E-Election

Project report submitted in fulfillment of the

requirement for the degree of

Bachelor of Technology

In

Computer Science and Engineering

By

Parkhi Gupta (131303)

Nitya Singla(131201)

Osheen Agarwal(131252)

Nishita Singhal(131332)

Preetish Thakur(131213)

Rajat Singh(131262)

Under the supervision of

Mr. Fahad Rahman Khan (Senior Member, ETA, Infosys Tech. Ltd.)

To

Department of Computer Science and Engineering and Information Technology

Jaypee University of Information Technology, Waknaghat,

Solan-173234, Himachal Pradesh

CERTIFICATE

Candidate's Declaration

This is to specify that the work which is being presented as the report entitled "E-Elections" in partial fulfillment for the requirements for the award of the degree of **Bachelor of Technology** in Computer Science and Engineering/Information Technology submitted in the department of **Computer Science Engineering and Information Technology,** Jaypee University Of Information Technology, Waknaghat is an authentic record of our own work carried out in the period of 19th April,2017 to 25th May,2017 under the supervision of Mr. Fahad Rahman Khan (Member in the department of Education, Training and Assessment at Mysuru Development Centre, Infosys Technologies Ltd, Karnataka).

The matter enclosed in the report has not been submitted for the award of any other degree or diploma.

Parkhi Gupta (131303)

Nitya Singla (131201)

Osheen Agarwal (131252)

Nishita Singhal (131332)

Preetish Thakur (131213)

Rajat Singh (131262)

This is to certify that the above statement made by the candidate is true to the best of my knowledge.

Mr. Fahad Rahman Khan

Member,

ETA, Infosys Technologies Ltd.

Dated: 25th May, 2017.

ACKNOWLEDGEMENT

TABLE OF CONTENTS

LIST OF FIGURES

15	Dismiss an election functionality on Admin page
16	End an election functionality on Admin page
17	Renounce Candidate functionality on Admin page

LIST OF TABLES

S. No.	Title
1	Software Requirements
2	Hardware Requirements
3	Candidate table
4	Voter table
5	Election table
6	Candidate Agenda table
7	User Concern table

ABSTRACT

In this project, we are required to make an E-Election system from scratch symbolizing MVC (Model View Controller) application. This is used for separation of logic from the user interface.

This is achieved by separating the 3 parts of the application i.e the model, the view and the controller. It can also be called as a separation design.

Since web is the eternal platform for communication and recreation and business on web is ever-growing, web applications can serve a huge business requirement to be fulfilled.

We here, have tried to construct a web-based E-Election system through which a user can communicate with the system as effortlessly as ever.

Technologies used are Windows 7 or above, 4 GB RAM, 80 GB Hard disk, VS-2015, SQL Server 2012 or above.

1. INTRODUCTION

'E-Election' is a web based application which will help the users to get to know their representatives from different political parties for their respective constituency during election. The representatives from different political parties can share their agenda to the public using this application. This will also be used to caste vote online thereby solving lots of problems which people of India face today while casting their votes standing in queue. Apart from that this application can also be used by common people to put light on their problems before their ward Councilor after election throughout the year.

Electronic balloting and voting can make the decision handle more helpful and productive on the off chance that it can be accomplished safely and also safeguard the voter's security. The fundamental standards of vote based system are based on group basic leadership of nationals through the voting procedure. It might be considered as a critical pointer of law based handle. The rule of post of development through voting process is a general public basic leadership results and which is the premise of the worldview. Accepting that a definitive popularity based process would give the office to all natives to vote on all choices. The reason here is to show how the utilization of Data Technology assume a critical part for another venture towards majority rule handle. Not just it changes the size of basic leadership additionally it licenses production of new correspondence connections and basic leadership handle that do not exist prior in the political structures. Here attempt to accomplish for all intents and purposes the two things at the same time that are voter's protection against security. Keeping in mind the end goal to save the voter's security, require to produce nom de plumes every voters that can't straightforwardly interface to the voters enrollment or character. Additionally can't distinguish the voters by the decision expert or any political gathering or whatever else without the consent of voter and other three bunches shape with the end goal of protection. The gathering implies consider the diverse gatherings identified with the political party, identified with the NGO or social gatherings or any person check and identified with the race expert itself.

1.1   PROBLEM STATEMENT

There is a great cost associated with collecting and counting votes, since many people must be hired to perform and check these tasks. Manual elections take a long time to set up, and occurrences such as recounts can greatly delay the reporting of results. All of these time delays can be at least partially eliminated by having computers run elections.

There are also many problems relating to the accuracy of manual elections. The intentional inaccuracies introduced by the corruption of election officials can be eliminated by having the election handled by an entirely impartial computer. The unintentional inaccuracies of manual elections, such as improperly printed or filled out ballots, can also be eliminated by electronic elections which use clear and consistent interfaces.

It should be noted that although electronic elections have a great number of advantages, they are largely untested and thus even the best systems may be prone to problems, at least initially. Although they can certainly be designed with full security and privacy features, corruption of the results can be very difficult to detect if someone does manage to break through the security of the software. The privacy feature of the software means that what the software is actually doing during an election cannot be transparent to election officials. One must also be very careful that security holes are not built into the elections software by the developers and that the officials who run and maintain the elections do not have the power to corrupt results.

1.2 OBJECTIVE

Any organization running an electronic election will want software that is easy to install and run. Ballots must be easy to design and they must be flexible as to the number and types of questions. The Election Server must run efficiently and securely. It must be impossible for anyone to break into the system and corrupt the results, prematurely know the results of the election, vote when they are not authorized to do so or vote more than once. The results of the election must be clearly presented upon the completion of the election.

Voters need the ballots to be clear and easy to fill out and answer. It is important that it be impossible for anyone to associate a voter's name with his or her vote.

1.3   METHODOLOGY

This website can be divided into three tiers.

1. Presentation Tier – This tier consists of the user interface which is made using html and CSS. It also has a controller which uses JavaScript and AngularJS. The controller sends data to the API which uses java and RESTful web services like GET and POST.

2. Business Tier – This tier consists of the service classes where business logic is implemented and validations are done, if any.

3. Persistence tier – This tier is responsible for interaction with database. It uses Hibernate, HQL and criteria API.

2. LITERATURE SURVEY

Our project depends on different languages-

1. **Java:** Java is a simple, object-oriented programming language developed to serve various business domains like banking, insurance, education, entertainment etc. Features of Java includes-Object Oriented, Robust, simple, Multi-threaded, Secure and platform independent.

   If a program written on a particular platform can run on other platforms without any recompilation, it is known as platform independence. Since Java is platform independent, it is not a problem. A program written using Java on Windows will execute without any recompilation on any other platform.

   Business tier is completely   designed in this language and uses different features of Java making our project platform independent. Various API's, persistence tier uses java partially.

2. **Hibernate:** With the help of hibernate, a Java application can store, retrieve or process the data in or from a file system and database. Hibernate is an open source ORM implementation for Java developers which follows JPA standards.

HQL (Subpart of Hibernate):

To retrieve data using non-primary key value, use of either get() or load() methods is not possible, so Hibernate Query language (HQL) is used. HQL is same as SQL in its appearance, but instead of operating on tables and columns, HQL works with entity classes and its properties. Using HQL, any DML operations can be performed that can be done with SQL.

Criteria API (Subpart of Hibernate):

It is another way of interacting with databases which is written completely in java and easy to find syntax error because errors are detected at compile time unlike HQL where errors are detected at run time. Also it is used for dynamic queries.

HQL	CRITERIA API
Can be used for all CRUD operation	Can be used for retrieval operation only
Defined using query string	Defined by java objects representing query elements
Errors are detected at runtime	Errors are detected at compile time
Preferred for static queries	Preferred for dynamic queries

Advantages of Hibernate-

1. Hibernate supports Inheritance, Associations, Collections.
2. Hibernate supports relationships like One-To-Many, One-To-One, Many-To-Many-to-Many, Many-To-One.
3. Hibernate has capability to generate primary keys automatically while we are storing the records into database
4. Hibernate has its own query language, i.e. hibernate query language which is database independent
5. Hibernate supports annotations, apart from XML
6. Hibernate supports caching mechanism by this, the number of round trips between an application and the database will be reduced, by using this caching technique an application performance will be increased automatically.

3. HTML:

HTML-Hypertext markup language is a front end language used for view part to the user. The data is stored in a file which has .html extension. The interaction of front end with backend is done through various controllers.HTML does not deal with any kind of validation or logic. There exists various versions of HTML like HTML 3.2, HTML 4.0, HTML 5 and HTML 4.01.

Different features with the different versions are associated making HTML user friendly and automation of tasks. It includes various features like table, lists (unordered and ordered), handling images, videos etc.

4. CSS:

CSS (Cascading Style Sheets)uses various selectors, properties and values required to style a web page. It separates the page content from the presentation allowing for greater flexibility and control over styling. CSS uses various colors and fonts to make web pages look more attractive. CSS can be added in three ways to HTML-

Inline CSS- CSS can be added to any of the HTML tags using the style attribute. The styling here is applied only to the data present inside that particular tag.

Embedded CSS- In embedded CSS, CSS is separated from the HTML content. The styling data is present in the style element which is written in the head section of the page. The styling here is applied only to the data present on the same page.

External CSS-In external CSS, the styling data is written in a separate file with a .css extension. The major advantage of using external CSS is that the styling can be applied to any number of pages.

5. Bootstrap:

Bootstrap contains various classes that help in designing responsive webpages. It has many classes required for adding styles to text and UI components. The major advantage of Bootstrap over CSS is that in CSS the degree of compatibility varies with various browsers. Bootstrap is a complete CSS framework offering Grid system and configurations, Typography classes and UI components like forms and tables. It is a widely used framework in the development of responsive website.

5. Angular -JS:

Angular-JS is a JavaScript framework which is made up of several JavaScript files which helps in organizing and structuring the code. It reduces the number of lines of code to be written making it easier and faster to create web applications.

3.   SYSTEM DEVELOPMENT

The primary priorities of this design are, in order of importance:

1) Functionality
2) Reliability
3) Maintainability
4) Security and Privacy
5) Scalability
6) Interfaces

3.1 Functional Requirements

1. There will be a common login portal for candidate, user and admin so that he/she   can login to the respective account.

2. There will be a logout mechanism so that admin/candidate/user can logout.

3. There will be a registration page so that user/candidate can register.

4. There will be the option of accepting or rejecting a candidate's application so that Admin can select particular candidates for an election.

5. Admin can add an election so that a new election can be registered.

6. Admin will be able to start or end an election so that the election process can start.

7. Candidate will be able to register for an election after the Admin's approval.

8. Candidate can submit his/her agenda after the Admin's approval so that the users get to know about his/her agenda.

9. User will have the voting facility so that he/she can cast vote.

10. Admin will be able to renounce a candidate so that he/she is not able to stand in the election.

11. Admin will have an option to dismiss the election so that he/she can do so under

certain circumstances.

12. User can view the profiles of the candidates so that he/she can cast to vote based on those details.

13. End user can view the election result so that he/she get to know the winner.

14. User will have a portal so that he/she can share his/her problems with the ward councilor after election.

15. Admin can ensure that a candidate can't register as a user as he/she is not liable to vote for himself/herself.

3.2 SOFTWARE REQUIREMENTS

ENVIRONMENT	VS-2015, SQL Server 2012 or above.
Language and Web Technology	JavaScript

3.3 HARDWARE REQUIREMENTS

OPERATING SYSTEM	Windows 7 or above
RAM	4GB RAM
HARD DISK	80 GB Hard disk

4. PERFORMANCE ANALYSIS

4.1 TESTING ANALYSIS

Testing is the stage of implementation that is aimed at ensuring that the system works accurately and efficiently before the live operation commences. Testing is vital to the success of the system. System testing makes the logical assumption that if all the parts of the system are correct, then the goal will be successfully achieved. A series of testing are done for the proposed system before the system is ready for the user acceptance testing.

For Login Page:

1. To check whether username and password fields are rendered.
2. To check whether the page redirects to the admin page when logging in as an admin.
3. To check whether the page redirects to the candidate page when logging in as a candidate.
4. To check whether the page redirects to the user page when logging in as an user.
5. To check whether error message "Wrong username or password" is displayed in red color while logging in with wrong credentials.

For Sign Up Candidate:

1. To check whether signup form fields are rendered.
2. To check whether name field is not accepting numbers.
3. To check on entering different passwords "Passwords do not match" error is shown.
4. To check whether Email id accepted is of the form "characters@characters.domain" .
5. To check whether age field is accepting value between 21-60.
6. To check whether age field is not accepting values less than 21 and greater than 60.
7. To check whether Mobile number field is accepting only 10 digit numbers.
8. To check whether if not selecting "Select Constituency" shows error.
9. To check if not selecting "Select Qualification" shows an error.

For Sign Up User:

1. To check whether Voter signup form fields are rendered.
2. To check whether name field is not accepting numbers.
3. To check on entering different passwords "Passwords do not match" error is shown.
4. To check whether if not selecting "Select Constituency" shows error.
5. To check whether VoterId field is accepting only 10 digit numbers or capital Alphabets.
6. To check whether on successful insertion of voter details, **"**You have successfully registered and are eligible to vote from: " is displayed.

For Admin Page:

1. To check whether navbar is fixed at a position on scrolling down the page.
2. To check whether it is scrolling down smoothly on clicking of any of the links present on the navbar.
3. To check whether on clicking "view candidates applications" link, table with candidate details along with the option of accepting/rejecting the candidate is displayed.
4. To check whether on rejection of the application, "Your request has been rejected. You cannot proceed further." message is displayed.
5. To check whether on successful updation of request status, "Request Status successfully updated. " message is displayed.
6. To check whether on unsuccessful updation of request status, "Unable to update the request status" message is displayed.
7. To check whether on clicking "Add an election" option , a form with start date of type calendar, end date of type calendar, constituency with all the states dropdown and a submit button is displayed.
8. To check whether on clicking the submit button, "New election has been added successfully" message is displayed on successful insertion into the database.
9. To check whether on clicking "Dismiss election" option, "Election found and dismissed" is displayed.
10. To check whether on clicking "Logout" link, Admin will redirect to login page.

For Candidate Page:

1. To check whether navbar is fixed at a position on scrolling down the page.
2. To check whether it is scrolling down smoothly on clicking of any of the links present on the navbar.
3. To check whether on clicking "Register for election" option, a dropdown with election Id's along with a submit button is displayed.
4. To check whether on clicking the submit button, "Successfully chosen election" message is displayed on successful insertion into the database.
5. To check whether on clicking "view election details" link, table with election details is displayed.
6. To check whether on clicking "Update Agenda" option, a text field is displayed.
7. To check whether on clicking the submit button, "Agenda updated successfully." message is displayed on successful insertion of agenda into the database.
8. To check whether on clicking the submit button, "Unable to update Agenda." message is displayed on unsuccessful insertion of agenda into the database.
9. To check whether on clicking "Logout" link, Admin will redirect to login page.

For User Page:

1. To check whether navbar is fixed at a position on scrolling down the page.
2. To check whether it is scrolling down smoothly on clicking of any of the links present on the navbar.
3. To check whether on clicking "View ongoing elections" option, election details for those elections which are currently going on is displayed.

4. To check whether on clicking "Submit complaints" option, a text field is   displayed.

5. To check whether on clicking the submit button, "Concern received successfully." message is displayed on successful insertion of agenda into the database.

6. To check whether on clicking the submit button, "Concern not received." message is displayed on unsuccessful insertion of agenda into the database.

7. To check whether on clicking "Logout" link, Admin will redirect to login page.

4.2 EMBEDDING ALGORITHM IN APPLICATION

1. Sign Up Candidate

In this module, a form containing name, password, email, qualification, age, experience, constituency and mobile number is taken as input from the candidate. After filling these details, when candidate clicks on submit button, these details will be sent to the controller. Controller will stringify these details and further send them to **Application program interface** (API) using POST RESTful service.

API will further convert this data from json to bean and then again send this bean to service class as API cannot interact with **data access object** (DAO) class directly. So, API will call addCandidate() method of service class and service class will further call addCandidate() method of DAO class. DAO will first open the session. As DAO directly interacts with database, it will add these details to the database table of candidate. After adding all the details to the database, it will close the session.

DAO will return back the bean to the addCandidate() method of service class. And service will again send this bean to addCandidate() method of API class as DAO cannot interact with API directly. API will convert this bean object to json again. It will send this json object to controller again.

Candidate details along with its data type is given in the below table:

S No.	PARAMETER	DATA TYPE
1	Candidate Id	Number
2	Name	Varchar2
3	Password	Varchar
4	Email Id	Varchar
5	Age	Number
6	Constituency	Varchar
7	Qualification	Varchar
8	Request Status	Varchar
9	Experience	Number

2. Sign Up Voter

In this module, a form containing name, password, email, constituency and voter Id is taken as input from the voter. After filling these details, when voter clicks on submit button, these details will be sent to the controller. Controller will stringify these details and further send them to **Application program interface** (API) using POST RESTful service.
API will further convert this data from json to bean and then again send this bean to service class as API cannot interact with **data access object** (DAO) class directly. So, API will call addUser() method of service class and service class will further call addUser() method of DAO class. DAO will first open the session. As DAO directly interacts with database, it will add these details to the database table of candidate. After adding all the details to the database, it will close the session.

DAO will return back the bean to the addUser() method of service class. And service will again send this bean to addUser() method of API class as DAO cannot interact with API directly. API will convert this bean object to json again. It will send this json object to controller again.

Voter details along with its data type is given in the below table:

S No.	PARAMETER	DATA TYPE
1	Voter Id	Varchar
2	Name	Varchar2
3	Password	Varchar
4	Email Id	Varchar
6	Constituency	Varchar

3. Common Login for Admin, Candidate, User

In this module, a form containing username and password is taken as input from the user (user/admin/candidate). After filling these details, when user clicks on submit button, these details will be sent to the controller. Controller will first recognize the user. If username is email Id, then it will be a candidate. If username is of 10 digits and contains only capital letters and numbers, then it will be a voter. If username is admin, then it will be an admin. Controller will then stringify these details and further send them to respective **Application program interface** (API) using POST RESTful service.

API will further convert this data from json to bean and then again send this bean to service class as API cannot interact with **data access object** (DAO) class directly. So, API will call validate() method of service class and service class will further call validate() method of DAO class. DAO will first open the session. As DAO directly interacts with database, it will check whether this username exists in the database. If this username exists, it will further check whether received password matches with existing password. If both the passwords also match, DAO will return back the bean to the validate() method of service class and close the session. And service will again send this bean to validate() method of API class as DAO cannot interact with API directly. API will convert this bean object to json again. It will send this json object to controller again. Controller will then redirect the user to corresponding page.

If either username or password doesn't match, alert box containing "Invalid username or password" message is displayed.

4. Admin

Admin page have the following functionalities –

1. View candidates applications - On clicking this link, admin will get a table of candidate details which will contain candidate Id, candidate name, constituency in which he wants to participate and two buttons for approval or rejection of the candidate. Admin will then click on one of these buttons to approve or reject the candidate.
2. Add Election - On clicking this link, admin will get a form containing start date, end date, constituency fields along with a submit button to add a new election to the database.
   Election table contains following parameters:

S No.	PARAMETER	DATA TYPE
1	Election Id	Number
2	Start Date	TimeStamp
3	End Date	TimeStamp
4	Constituency	Varchar2
5	Status	Varchar2

3. Start Election - On clicking this link, admin can start the election by setting up the election status as 'ON' (ongoing).
4. End Election - On clicking this link, admin can end the election by setting up the election status as 'CO' (completed).
5. Dismiss Election - On clicking this link, admin can dismiss the election by setting up the election status as 'DISMISS'.
6. Logout – On clicking this link, admin's session will get logged out.

5. Candidate

Candidate page have the following functionalities –

1. Register for election - On clicking this link, candidate will get a table of election details of his constituency along with a register button. On clicking this button, candidate can register himself/herself for that election. Admin will then approve or reject his/her application.

2. View election details - On clicking this link, candidate will get a list of ongoing elections of his constituency.

3. Update Agenda – On clicking this link, candidate can update his/her agenda for a particular election.
   Agenda table contains following parameters:

S No.	Parameter	Data Type
1	CandidateAgendaId	Number
2	Candidate Id	Number
3	Election Id	Number
4	Agenda	Varchar
5	Time of post	Date

4. Logout - On clicking this link, candidate's session will get logged out.

6. Voter

Candidate page have the following functionalities:

1. View Ongoing elections – On clicking this link, voter will get a list of ongoing elections of his constituency along with a vote button. On clicking this button, admin will get a list of candidates in that particular election along with a vote button so that voter can vote for a candidate. After that, vote for that particular candidate will be increased by one automatically.

2. Submit complaints **-** On clicking this link, voter can submit his/her concern for a particular candidate.

Concern table contains following parameters:

S No.	Parameter	Data Type
1	UserConcernId	Number
2	Voter Id	Varchar2
3	Candidate Id	Number
4	Concern	Varchar2
5	Time Of Post	Date

4.3   Screenshots

1. Main Page

2. About Us
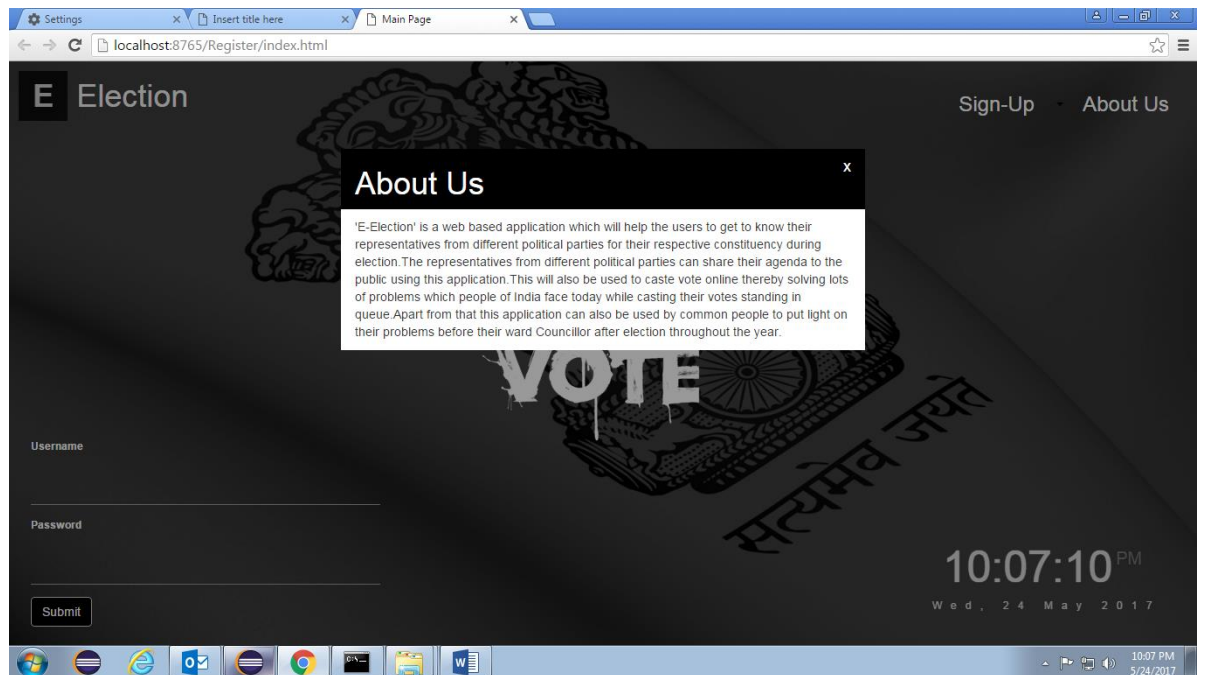
3. Sign Up Candidate
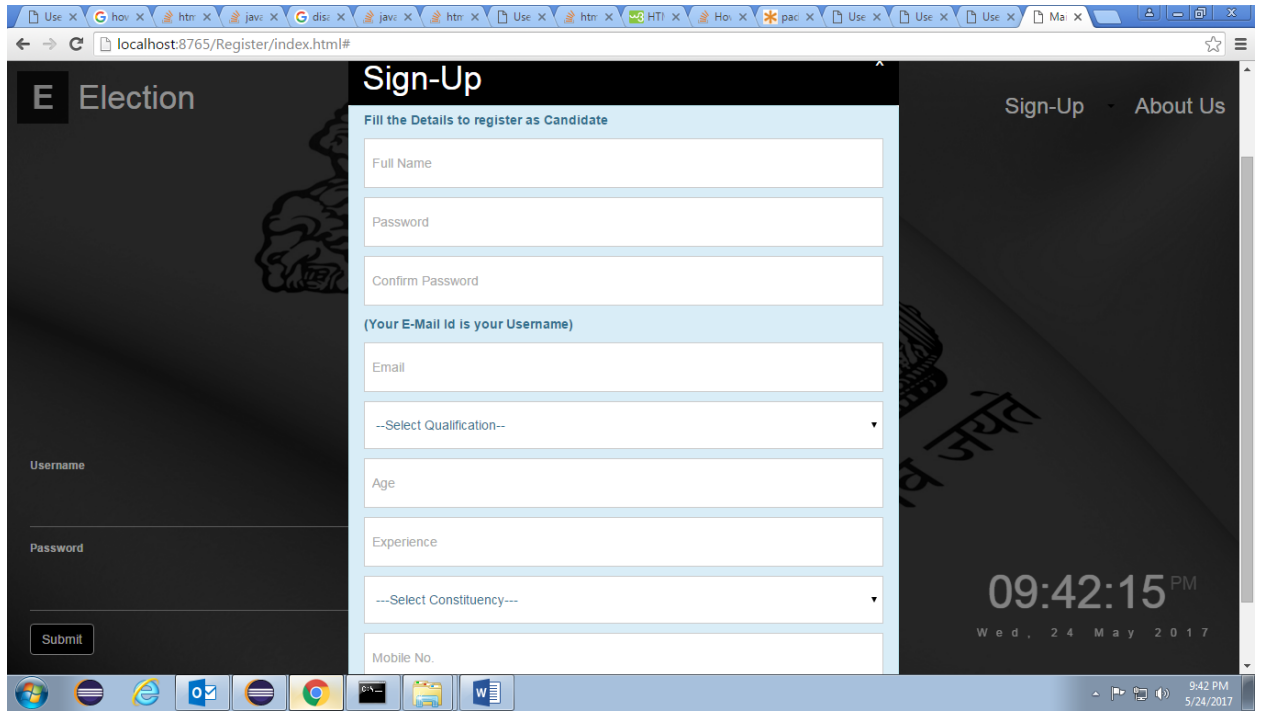
4. Sign Up Voter
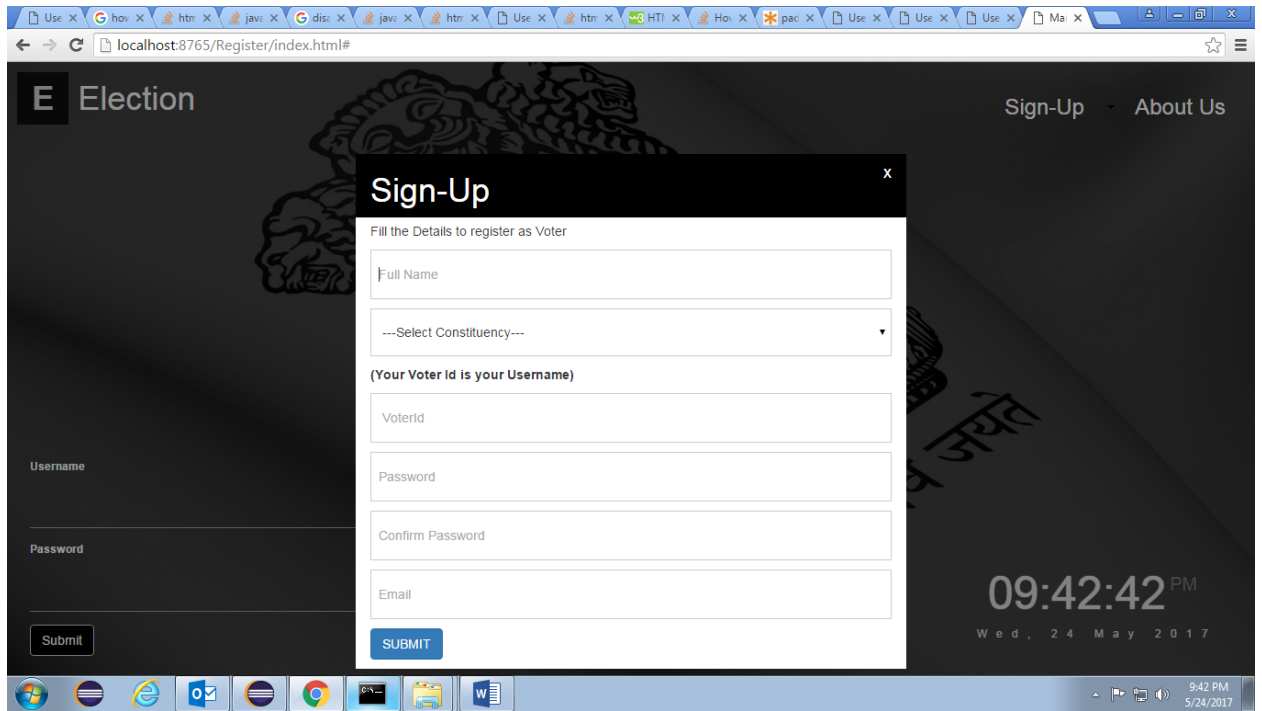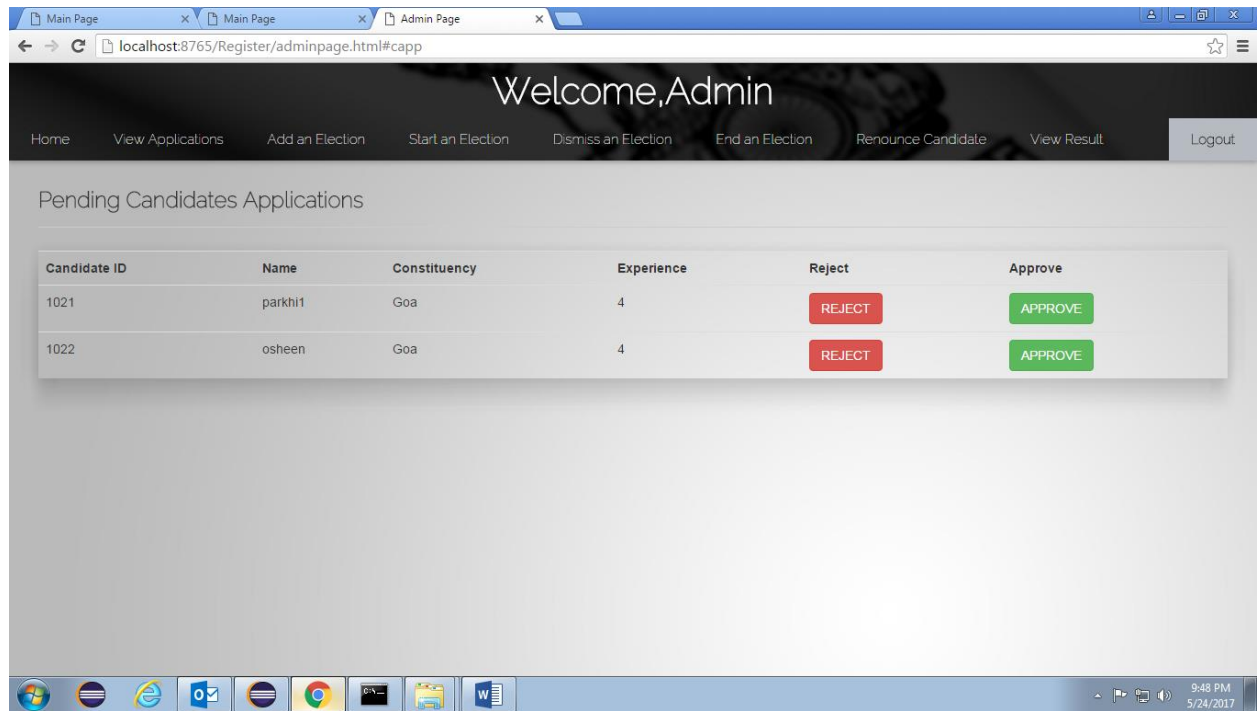
5. Pop Up after entering invalid username or password
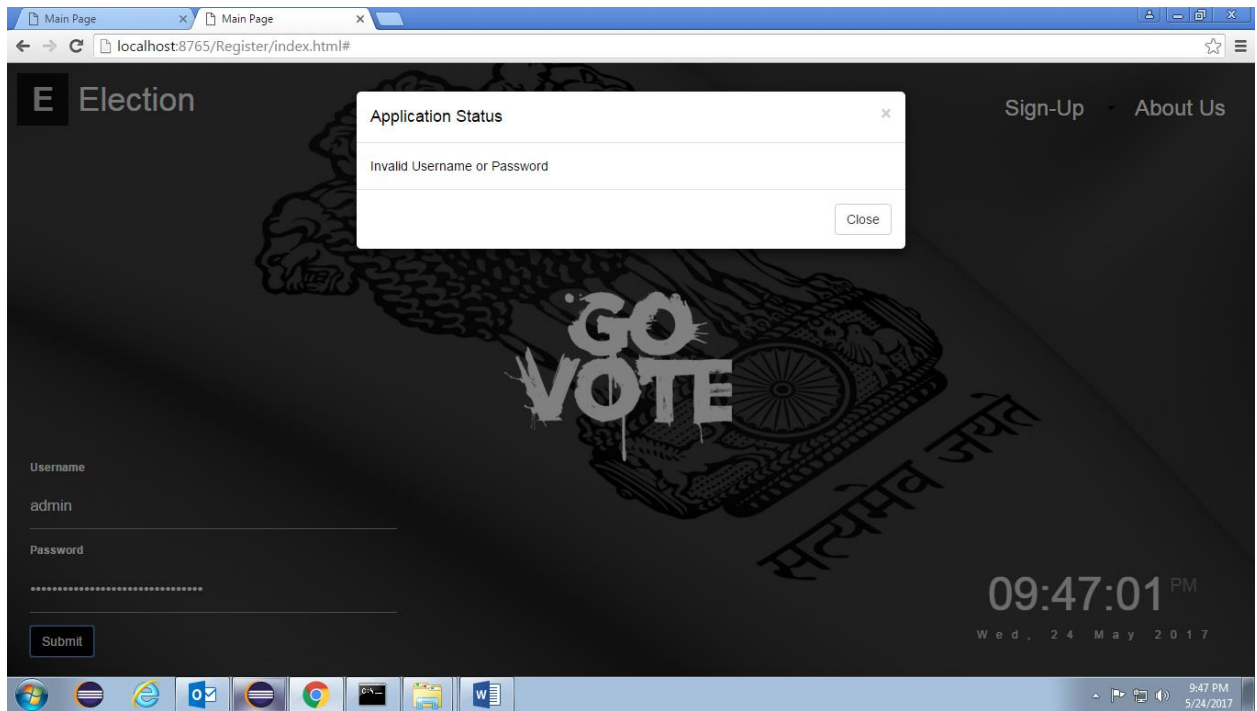
6. Admin Page
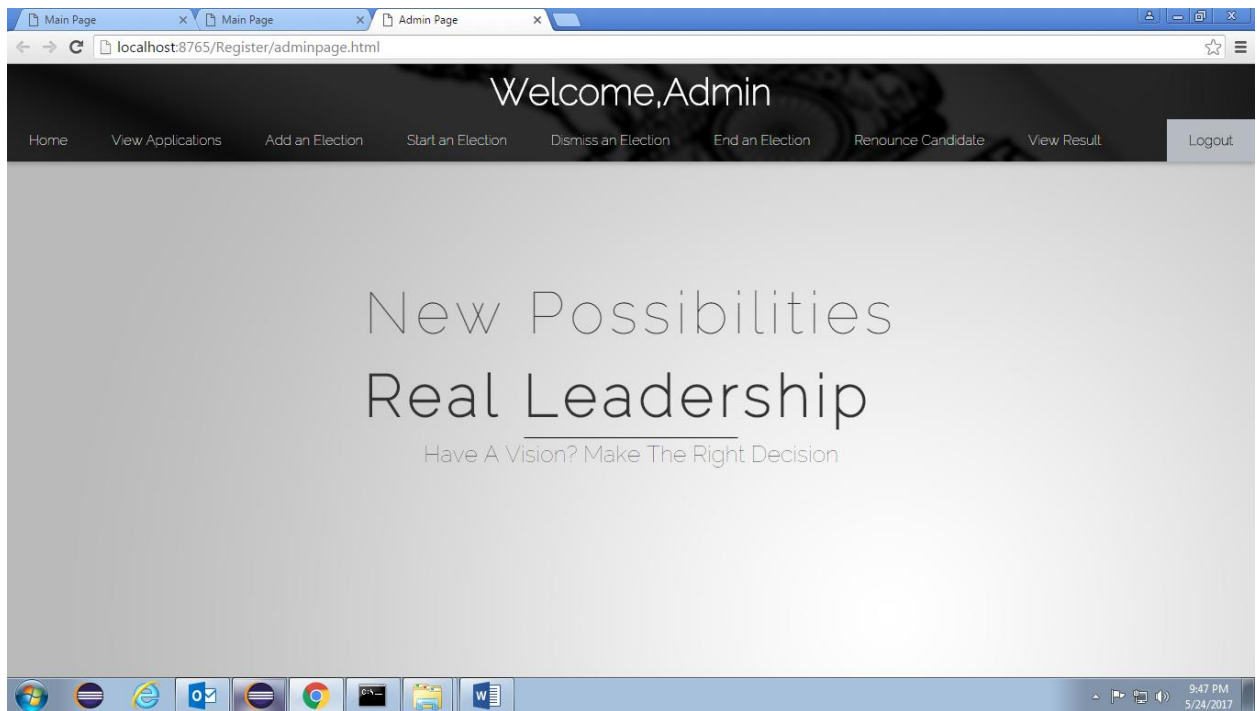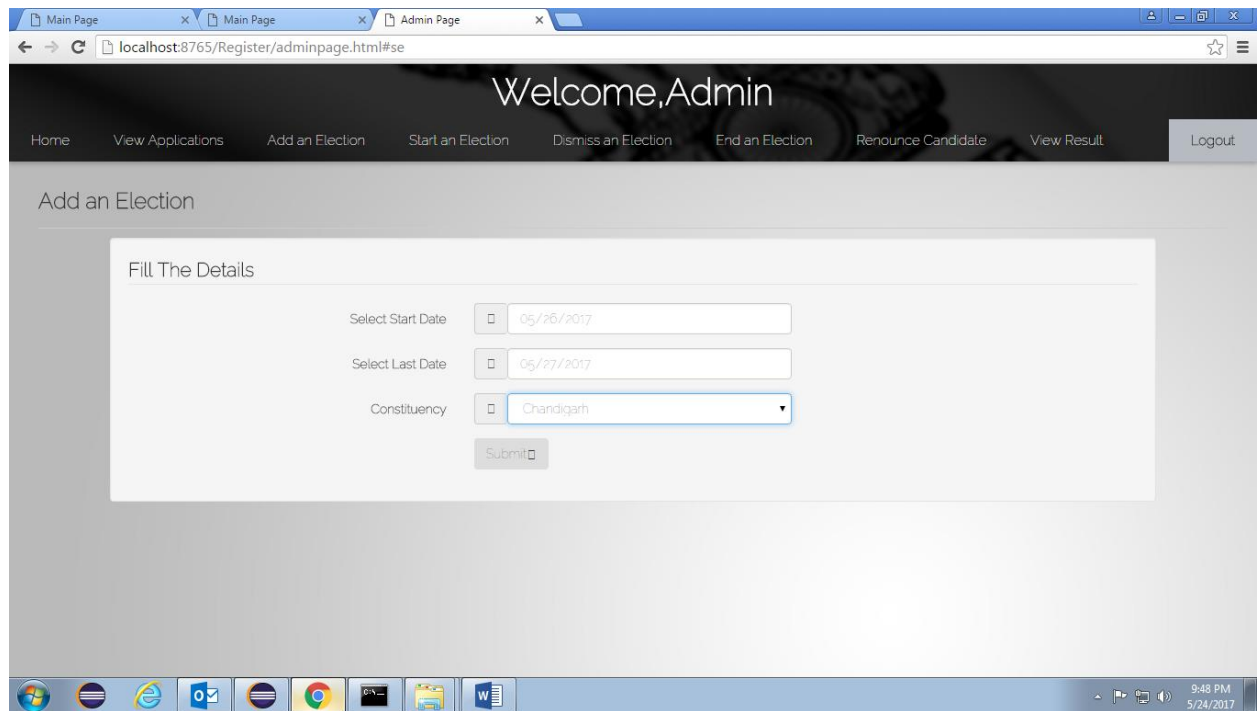
7. List of Pending Candidates Applications on Admin Page

**8. Add an Election functionality on Admin page.**

9. Start An Election functionality on Admin page

10. Candidate page

**11. Register for an election functionality on Candidate page**
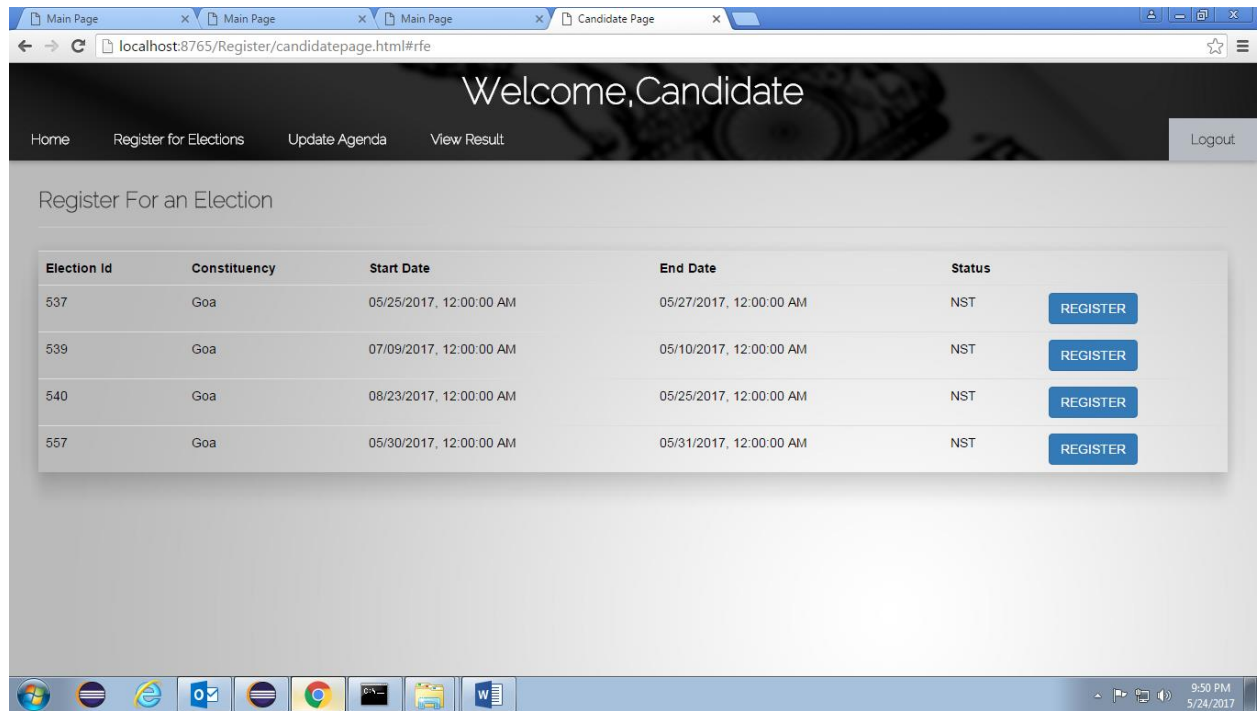
12. Success message on successful registration of a candidate for an election
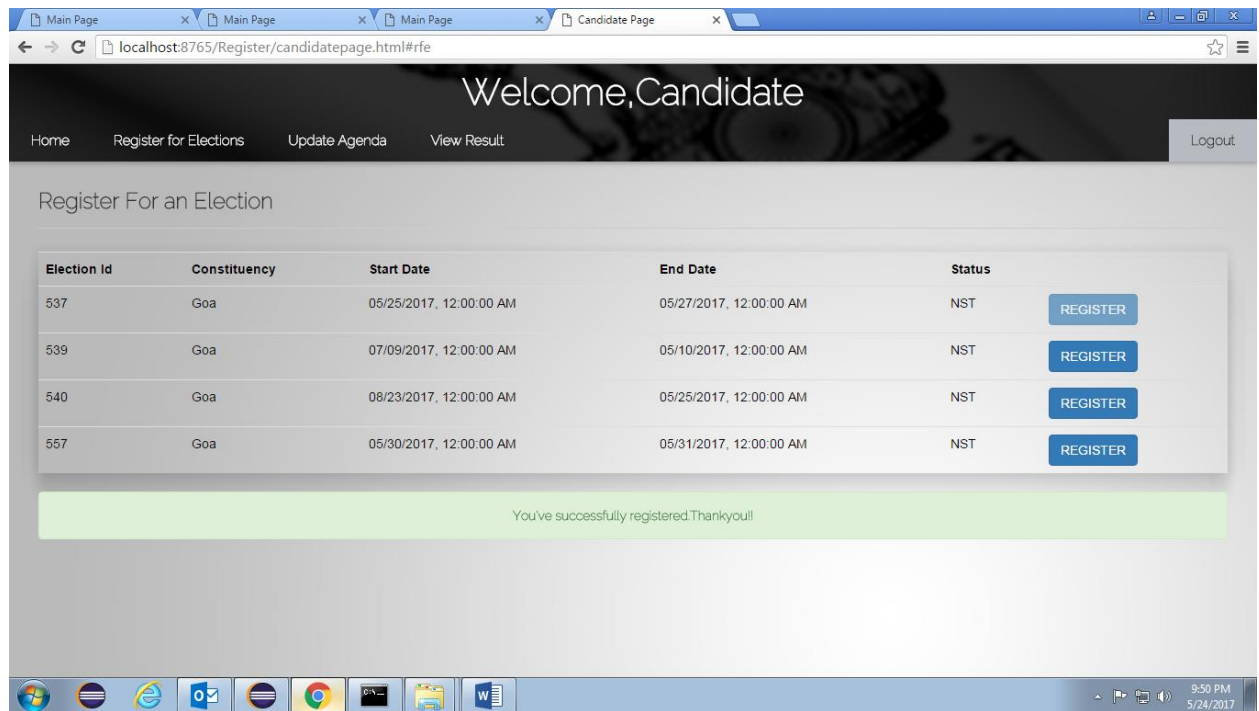
## 13. Update Agenda functionality on Candidate page
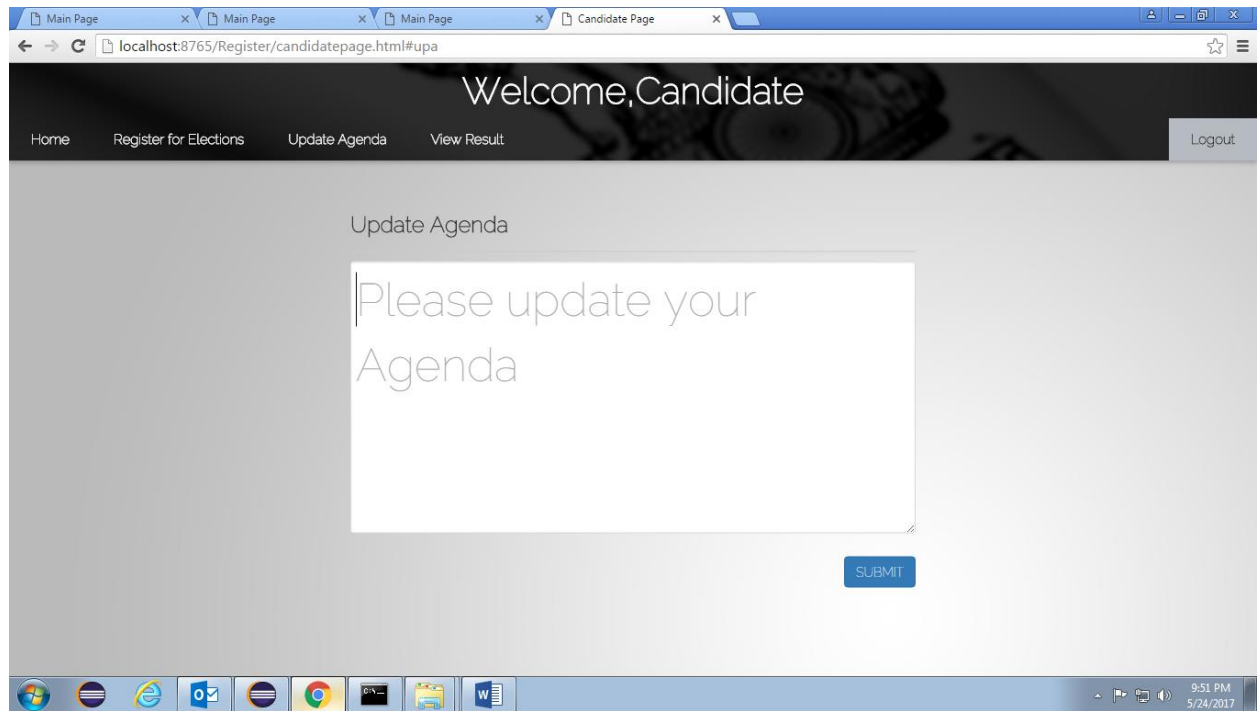
## 14. Common results page for Admin/ Candidate/ User

15. Dismiss an election functionality on Admin page

16. End an election functionality on Admin page

17. Renounce Candidate functionality on Admin page

5. CONCLUSION

It is concluded that the application works well and satisfies the users. The application is tested very well and errors are properly debugged. The application can be simultaneously accessed from more than one system. The application works according to the restrictions provided in their respective system. Further enhancements can be made to the application so that the application functions appear attractive and in a more useful manner than the present one.

5.1 FUTURE SCOPE

Every application has its own demerits. The project has covered almost all the requirements. Further requirements and improvements can easily be done since the coding is mainly structured and modular in nature. Changing the existing modules or adding new modules can append improvements. Further enhancements that can be made to the application are −

1. Better UI (User Interface) can be given to the program.
2. Allows the voters to change their votes before the election ends.
3. Sends each voter who has successfully voted a verification number to prove that they have voted.
4. E-mails these statistics to the voters and the candidates.
5. Contacts all authorized voters on enumeration lists by e-mail to give them their username information, passwords, election code, instructions to obtain the Voting Client and contact information of the admin.
6. Reports any attempted breaches of security to the Admin.