candidates, time frame , date and department name.	The system verifies if there is any mistake in the information according to the predefined format.	The system verifies if there is any mistake in the information according to the predefined format.	Pass
3.	User will press the "Confirm" button to submit the info.	System will validate the information from the database and in response will create the ballot.	System will validate the information from the database and in response will create the ballot.	Pass

Post-Conditions	
Ballot Created Successfully	

Table 28 test case of create Ballot

Table 11: Test case for Submit Vote

Test Case #: 04	**Test Case Name:** Submit Vote
System: Online Voting System	
Designed By: Areebah	
Executed By: Chandka Iftikhar	
Short Description: Submit vote allows the participant to cast a vote to a nominated candidate.	

Pre-Conditions	
User firstly need to login to the Online Voting system.	

Step	Action	Expected System Response	Actual Response	Status

1	Users will click the given "Submit Vote" option.	The system will respond by displaying the Ballot page.	The system will respond by displaying the Ballot page	pass
2.	User fill the required fields like select candidate, select position, select department and select preference.	The system validates the entered information from the database..	The system validates the entered information from the database..	pass
3.	User will press the "submit vote" button to submit the info.	After validation from the database, the system will enter the Vote record in the database.	After validation from the database, the system will enter the Vote record in the database.	pass

Post-Conditions

Vote will be successfully casted.

Table 29 Test Case for Submit vote

Table 12: Test Case for Submit Complaints

Test Case #: 05	Test Case Name: Submit Complaints

System: Online Voting System

Designed By: Areebah

Executed By: Areebah

Short Description: Submit Complaint allows the participant to give suggestions/ complaints about a candidate.

Pre-Conditions

Users firstly need to login to the Online Voting system

Step	Action	Expected System Response	Actual Response	Status
1	Users will click the given "Submit Complaint" option.	The system will respond by displaying the Suggestions/ complaint box.	The system will respond by displaying the Suggestions/ complaint box.	Pass

2.	User will fill the given suggestion box.	User will fill the given suggestion box.	User will fill the given suggestion box.	Pass
3.	User will press the "submit vote" button to submit the info.	. System will update the feedback in the database.	System will update the feedback in the database.	Pass

Post-Condition

Feedback (complaint/ suggestions) will be successfully submitted.

Table 30 Test Case for submit complaint

Table 13: Test case for Voting guide

Test Case #: 06

System: Online Voting System

Designed By: Areebah

Executed By: Chandkaiftikhar

Short Description: Voting guide allows the fresh(new) users to get guideline for how to vote on the Online Voting system.

Test Case Name: Voting guide

Pre-Conditions

Users firstly need to get logged in to the Online Voting system

Step	Action	Expected System Response	Actual Response	Status
1	Users will first login to the Online Voting system by their ID and password.	In response to the correct action, system will lead the users to the dashboard.	In response to the correct action, system will lead the users to the dashboard.	Pass
2.	Users will click onto the "helpline" option.	In Response to this action system will lead the user to the help documentation.	In Response to this action system will lead the user to the help documentatio n.	Pass
3.	Users will click on the Voting guide Video clip to get guideline.	. System will (display)play the voting guide clip step by step.	. System will (display)play the voting guide clip step by step.	Pass

Post-Condition : Voting guide will be shown to the user successfully.

Table 31 Test Case for voting guide

Table 14: Test Case for View Details

Test Case #: 07	**Test Case Name:** View details
System: Online Voting System	
Designed By: Chandka Iftikhar	
Executed By: Chandka Iftikhar	
Short Description: View details will allow the users to see election details and personal account details.	

Pre-Conditions

Users firstly need to get logged in to the Online Voting system

Step	Action	Expected System Response	Actual Response	Status
1	User will press the given "view details" button.	System in response will display the following options 1.View candidate profile 2.Ballot 3.View results	System in response will display the following options 1.View candidate profile 2.Ballot 3.View results	Pass
2.	. User clicks on "view candidate profile	System in response will show the candidate profile.	System in response will show the	Pass

			candidate profile.	
3.	User clicks on "View personal profile"	.System in response will show the Ballot.	System in response will show the Ballot.	Pass
4.	User clicks on "View Results"	System in response will show the final count of votes for each nominated candidate	System in response will show the final count of votes for each nominated candidate	Pass

Post-Condition: Details have been displayed to the user by the system.

Table 32 Test case for view details

Table 15: Test Case for Update account settings

Test Case #: 08

Test Case Name: Update account settings

System: Online Voting System

Designed By: Chandka Iftikhar

Executed By: Areebah.

Short Description: Update account settings will allow the user to edit changes in his registered account.

Pre-Conditions

Users must firstly need to login to the Online Voting system.

Ste p	Action	Expected System Response	Actual Response	Status
1	User will press the given "settings" option.	1.System in response will display the previously entered details.	1.System in response will display the previously entered details.	Pass
2.	After entering the new information, User will press the given "confirm button".	System in response to the Confirm action will update the data in the database.	System in response to the Confirm action will update the data in the database.	Pass
3.	User will have to enter new and old passwords in the given fields.	. System will match the old password , verify the format of the new entered password.	. System will match the old password , verify the format of the new entered password.	Pass
4.	User will press the "submit" button to save the changes.	System will notify the user after successful updation of new changes.	System will notify the user after successful updation of new changes.	Pass

Post-Condition: Account settings will be updated successfully.

Table 33 Test case to update account setting

Table 16: Test case for Access Dashboard

Test Case #: 09

System: Online Voting System

Designed By: Chandka Iftikhar

Executed By: Chandka Iftikhar

Short Description: Access dashboard will allow the user to get access to use the functionality of the Online Voting system.

Test Case Name: Access dashboard

Pre-Conditions
Users must firstly need to login to the Online Voting system.

Step	Action	Expected System Response	Actual Response	Status
1	Users will login to the system to access the dashboard.	System will display the following fields on the dashboard 1.Events 2.Elections 3.Account settings 4.View details 5.Logout 6.Submit complaint 7. Voting guide.	System will display the following fields on the dashboard 1.Events 2.Elections 3.Account settings 4.View details 5.Logout 6.Submit complaint 7. Voting guide.	Pass

2.	User presses "submit vote" to cast vote	In response to the action System will display the ballot page.	In response to the action System will display the ballot page.	
3.	User press "submit complaint" to give suggestions/f eedback.	In response to the action System will display the complaint/suggestion box.	In response to the action System will display the complaint/suggestion box	Pass
4.	User presses "view details" to get some information.	In response to the action System will display the view details options. 1.View result 2.View candidate profile 3. Ballot	In response to the action System will display the view details options. 1.View result 2.View candidate profile 3. Ballot	Pass
5.	User presses "update account settings" to change account settings.	In response to the action System will display the settings options. 1.Email ID 2.Old password 3.New password	In response to the action System will display the settings options. 1.Email ID 2.Old password 3.New password	Pass
6.	User presses the "helpline" button to view the voting guide.	In response to the action System will display the voting guide.	In response to the action System will display the voting guide.	Pass
7.	User presses the "logout" button.	In response to the action system will lead the user to the login page.	In response to the action system will lead the user to the login page.	Pass

> **Post-Condition**: Users will have access to the functionality of the Online Voting system.

Table 34 Test case for access dashboard

4.1. Unit/ Integration/ Acceptance/System testing

Unit testing and integration testing is carried out by researchers. Complete end to end integrations and system testing has also ben done in order to ensure that there will be no errors, mistakes or bugs in the working application. In this way the deployed application will be bug free.

4.1.1. Features to be Tested

- Login
- Signup
- User authentication
- Create Ballot
- Send Notification
- Add organization
- Add departments
- Submit vote
- Add Candidates
- Submit Complaints/feedback
- Recover password
- View details
- Result calculations
- Edit profile
- Verification code generation
- Voting guide
- Account settings
- Logout

4.2. Unit Testing:

The procedure through which all of the individual components of a system are inspected and tested is called unit testing. Unit testing is mainly performed at the module level so that each and every aspect of the application can be verified.

Following are the modules which are tested individually in our Online Voting System.

Common Units

Units	Common Tools	Result
Login	Manually	Pass
Register	Manually	Pass
Addition of data in database	Manually	Pass
Deletion of data from database	Manually	Pass
Counting of votes	Manually	Pass
Process of Notifications	Manually	Pass
Submit Vote	Manually	Pass
View Information of all modules	Manually	Pass
Creation of Ballots	Manually	Pass
Logout	Manually	Pass

Admin

Units	Common Tools	Result
Login	Manually	Pass
Register	Manually	Pass
Addition of data in database	Manually	Pass
Deletion of data from database	Manually	Pass
Counting of votes	Manually	Pass
Process of Notifications	Manually	Pass
Submit Vote	Manually	Pass
View Information of all modules	Manually	Pass
Creation of Ballots	Manually	Pass
Logout	Manually	Pass

Student

Units	Common Tools	Result
Login	Manually	Pass
Register	Manually	Pass
Addition of data in database	Manually	Pass
Deletion of data from database	Manually	Pass
Counting of votes	Manually	Pass
Process of Notifications	Manually	Pass
Submit Vote	Manually	Pass
View Information of all modules	Manually	Pass
Creation of Ballots	Manually	Pass
Logout	Manually	Pass

Supervisor

Units	Common Tools	Result
Login	Manually	Pass
Register	Manually	Pass
Addition of data in database	Manually	Pass
Deletion of data from database	Manually	Pass
Counting of votes	Manually	Pass
Process of Notifications	Manually	Pass
Submit Vote	Manually	Pass
View Information of all modules	Manually	Pass
Creation of Ballots	Manually	Pass
Logout	Manually	Pass

Head Of committee (HOC)

Units	Common Tools	Result
Login	Manually	Pass
Register	Manually	Pass
Addition of data in database	Manually	Pass
Deletion of data from database	Manually	Pass
Counting of votes	Manually	Pass
Process of Notifications	Manually	Pass
Submit Vote	Manually	Pass
View Information of all modules	Manually	Pass
Creation of Ballots	Manually	Pass
Logout	Manually	Pass

Evaluation Committee (EC)

Units	Common Tools	Result
Login	Manually	Pass
Register	Manually	Pass
Addition of data in database	Manually	Pass
Deletion of data from database	Manually	Pass
Counting of votes	Manually	Pass
Process of Notifications	Manually	Pass
Submit Vote	Manually	Pass
View Information of all modules	Manually	Pass
Creation of Ballots	Manually	Pass
Logout	Manually	Pass

4.3. Integration testing

Modules are those smaller units which were integrated in the earlier stage. In the Integration testing phase all the modules are combined together and then are tested to check the complete working of

that functionality. In this phase we will be testing all the possible actions which the users and admins are going to perform logically.

In our Online Voting System, after the creation of ballots, notifications are sent to the Voters and when voters cast votes, results are generated. In this way one functionality depends on others.

4.4. System Testing

After completion of unit and integration testing, we tested our Application and Amin panel. We tested all the functional requirements of the Application and Admin panel and fixed all the buys we found while testing those requirements of the system.

4.5. Acceptance testing

After completion of system testing Online voting system has been tested according to user's requirements. We tested our Application and web panel with specific users to make sure that our app and admin panel is working properly or not before delivering it to customers.

4.6. Manual Testing

As manual testing ensures correctness and is reliable as well, that is why our Online Voting system has been tested manually.

4.7. Pass/fail Criteria

The pass/fail criteria of our Online Voting system are quite simple. If the test case post conditions are fulfilled, then the test case is pass otherwise it is failed.

5. Chapter no 5

5.1. Conclusion

We are living in the 21st century where the world of technology is getting more advanced day by day. In this computerized world, we still cannot rely on the traditional paper-based polling system

as there are so many issues that people and organizations face with that kind of election system. Solution to all the problems with the traditional polling system is E-Voting. Online Voting System provides potential for better, improved and advanced way of votes conduction, management and results with the consumption of minimal resources.

Online Voting system has increased the levels of accuracy, efficiency, and security. There will be no chances of duplication of votes or fake votes casting. Our Online Voting system will save all the resources such as time, money and labor effort which were wasted in the traditional paper-based polling system. Our Online Voting system has made the election system much more convenient than what we had before. Chances of mistakes, errors and corruptions are finished due to automated functionalities.

5.2. Problems faced and lessons learned

While developing this online Voting System we faced many problems. The very First problem we faced was the requirements gathering phase and it also took a lot of time. Allocation and division of tasks between each other was also very difficult but then the conflicts were resolved when we learned how to work as a team. Time management was also difficult, but we used slack which is a project management tool and assigned deadlines to each task. We tried our best to complete each task before the deadline.

In developing this Online Voting system, we learned react native for the front end of mobile App, react.js for the development of Web panel, node.js for backend, NoSQL for database, ngrok to make our local host live and post man for the testing of API's. We also learned a lot about how the whole process to develop a project executes and how it goes through different phases to make a project bug free. The way we got through the whole process of development was really a great experience.

5.3. Project Summery

In our Online Voting System, we first of gathered all the functional requirements and wrote them. Then we roughly drew the low fidelity prototypes for our system according to the functional requirements. In this way we got the complete idea about how our system will look like, how many screens will it contain, the flow of different screens for each functionality/on press of buttons and what features will our system contains. After this to know the flow of functionalities we made the activity and sequential diagrams of our project. Then we made the use case diagrams, this showed us that how our actors will interact with the system and wrote the use case descriptions of our project. After that we wrote the non-functional requirements of our project and made the ER Diagram to make the database design of our project. We also made collaboration diagrams traceability matrix of our project. After the completion of each module, we made test cases and wrote test case descriptions and tested them manually.

The Tasks and members list is given below

Tasks	Members
Front End	Areebah
Front End Integration	Areebah
Testing Of API's	Areebah, Chandka Iftikhar
Back End	Chandka Iftikhar
Back End Integration	Chandka Iftikhar
Documentation	Areebah, Chandka Iftikhar

5.4. Future Work

The successful implementation of the Online Voting system will not only help reduce the chances of corruption and fake vote castings but will also save time, cost and labor effort. This Online voting system will provide a swift and convenient platform for secured elections. Now the participants will also be able to present their point of views and feedback about the things they want to get improved and about the problems they need to get resolved.

In this way the organizations can improve themselves and will get to know the ground realities and abilities of their candidates (organizations will come to know what an employee actually is). It will also help organizations and employees to improve their working techniques and strategies.

In addition to the solution of all the problems, No one will need to wait for extra hours to know the results, as the results will be generated automatically with 100% accuracy. The successful implementation of our idea about the Online Voting system will definitely increase the advancement in the electronic Voting systems

5.5. prototype:

5.5.1. Mobile application screens
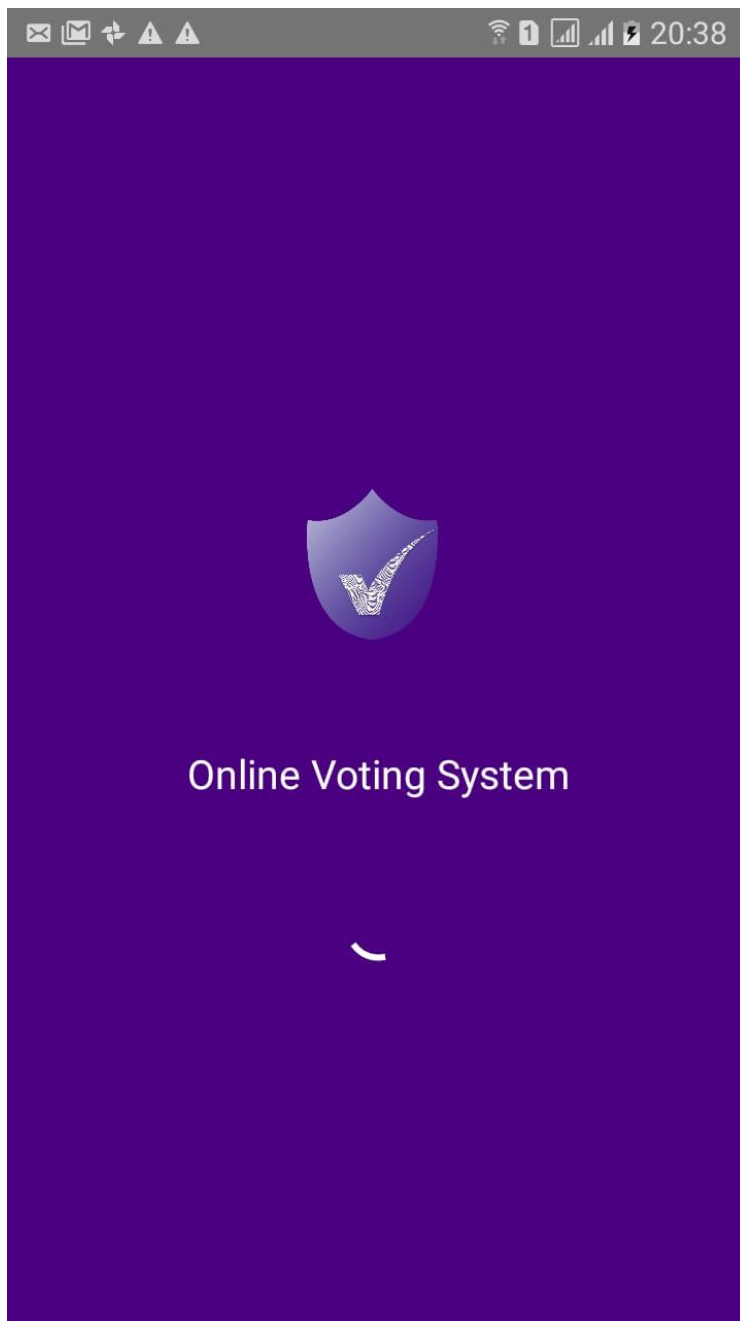
Figure 28-Splash Screen

Figure 29- Login Screen

Figure 30- Signup Screen

Figure 31- Dashboard Screen

Registration Successful.

Login Now

Figure 32- Registration Successful Screen

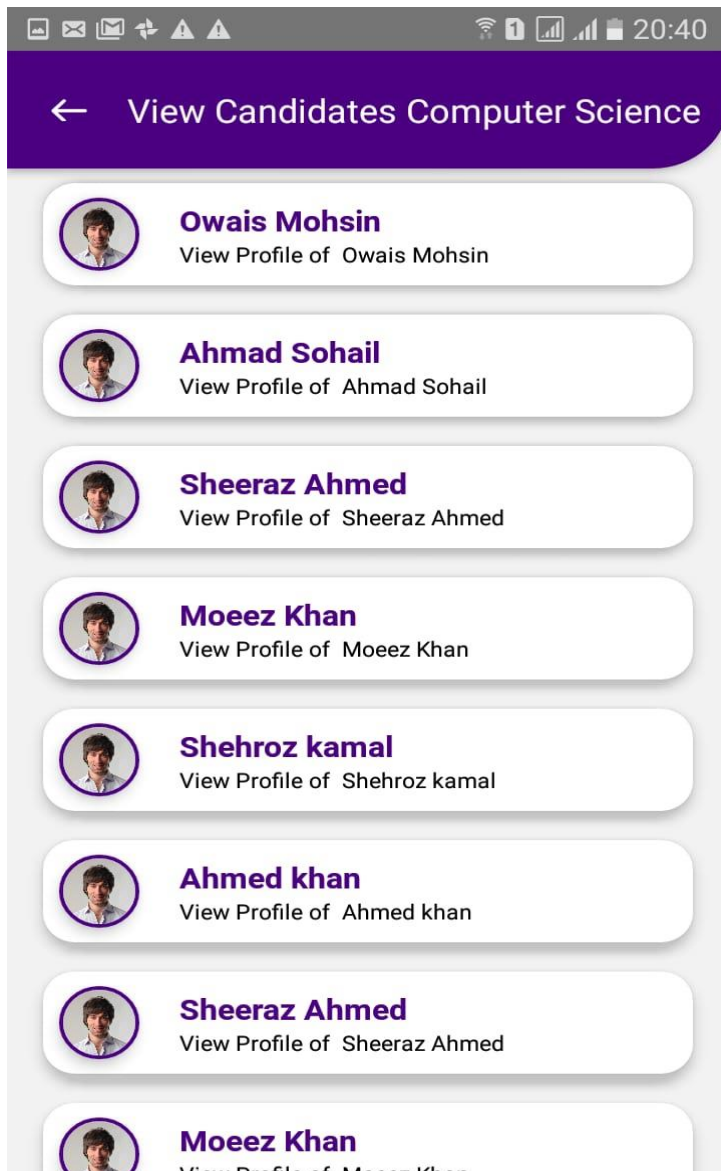Figure 33- Edit Profile Screen
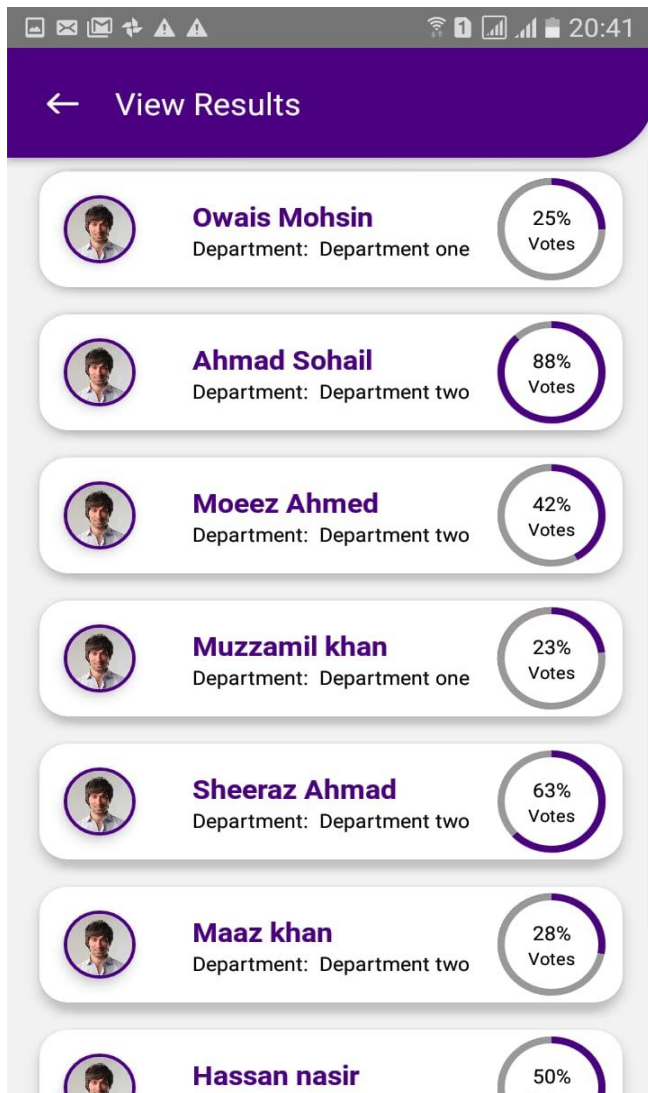
Figure 34- View candidate's screen
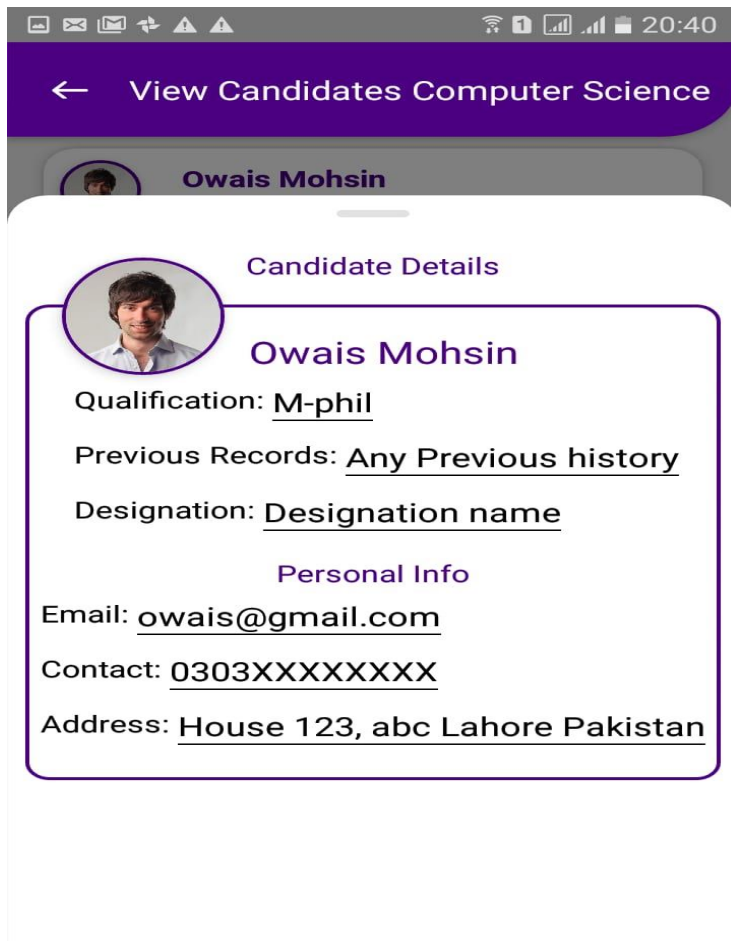
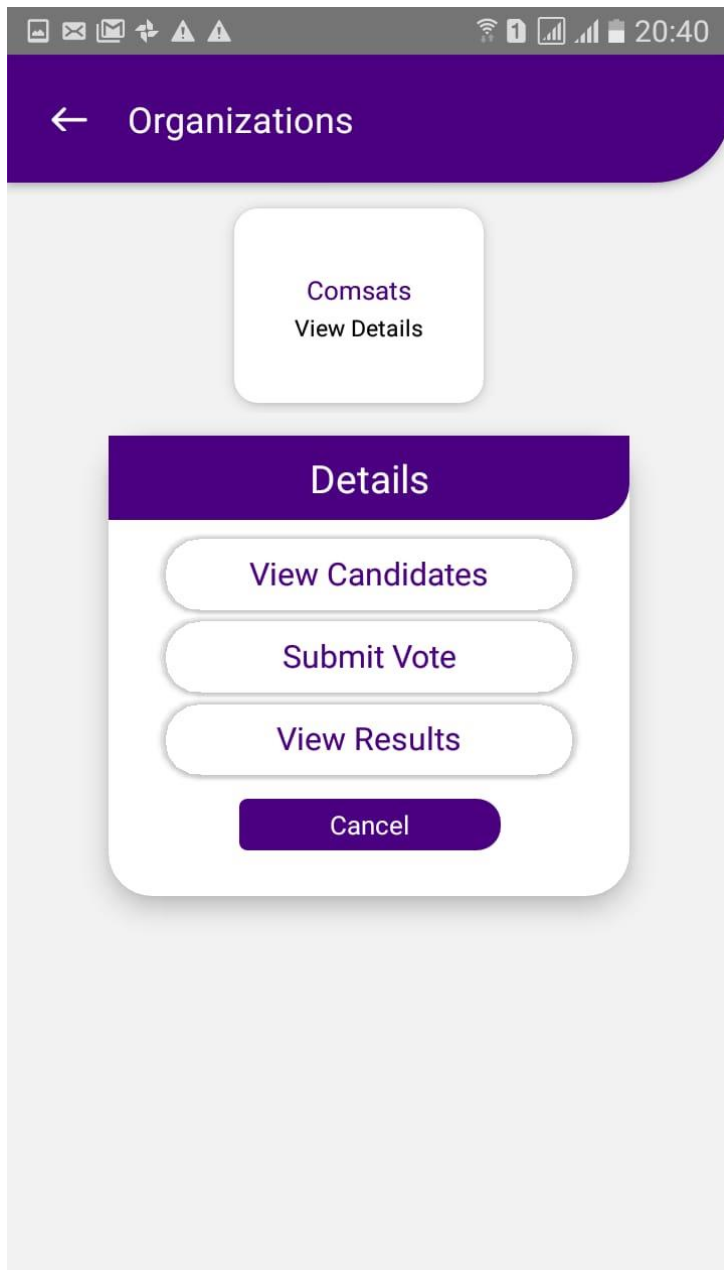Figure 35- View results screen

Figure 36- Candidates Profile screen

Figure 37-View details screen
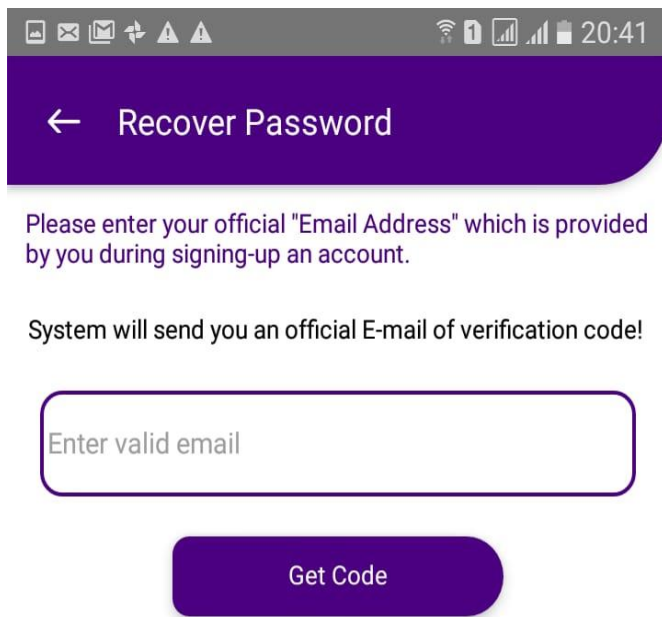
Figure 38- Recover Password Screen

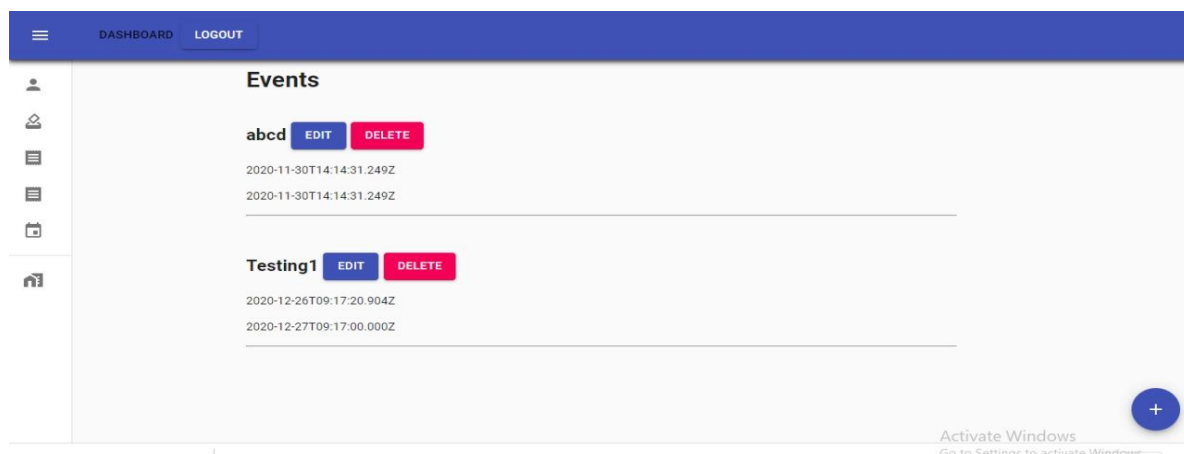## 5.5.2 Admin panel screens

Figure 39- Event creation screen

Figure 40- Users screen

Figure 41- Dashboard of Admin panel

Figure 42-Departments screen
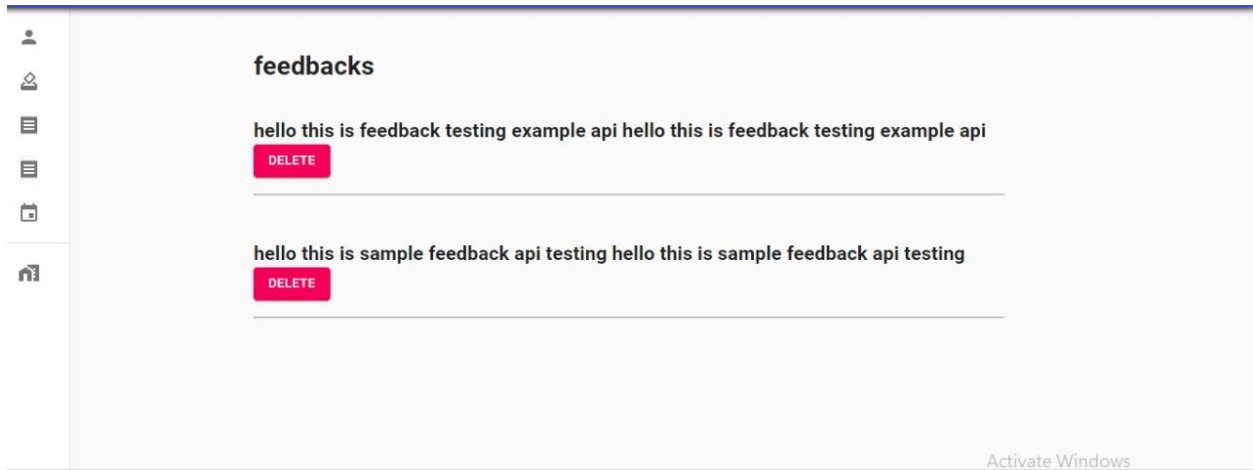
Figure 43- candidates screen of admin panel
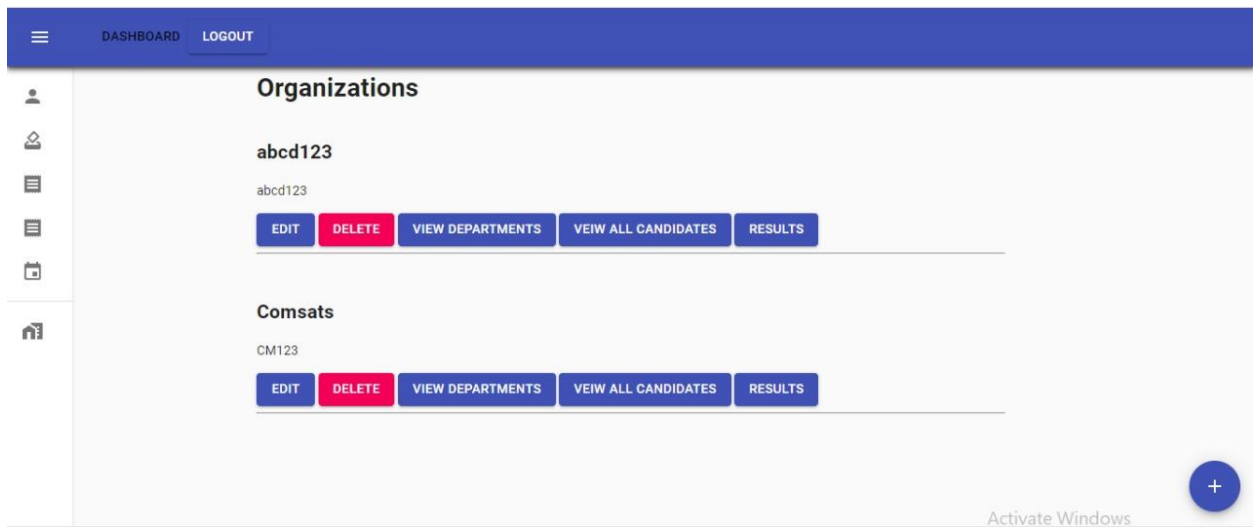
Figure 44- Add organizations screen

6.References

1. https://electionrunner.com/

2. https://electionrunner.com/support/kb/account/about-the-mobile-app/

3. http://www.pollgateway.com/process-overview/

4. https://www.voxvote.com/

5. https://www.opavote.com/

6. https://www.voxvote.com/tutorials/video_nederlands

7. https://www.ezvoteonline.com/

8. https://1000projects.org/online-voting-system-project-abstract.html

9. https://www.w3.org/TR/rdf-sparql-query/

10. https://www.eballot.com/votes-and-elections/what-is-an-online-voting-system

11. https://www.bigpulse.com/elections?cn=Online%20voting%20system&agn=1&gkw=online%20voting%20system&gclid=CjwKCAiAi4fwBRBxEiwAEO8_HqAydJgj_5vo18zy7PQ79YuXGxvnXGdmVvFWsrg6HHSdwMDOqG393hoCeq8QAvD_BwE

12. https://www.google.com/search?q=what+are+benefitsof+incremental+model+in+software+engineering&rlz=1C1CHBF_enPK840PK840&oq=what&aqs=chrome.0.69i59l4j69i57j35i39j69i60l2.14557j1j7&sourceid=chrome&ie=UTF-8

13. https://www.capterra.com/voting-software/

14. https://www.softwaresuggest.com/us/poll-gateway

15. https://www.getapp.com/collaboration-software/a/opavote/

16. https://www.goodfirms.co/software/election-runner

17. https://www.google.com/search?q=poll+gateway&rlz=1C1CHBF_enPK840PK840&sxsrf=ALeKk02yhtiLhdJ1y_2XXTTy3nqR_B2K6A:1596045234338&source

=lnms&tbm=vid&sa=X&ved=2ahUKEwiwu_Ppg_PqAhU4AGMBHZOqDLsQ_

AUoA3oECAoQBQ&biw=1341&bih=600

18. https://www.google.com/search?rlz=1C1CHBF_enPK840PK840&biw=1341&bih

=600&tbm=vid&sxsrf=ALeKk03S6UoOVSVdyOPIyZgYh_WKNwyC8w%3A1

596045241895&ei=ubchX_6eNtTkgweMmoz4DA&q=opa+vote&oq=opa+vote&

gs_l=psy-ab.3..0i13k1.144168.150536.0.152097.9.9.0.0.0.0.292.1785.2-

7.8.0....0...1c.1.64.psy-

ab..1.7.1782.0..0j0i273k1j0i433i273k1j0i433k1j0i433i131k1j0i10k1j0i8i30k1j0i3

0k1j33i160k1.464.UshcAZ3iqlk

online voting system

1	www.coursehero.com Internet Source	**1**%
2	Zhen-Yu Wang, Xin-Yi Peng, Wei-Wei Lin. "Design of a Uniform Interface Platform for Business and Operation Support System", 2005 International Conference on Machine Learning and Cybernetics, 2005 Publication	<**1**%
3	Subarna S, Ankita K Jawale, Akshay S Vidap, Subodh D Sadachar, Shana Fliginger, Srimannarayana Myla. "Using a Model Based Systems Engineering Approach for Aerospace System Requirements Management", 2020 AIAA/IEEE 39th Digital Avionics Systems Conference (DASC), 2020 Publication	<**1**%
4	www.kckcc.edu Internet Source	<**1**%
5	www.slideshare.net Internet Source	<**1**%