SUPERIOR UNIVERSITY LAHORE

Faculty of Computer Science & IT

Final Year Project

[EV System]

Project ID:**[FYP-BSCS-F18-028]**

Project Team

Student Name	Student ID	Program	Contact Number	Email Address
Usama Ali	Bcsm-f15-087	BSCS	03118814359	syedusama587@gmail.com
M. HanzalaJaved	Bcsm-f15-095	BSCS	03030265575	hanzalamirza96@gmail.com
Ali Waqar	Bcsm-f15-200	BSCS	03134482509	Haiderali136@gmail.com

Dr. Arfan Jaffar(Professor)

Project Report

EV System

Change Record

Author(s)	Version	Date	Notes	Supervisor's Signature
	1.0		<Original Draft>	
			<Changes Based on Feedback from Supervisor>	
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			<Added Project Plan>	
			<Changes Based on Feedback from Supervisor>	

APPROVAL

PROJECT SUPERVISOR

Comments: _____

_____

Name:_____

Date:_____ Signature:_____

PROJECT MANAGER

Comments:

_____

_____

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Date:_____ Signature:_____

HEAD OF THE DEPARTMENT

Comments:

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Date:_____ Signature:_____

Dedication

This work dedicated to our family, friends and everyone who showered us with their love and support. We are especially thankful to those who presented challenges to our work and we pray for them because without their resistance we would never have been able to achieve what we did.

Acknowledgements

All praises be to Almighty Allah, Who gave us the strength, knowledge and courage to complete this task. We would like to pay tons of thanks and express my gratitude to my supervisor Sir Arfan Jaffar, for his useful guidance, remark and support throughout the learning process that he provided us a convenient direction to complete our project. Specially thanks to our parents, teachers and friends whose valuable prayers and support encouraged us to complete this project.

Executive Summary

Electronic voting system (EVS) is software that lets users vote through electronic devices and the data is processed at central location. EVS stores records of all of the pools and can be used later on for decision making. Furthermore, EVS is supported by electronic devices like biometric machines, data analysis, high performance servers etc. This project is the electronic voting system which will be based on tools related to our course. Through this project we will cast the votes which could be svl's selection votes or different types of competition held in our university. This project will help us to cast votes fairly. As we know that for casting the votes we will have database system in it through which we can enter k data and after that the vote casting and then result will be shown offline and fairly.

As we are working on the project of vote casting, the main issue, which have been about this project is fair result. As we know that there has been very corruption in this field or we can say that in this project corruption has been trend because voter can cast vote at someone's place and cannot judge this type of corruption because for the fair result we have to solve this problems.To overcome these problems we are about to make solution that a system will be design for vote casting with some electronic bio matric devices attached to them. As we are focusing on the fair work or fair result, we have to think about this issue. So we have selected some special aspects through which we can cast the vote fairly and show the result fair as well. We are adding the finger print system,so we have more authentic way for solving this problem and making this project more efficient. In this system a single person can only cast a single vote,

no much man power required a single person can handle it, candidates will not count the votes system automatically generate the count clock of votes per party and if there will be an update about more information it will be informed.

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Chapter 1

Introduction

Chapter 1: Introduction

Electronic voting system (EVS) is software that lets users vote through electronic devices and the data is processed at central location. EVS stores records of all of the pools and can be used later on for decision making. Furthermore, EVS is supported by electronic devices like biometric machines, data analysis, high performance servers etc. This project is the electronic voting system which will be based on tools related to our course. Through this project we will cast the votes which could be svl's selection votes or different types of competition held in our university. This project will help us to cast votes fairly. As we know that for casting the votes we will have database system in it through which we can enter k data and after that the vote casting and then result will be shown fairly.

1.1. Background

As we know that with the passage of time corruption has been increasing and it has also been difficult to remove the corruption in our lives. Specially in voting system, it has been a major problem that in vote counting or in vote casting process there have been the corruption due to which, as a result, someone gets the place of deserving person. For example if we discuss about the election system of our country, we all know about the corruption happening in our country in days of election. It can only be removed by this type of system through which the end of the corruption can happen.

1.2. Motivations and Challenges

With increasing technology voting system also need to be update due to which we can minimize and can be safe the precious time of people which have been waste in paper voting. The main thing is time. As we know the time is money, so we have to solve out that problem. This system definitely is the better than paper voting.

1.3. Goals and Objectives

Objective of EVsystem is to save the time period of its users and do most of the tasks that takes time like document reading and questioning about it and doing their tasks. We are targeting the professional business and our objective is to provide them the smart solutions to their life problems and tasks.

Goals of "EVsystem" given below:

- It aims to give the easiest way for users.
- Introduce the modern features into the market that automate the systems.
- We will also provide the data analysis option so that we can count the age categories of users/people

1.4. Literature Review/Existing Solutions

There are many existing solutions in market but they have been working on just bio-metric or they have been just focusing on online system. They have also work on application but it's not been well due to corruption or some other errors. As we know that this is a very critical project for the corruption point of view therefore, this project has not been marked their place in market.

1.5. Gap Analysis

As we know that competitors have been working on just bio-metric or they have been just focusing on online system. EVSystem consists of offline voting with special features of bio-metric and data analysis. Bio-metric system can easily beat the corruption because of fair result. They both perform their role alternatively that if one doesn't work then the other will do their duty.

1.6. Proposed Solution

To overcome the problems we are about to make solution that a system will be design for vote casting with some electronic bio matric devices attached to them. As we are focusing on the fair work or fair result, we have to think about this issue. So we have selected some special aspects through which we can cast the vote fairly and show the result fair as well. We are adding thefinger print system, due to which problem will eliminate and if there will be some issue then it will eliminate through thisbecause we are making this project more efficient. We also add the data analyzer system so that we can count the age category of the vote caster.In this system a single person can only cast a single vote, no much man power required a single person can handle it, candidates will not count the votes, system automatically generate the count clock of votes per party and if there will be an update about more information it will be informed.

1.7. Project Plan

As the need for voting system has started to increase and some organizations or countries has started to look for the solutions, this can be the starting point to improve and deploy in the real world scenarios.

In this project we have tried to explain the importance of today's technology its unique properties and its application areas especially in e-voting.

We need to keep in mind e-voting is not the only process during the whole voting processes. There might be some other security concerns that need to be considered when such an application is built for practical reasons.

Lastly, Efficiency can be improved by saving human time and using some technology and to reduce some kind of barriers and provide a safe a secure application which cannot break down by a hacker or any kind of cracker.

1.7.1. Work Breakdown Structure

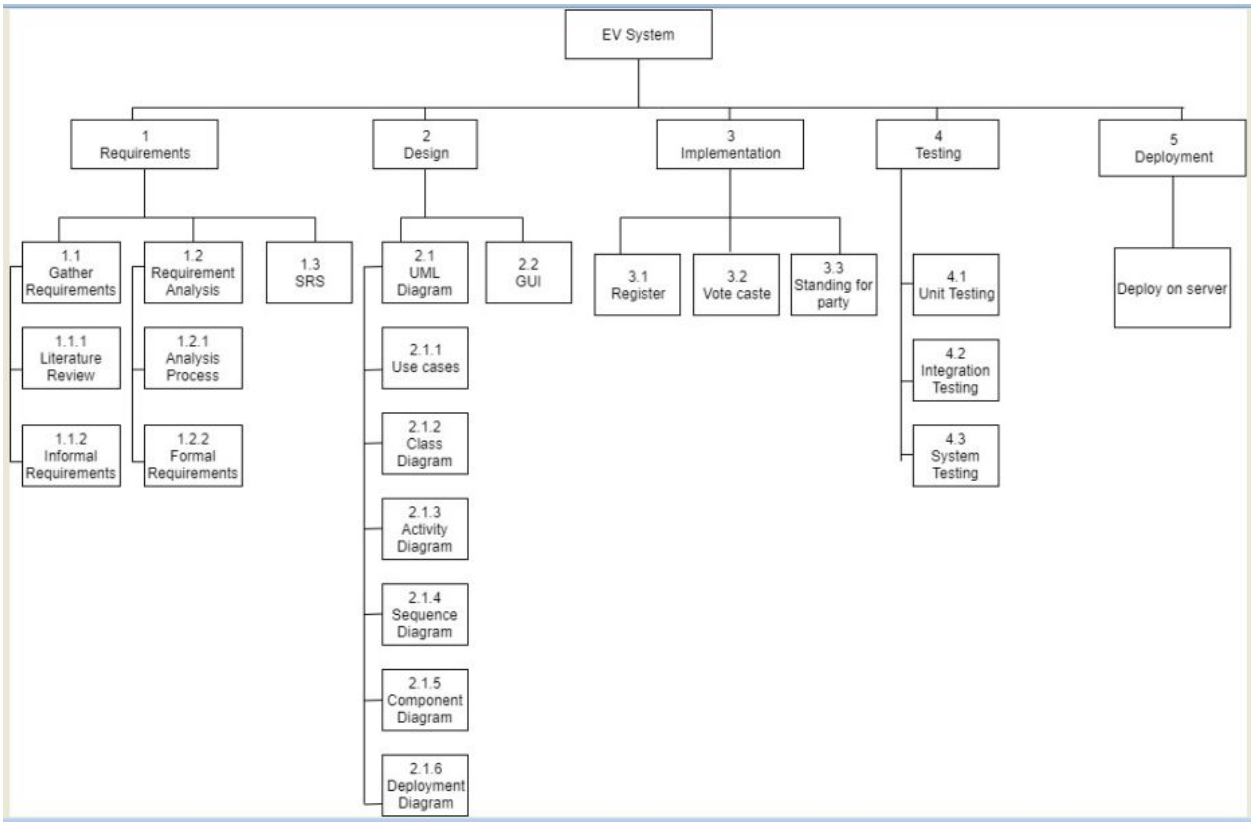

Figure 1

1.7.2. Roles & Responsibility Matrix

Table 1

WBS #	WBS Deliverable	Activity #	Activity to Complete the Deliverable	Duration (# of Days)	Responsible Team Member(s) & Role(s)
1	1.1 Initial	1.1.1	Research	10	Team
		1.1.2	Analysis	5	Team
	1.2 Planning	1.2.1	Scope Statement	5	Hanzala
		1.2.2	Determining Responsibilities	3	Hanzala
		1.2.3	Project Plan	7	Ali Waqar
	1.3 Execution	1.3.1	Requirement Gathering	10	Usama, Hanzala
		1.3.2	Validating Requirement	3	Ali Waqar, Usama
		1.3.3	Designing system	25	Ali Waqar
		1.3.4	Implementation	80	Ali Waqar, Hanzala

		1.3.5	Testing	15	Team

1.7.3. Gantt Chart

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Table 2

Activity	Members & Weeks																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Title Submission									Midterm Exam Week							Study Week	Exam Week	Exam Week
Proposal Document																		
Requirement gathering																		
Prototype design																		
Design interface																		
Database design																		
DOC-1 Submission																		
Login and registration module																		
Searching of pervious work																		

Biometric Testing																	
Vote counting module																	
Display result module																	

Table 3

Activity	**Weeks**																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Requirement changes module									Mid term Exam Week							Study Week	Exam Week	Exam Week
Transection module																		
DOC-2 Submission																		
Testing and bug fixes																		

Testing																	
Review and Maintenance																	

Chapter 2

Software Requirement Specifications

Chapter 2: Software Requirement Specifications

1.1. Introduction

1.1.1. Purpose

The purpose of this documentation is to provide detailed knowledge about our software system requirements, functional and non-functional requirements. This document contains introduction, description of our project, External Interfaces that will explain the user interaction with our system, functional requirements, features our system will provide, and it contains the non-functional requirements section, which will explain the efficiency and effectiveness of system.

EVSystem provides a platform where user can easily interact with the system.Offline voting system enables a voter to cast his/her vote through system without going to voting booth and additionally registering himself/herself for voting in advance, proxy vote or double voting is not possible, fast to access, easy to maintain all information of voting, highly efficient and flexible

1.1.2. Document Conventions

This document follows Calibri format and the font size is 12. Bold-faced text has used to emphasize sections and italicized text has used to label and recognize diagrams and the all text are justified.

1.1.3. Intended Audience and Reading Suggestions

Many people like will read this document:

- Team Manager
- Team Leader
- Developers

- Testers
- Users

The documentation has been organized approximately in order of increasing specificity.

- Scope of product
- Functional requirements
    - Use cases
    - DFDs
- Non-functional requirements

1.1.4. Product Scope

In EVS (Electronic Voting System) some major functions will used be used to meet the people and user demands like

- **Offline Voting**
- **Votes count clock**
- **Bio-Metric system**
- **Data Analysis**

1.1.5. References

This document is formed by helping from these sites and documents:

•https://s3.amazonaws.com/ppt-download/documentation-e-voting-160128182304.pdf?response-content-disposition=attachment&Signature=EGt0FD4cCAfSKRsuwHB9HYQ%2F%2FXs%3D&Expires=1546557816&AWSAccessKeyId=AKIAIA5TS2BVP74IAVEQ

• IEEE standard document for software requirement specification.

1.2. Overall Description

1.2.1. Product Perspective

Electronic voting system (EVS) is software that lets users vote through electronic devices and the data is processed at central location. EVS stores records of all of the pools and can be used

later on for decision making. Furthermore, EVS is supported by electronic devices like biometric machines,data analysis, high performance servers etc. This project is the electronic voting system which will be based on tools related to our course. Through this project we will cast the votes which could be svl's selection votes or different types of competition held in our university. This project will help us to cast votes fairly. As we know that for casting the votes we will have database system in it through which we can enter k data and after that the vote casting and then result will be shown fairly.

1.2.2. Product Functions

In EVS (Electronic Voting System) some major functions will used be used to meet the people and user demands like

- **Offline Voting**
- **Votes count clock**
- **Face Recognition**
- **Data Analysis**

Offline Voting

In offline voting, it removes the manual voting system done by handwriting it consume the man power of dealing each single person by the counter man. In offline voting people will be deal with the Electronic Voting System cast their vote by help out there self its mean less wages will be paid by the institute saving of money matter at that time.

Votes Count Clock

In Votes count clock candidate don't need to count all the votes by themselves system will automatically show the total votes cast by the people per party this is the solution of reducing the time wastage of counting persons and time wastage of announcements.

Bio-Metric System

Bio Metric System is the most important part of this project because of fake user entry and duplications of user violates. Electronic Bio Metric system proves in this era that no one has the same identification so a single person cannot cast vote for the send time if he/she has cast once.

Data Analysis

In data analysis, we can easily analysis the vote caster age and other desired information. It will be very useful in next election.

1.2.3. User Classes and Characteristics

There is one typeof user interacting with the system which will be admin.

Following are the characteristics of the system:

- Easy to use.
- Do not require any technical expertise.
- Do not require any special knowledge to just cast the vote.

1.2.4. Operating Environment

This software will easy implement of this system, which have window 7, and this is desktop application, which work on all window's operating system.

1.2.5. User Documentation

The following are the leaflets

- User manual
- Video tutorials
- Project documentation
- Implementation details

1.2.6. Assumptions and Dependencies

Following are the some

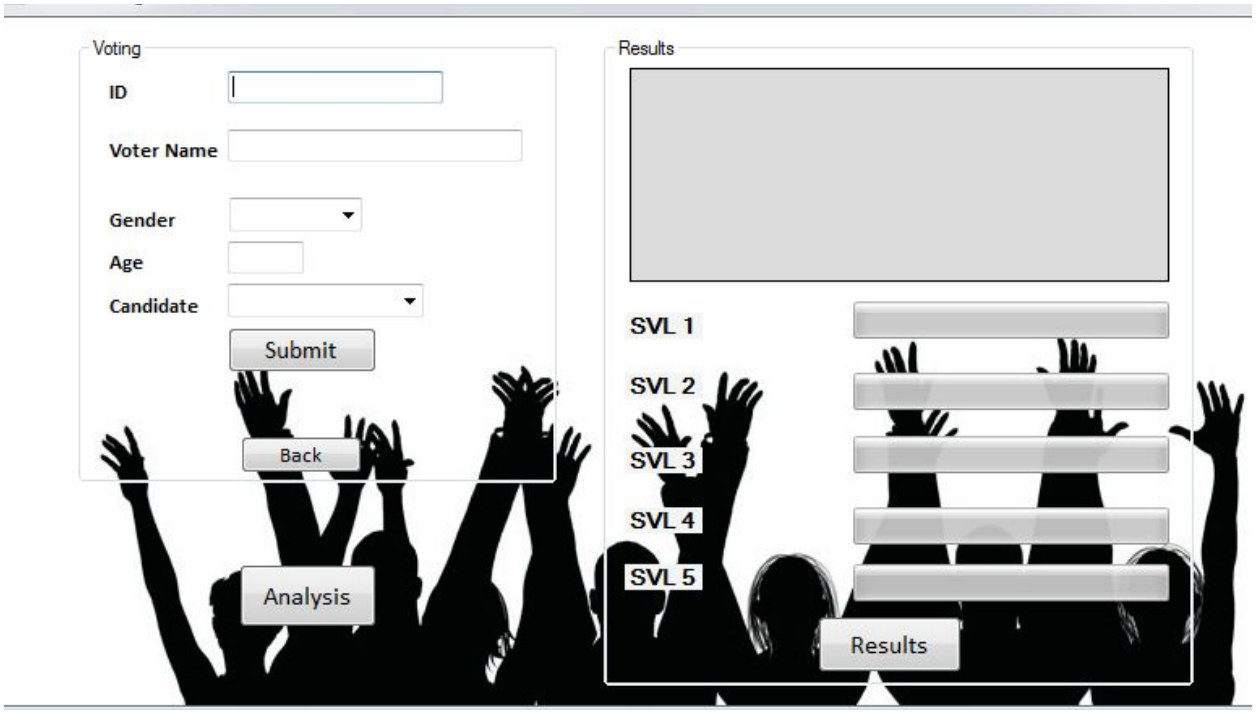
1. The EV system will be that much simple(complexity level is low)

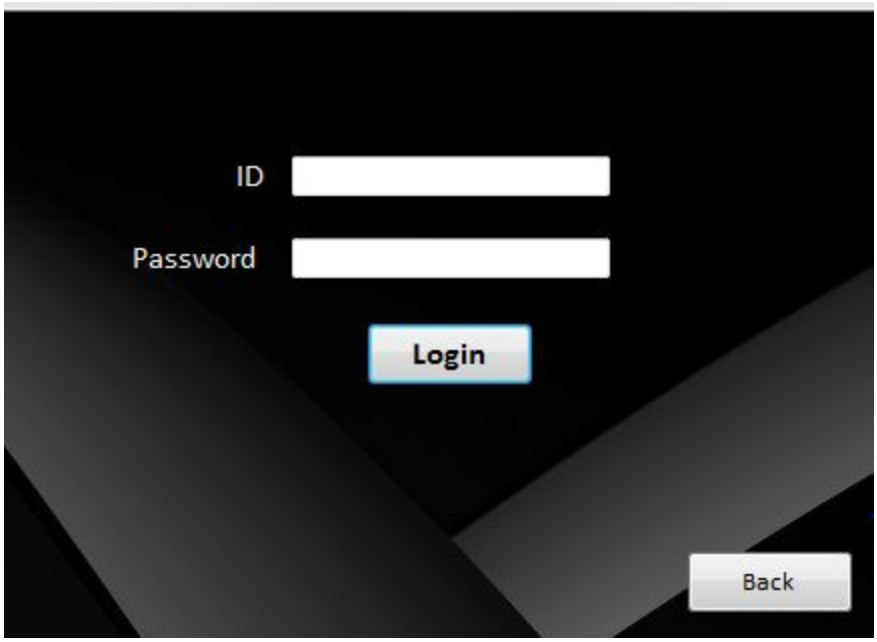
2. Ambiguity must be minimized in EV system
3. Operations must be easy and operate-able by the end user. We need to update our database with respect to time.
4. Right now we are operating on server ended system along with sql database

1.3. External Interface Requirements

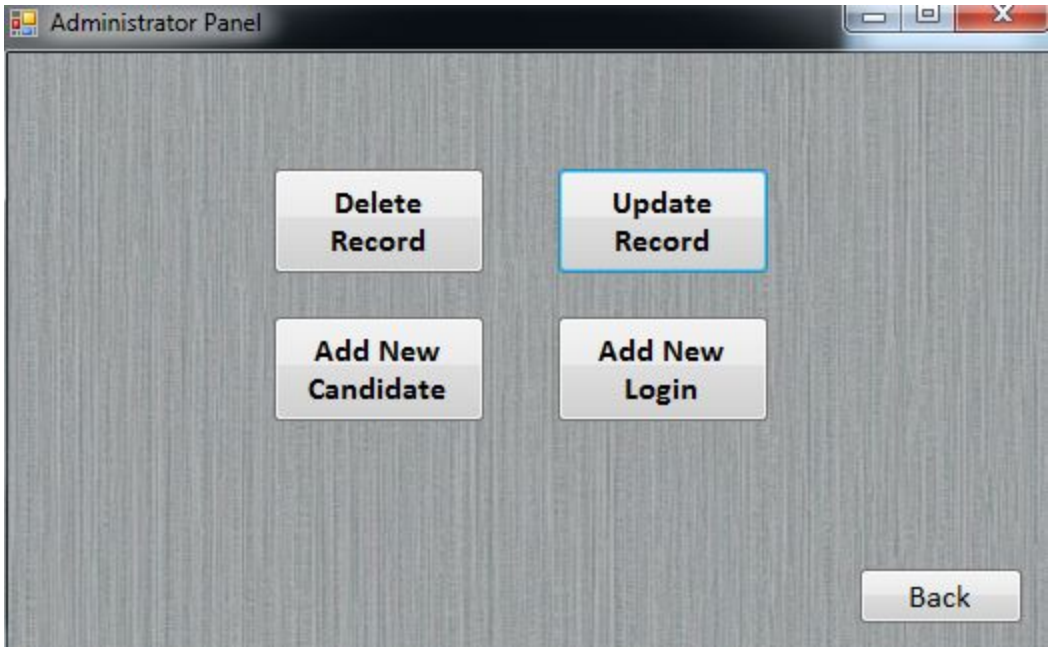
1.3.1. User Interfaces

- The GUI of the software is simple.
- Currently we are developing the GUI by using C# Library and SQL server query.
- Right now, the GUI of our software is very simple that currently fulfilling the customer needs.


Voting
ID
Voter Name
Gender
Age
Candidate
Submit
Back
Analysis
Results
SVL 1
SVL 2
SVL 3
SVL 4
SVL 5
Results


ID
Password
Login
Back


Fingerprint Enrollment
Prompt:
Scan the same fingerprint again.
Status:
The fingerprint reader was connected.
The fingerprint reader was touched.
The fingerprint sample was captured.
The fingerprint feature set was created.
The finger was removed from the fingerprint reader.
Fingerprint samples needed: 3
Close


Administrator Panel
Delete Record
Update Record
Add New Candidate
Add New Login
Back

1.3.2. Hardware Interfaces

Following are the interfaces required:

- Computer Systems
- Bio-Metric Machine

1.3.3. Software Interfaces

- The project developed in C#. The bio metric system has been design using Digital Persona.
- Communication channel between them is (C# interface and Devices connected to Databases).
- Information of a voter is gain by vote caster and stored it in database.

1.3.4. Communications Interfaces

EV system didn't use such kind of internet protocol right now because it is a server ended system having offline database storage called SQL SERVER.

1.4. System Features

1.4.1. System Feature 1

Bio-Metric System.

1.4.1.1. Description and Priority

Bio Metric System is the most important part of this project because of fake user entry and duplications of user violates. Electronic Bio Metric system proves in this era that no one has the same identification so a single person cannot cast vote for the send time if he/she has cast once.

1.4.1.2. Stimulus/Response Sequences

Following are the sequence of the responses that would be according to the user inputs

- User can only cast the vote once.
- The system will collect all votes and shows the result at the end.

1.4.1.3. Functional Requirements

REQ-SF1-1: <Vote casting> before casting the votes the voter must be considered clearly that whether the voter is eligible for voting or not.

REQ-SF1-2: Make sure that the vote is fully considered. If it's not, system cannot count it.

REQ-SF1-3: <Empty vote> Nothing will happen later.

1.4.2. System Feature 3 (and so on)

Data Analysis

1.4.2.1. Description and Priority

In data analysis, we can easily analysis the vote caster age and other desired information. It will be very useful in next election.

1.4.2.2. Stimulus/Response Sequences

- Data Analysis will store the data of voter. It can be their age, department, resignation.
- EV System will store the data in its database.

1.4.2.3. Functional Requirements

REQ-SF2-1: <Software Capacity>It's capacity will be available to execute feature efficiently.

REQ-SF2-2: <Other Requirements are under consideration>

Identifier	**FR-01**
Title	Bio Metric System
Requirement	To cast the vote

Rationale	BMS
Restrictions and Risks	Vote only once
Dependencies	Nil
Priority	High

Identifier	**FR-02**
Title	Data Analysis
Requirement	Store the information of voter
Rationale	Storing
Restrictions and Risks	No repetition of data
Dependencies	Nil
Priority	Medium

1.5. Other Nonfunctional Requirements

1.5.1. Performance Requirements

The software should be available in minimum down-town. The software should provide the user with appropriate error messages and should handle run-time exception in a controlled manner in order to avoid abnormal termination.

1.5.2. Safety Requirements

The software should be designed and developed in such a way that it remains highly maintainable, flexible and future enhancements can be easily incorporated.

1.5.3. Security Requirements

The software should provide protection against unauthorized access.

1.5.4. Software Quality Attributes

- EV System is software and it is required to be deployed once on a system and then it can be easily accessed by user without any other installation
- EV System offers high portability and later can be moved to different systems if required.

1.5.5. Business Rules

As we know this system consists of exeptional ways of voting. That is through bio metric. Both will work alternatively; if one does not work then the other will perform the task.

1.6. Other Requirements

- Usability
- Robustness
- Flexibility

Chapter 3

Use Case Analysis

Chapter 3: System Analysis

In this chapter all the functions of EV system describe with their features and their access to administrator and user, their limitation their capacity.

3.1. Use Case Model

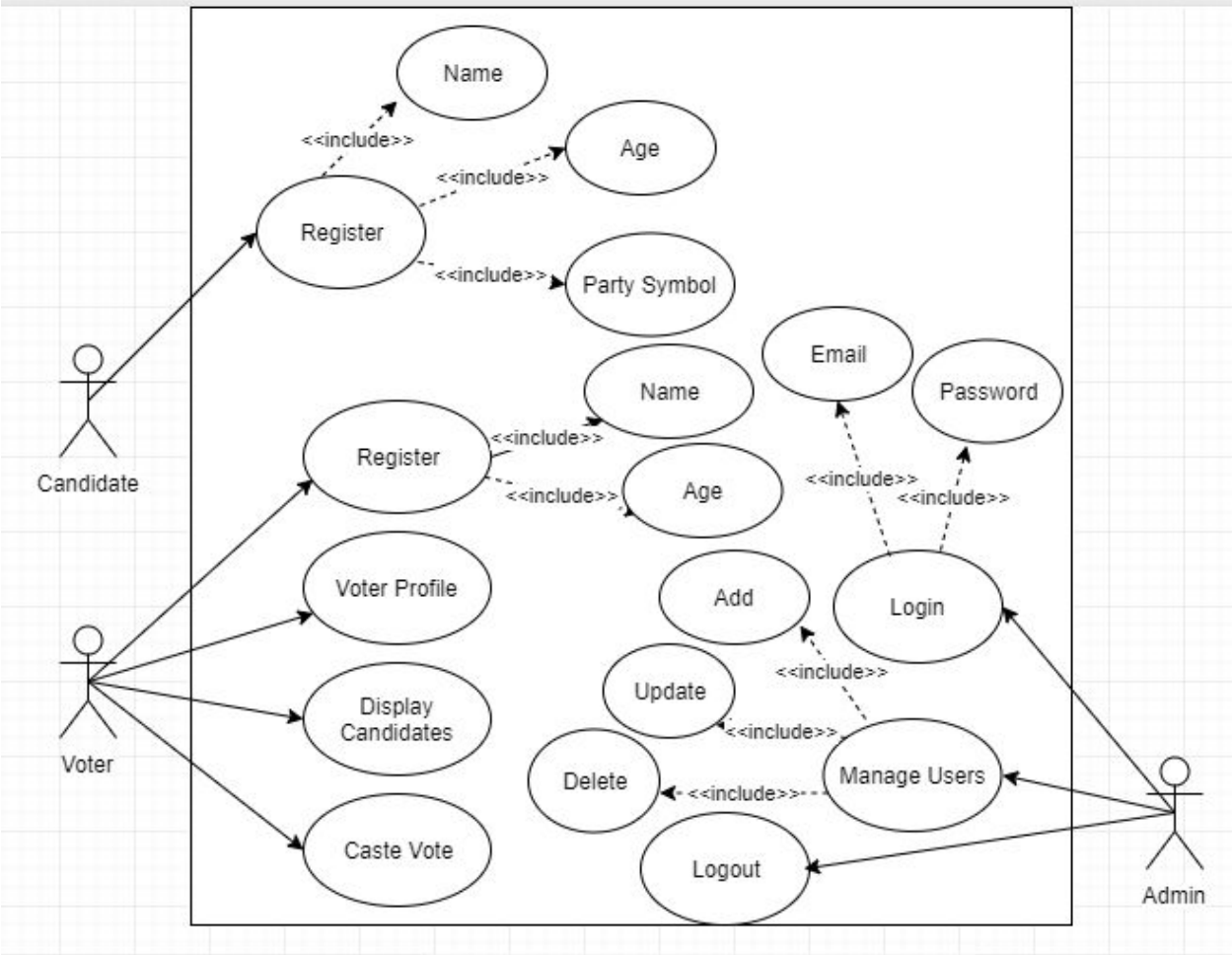


Figure 2

3.2. Fully Dressed Use Cases

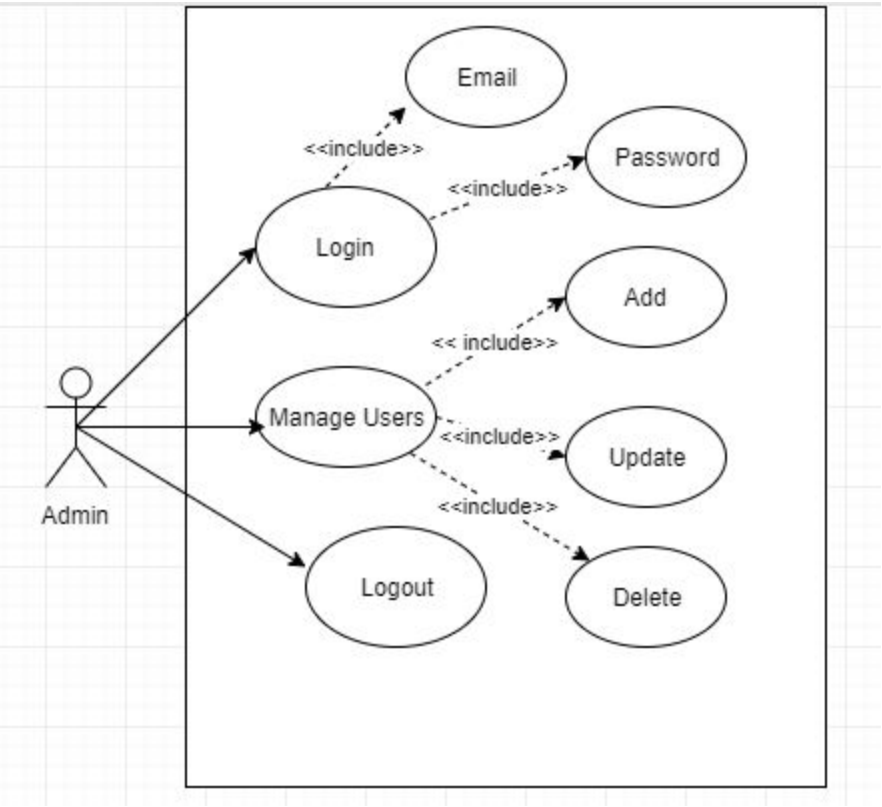


Figure 3

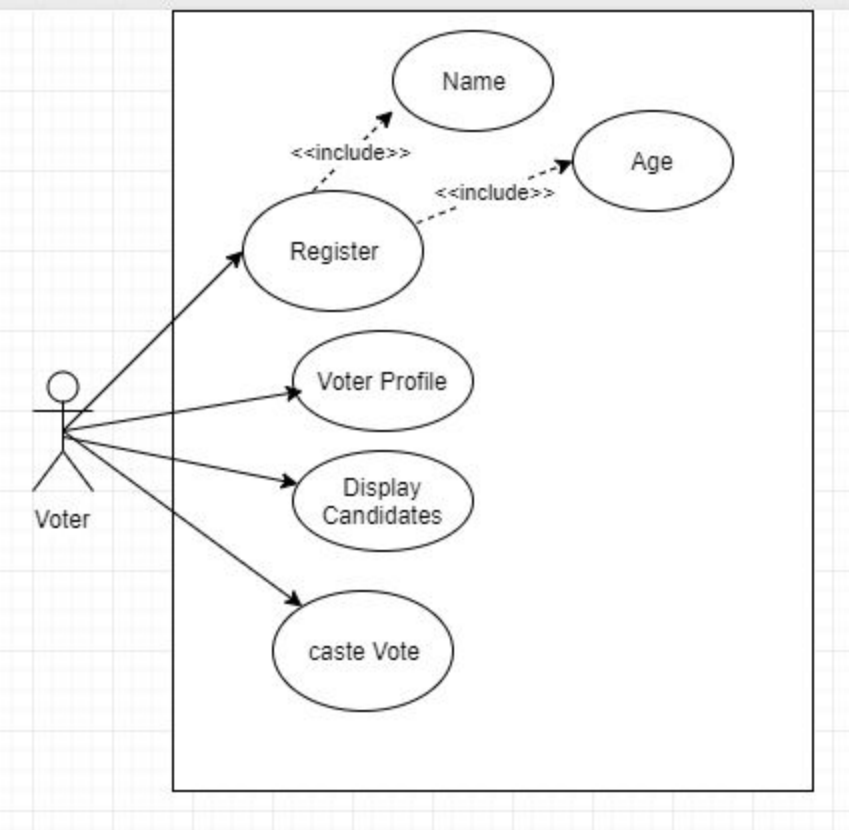

Name
<<include>>
Age
<<include>>
Register
Voter Profile
Voter
Display
Candidates
caste Vote

Figure 4

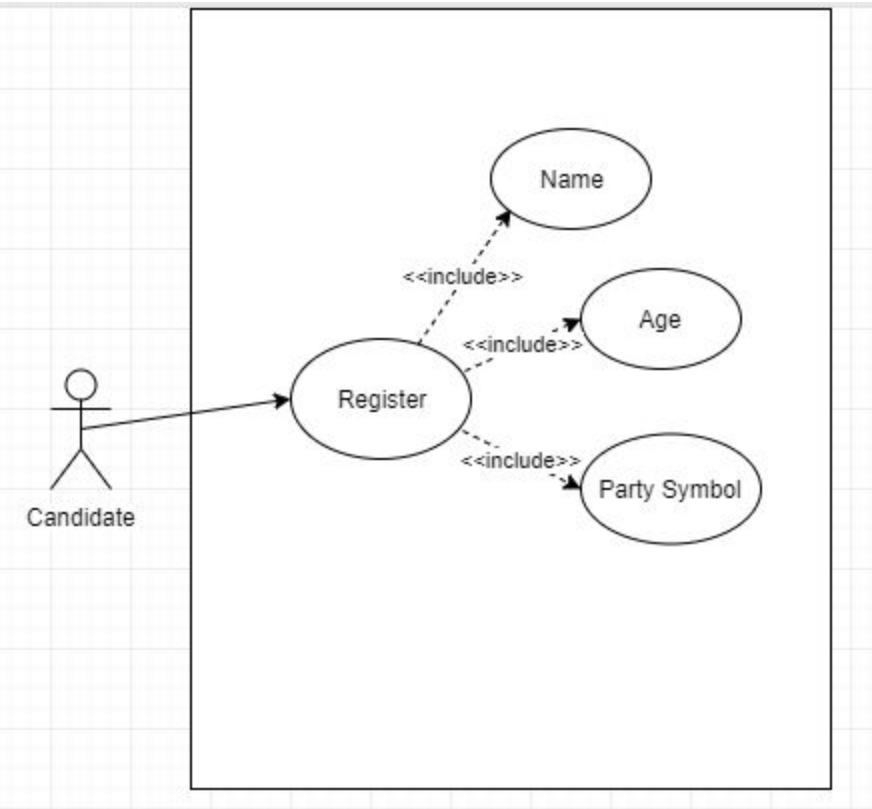

Name
<<include>>
Age
<<include>>
Register
<<include>>
Party Symbol
Candidate

Figure 5

Chapter 4

System Design

Chapter 4: System Design

This chapter describe about system use cases and how the different actors are interacting with the system. In use case main functionalities of the system are defined that are divided in different modules e.g. major use case in which all functionalities of the system are defined is divide into candidate, voter and admin module and each actor interacting with module and performing his module functionalities.

4.1. Architecture Diagram

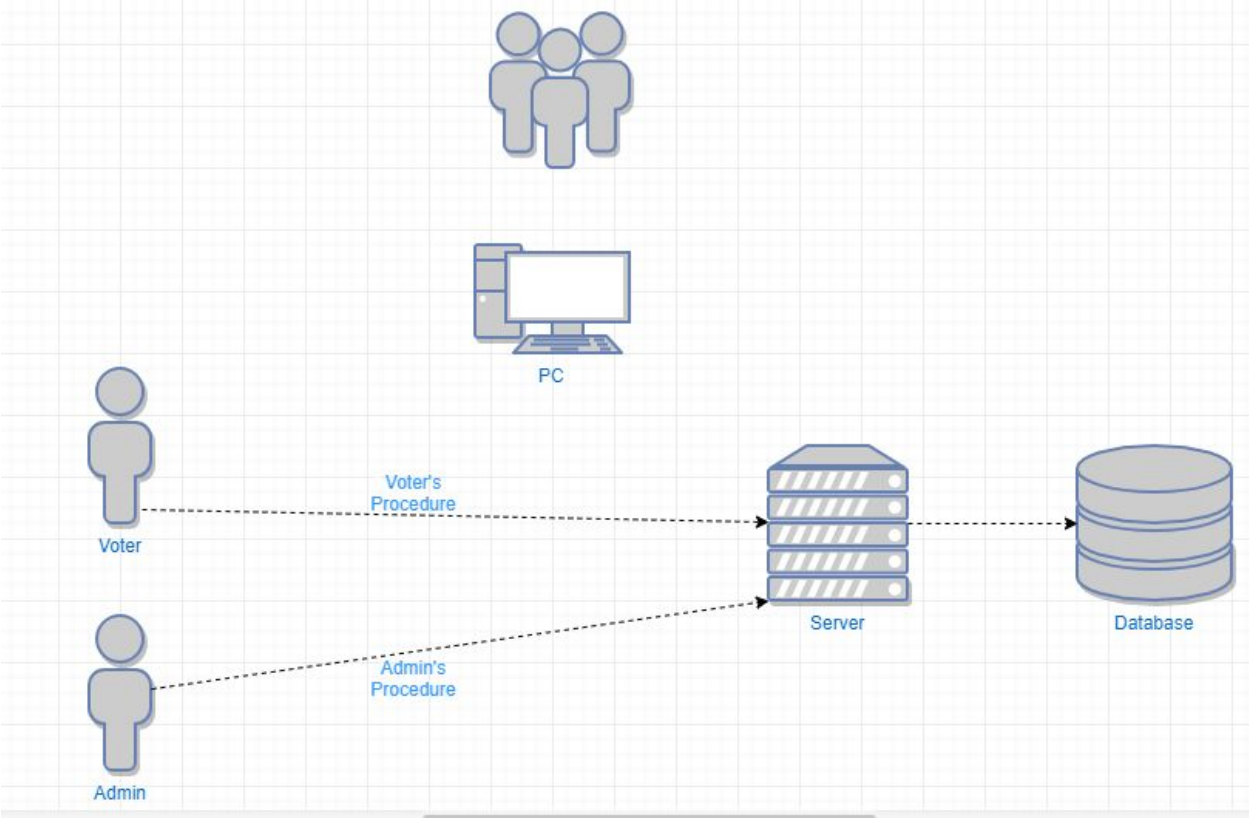


Figure 6

4.2. Domain Model

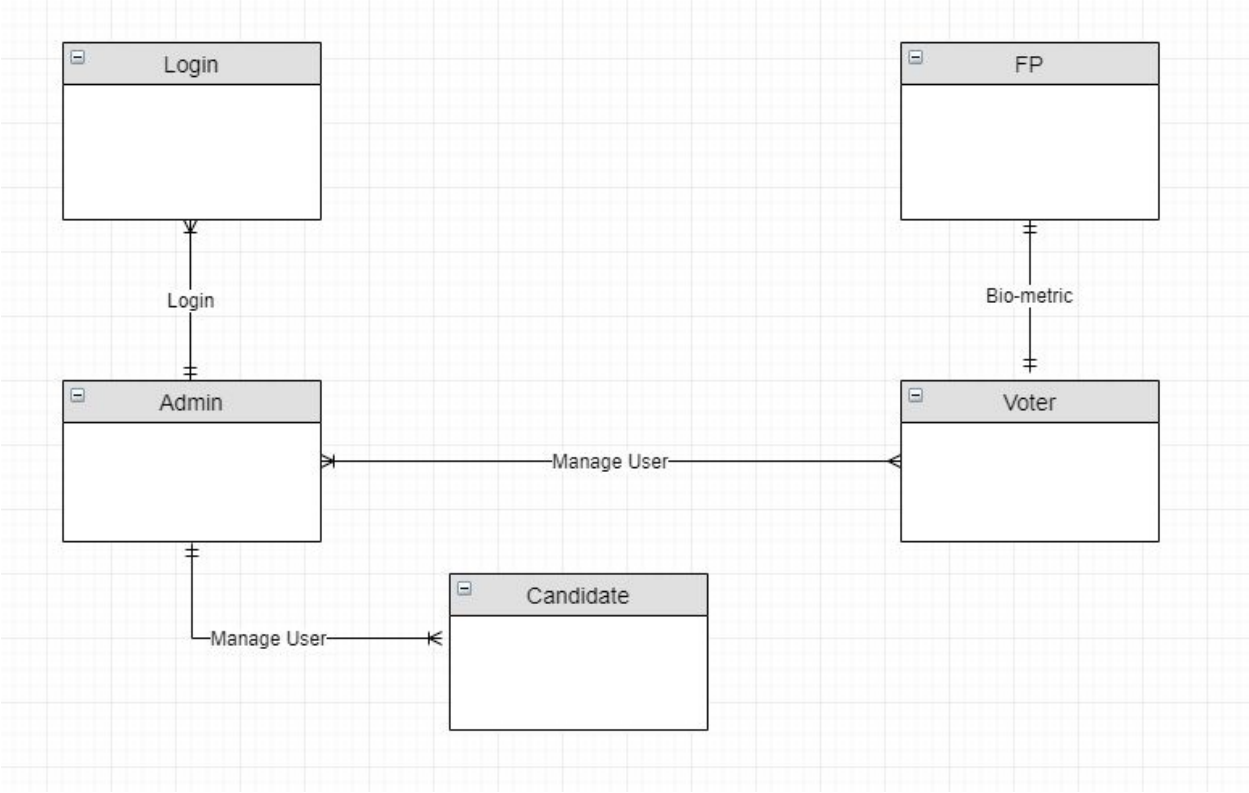


Figure 7

4.3. Entity Relationship Diagram with data dictionary

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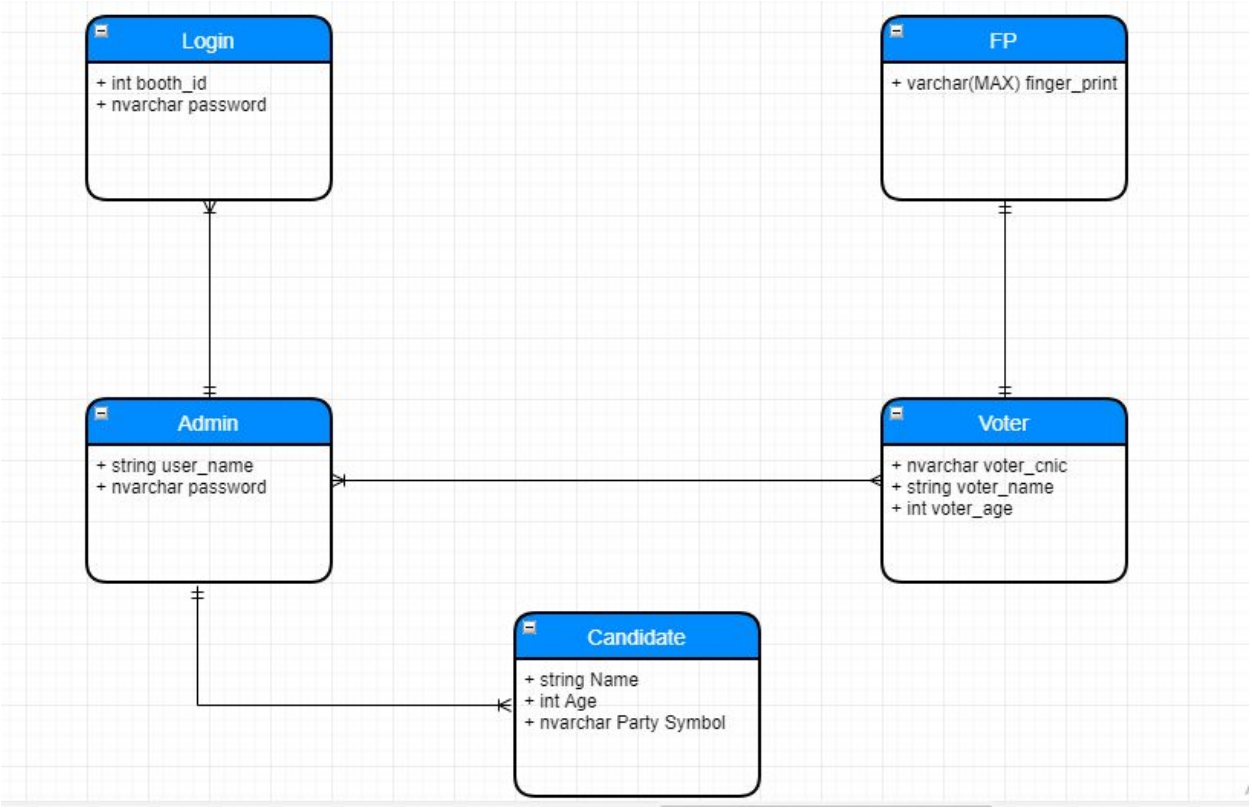

Figure 8

Table 4

Voter:

Attribute	Data Type	Nullable	Description
ID	Nvarchar	No	The identity number of this entity
Name	Varchar	No	The name of this entity
Age	Int	No	The age of this entity

Table 5

Admin:

Attribute	Data Type	Nullable	Description
Name	Varchar	No	The name of this entity
Password	Nvarchar	No	The password of this entity

Table 6

Candidate:

Attribute	Data Type	Nullable	Description
Name	Varchar	No	The name of this entity
Age	Int	No	The age of this entity
Party Symbol	Nvarchar		The party symbol of this entity

4.4. Class Diagram

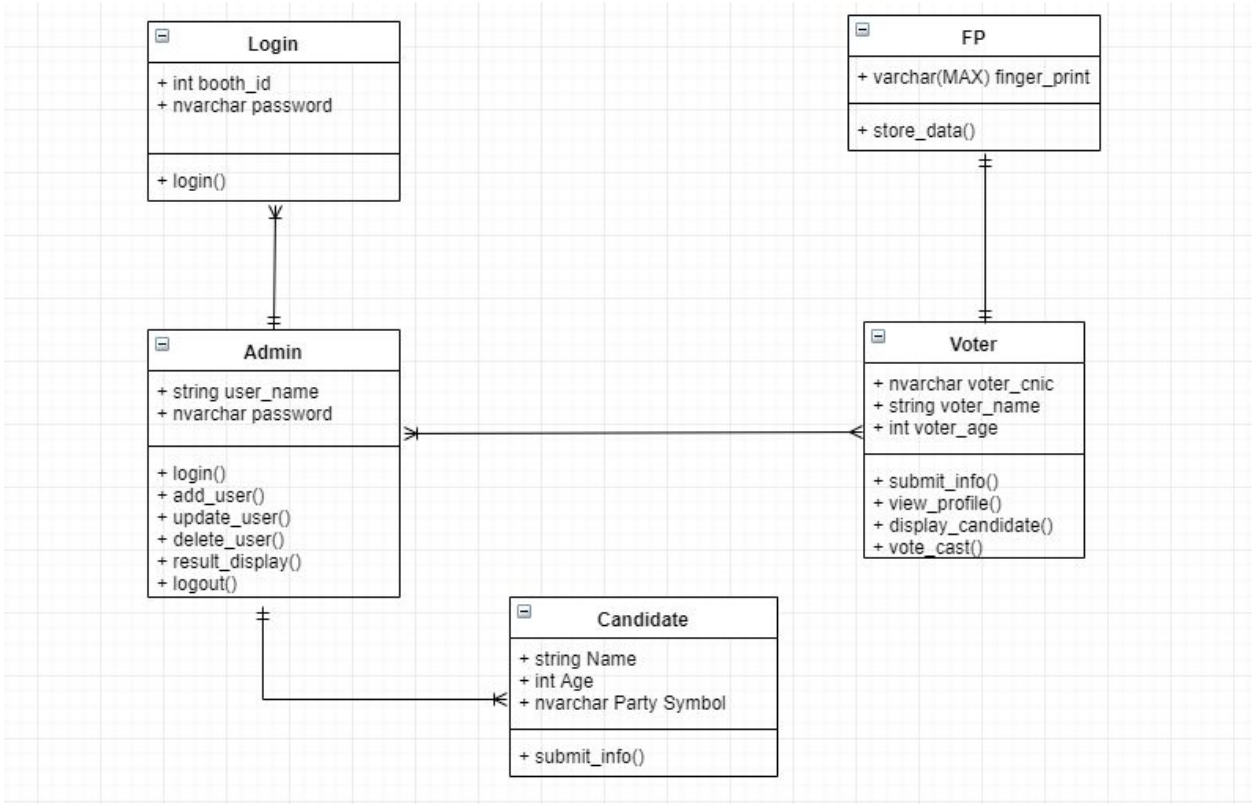

Figure 9

4.5. Sequence / Collaboration Diagram

For Admin:

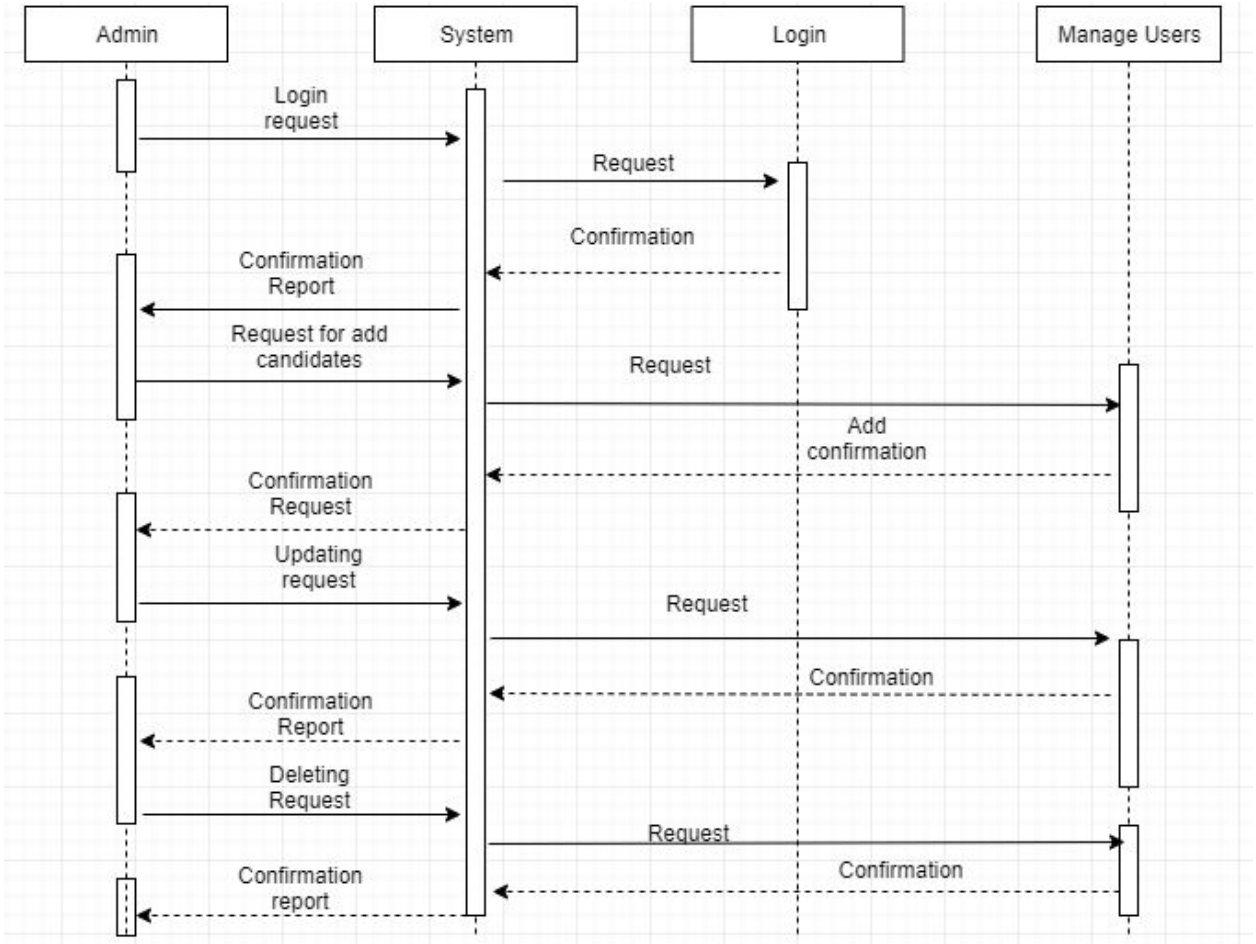

Figure 10

For Voters:

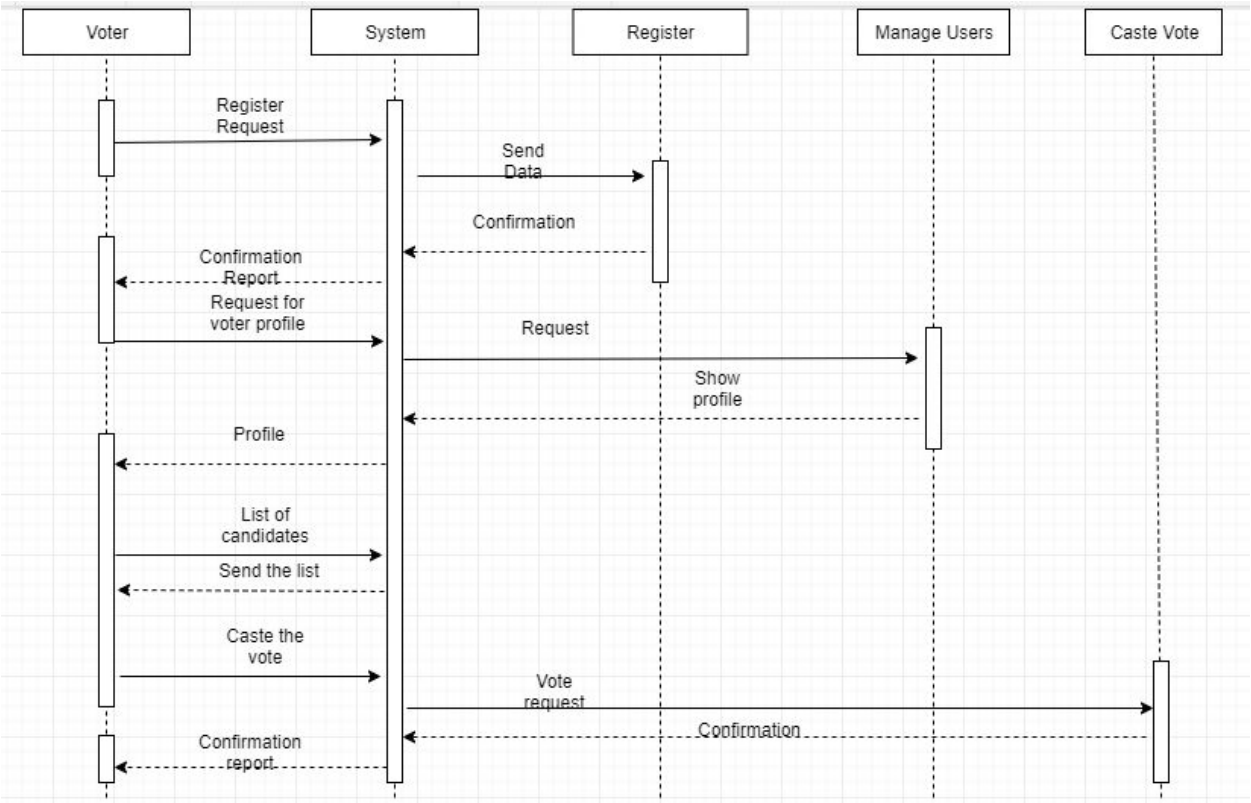

Figure 11

For Candidates:

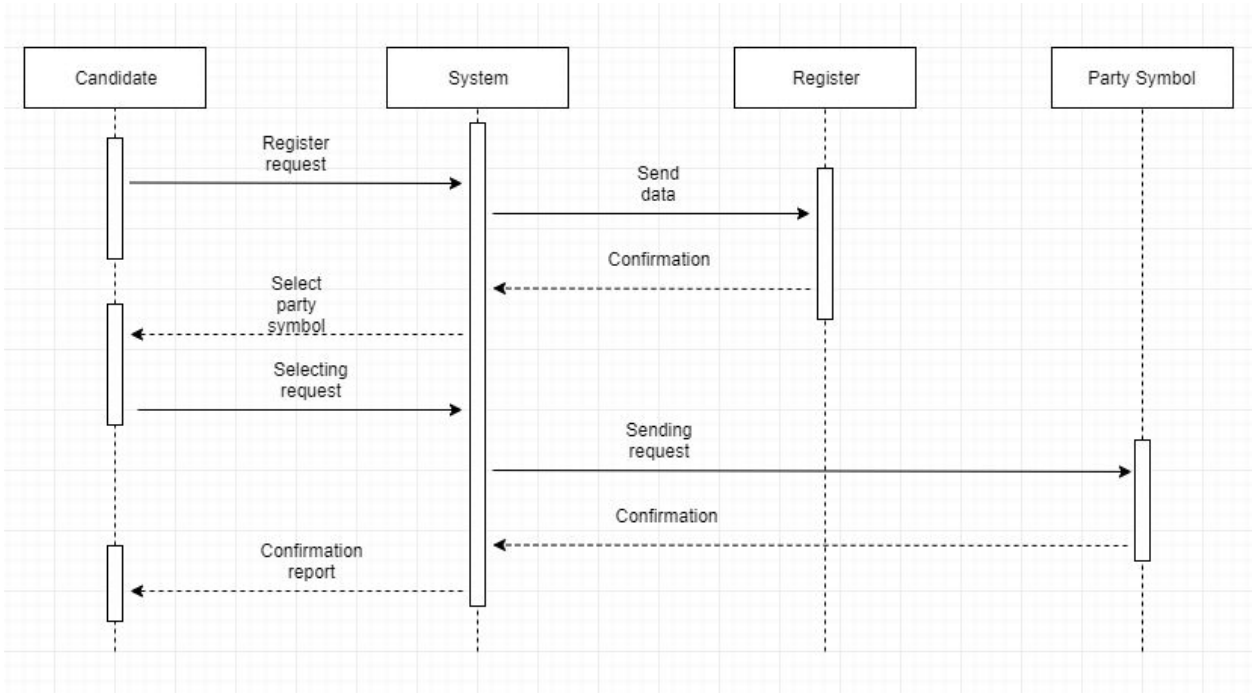

Figure 12

4.6. Operation contracts

Table 7

Name	CO1: Authentication
Operation	Authenticate
Responsibilities	Provide entrance access to voter
Cross reference	Use case
Exceptions	If voter is eligible then give him/her rights
Output	Voter is authenticated
Preconditions	Voter request for access
Post condition	Voter can caste the vote

Table 8

Name	CO2: Voting Process
Operation	Vote Casting
Responsibilities	Vote through available technologies
Exceptions	If voter has not been considered by on device then it will consider through another device
Output	Vote has casted
Preconditions	Voter wanted to caste the vote
Post condition	Voter has casted the vote

4.7. Activity Diagram

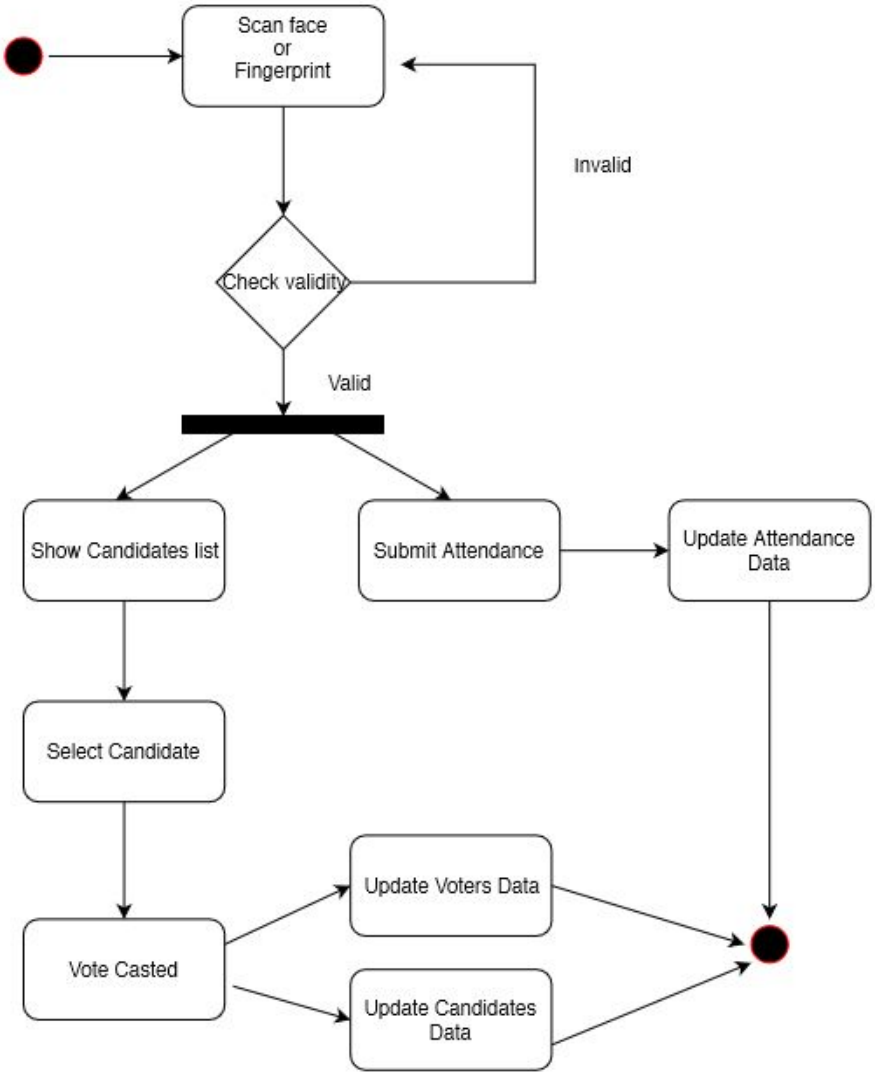

Figure 13

4.8. State Transition Diagram

State Transition For Voter:

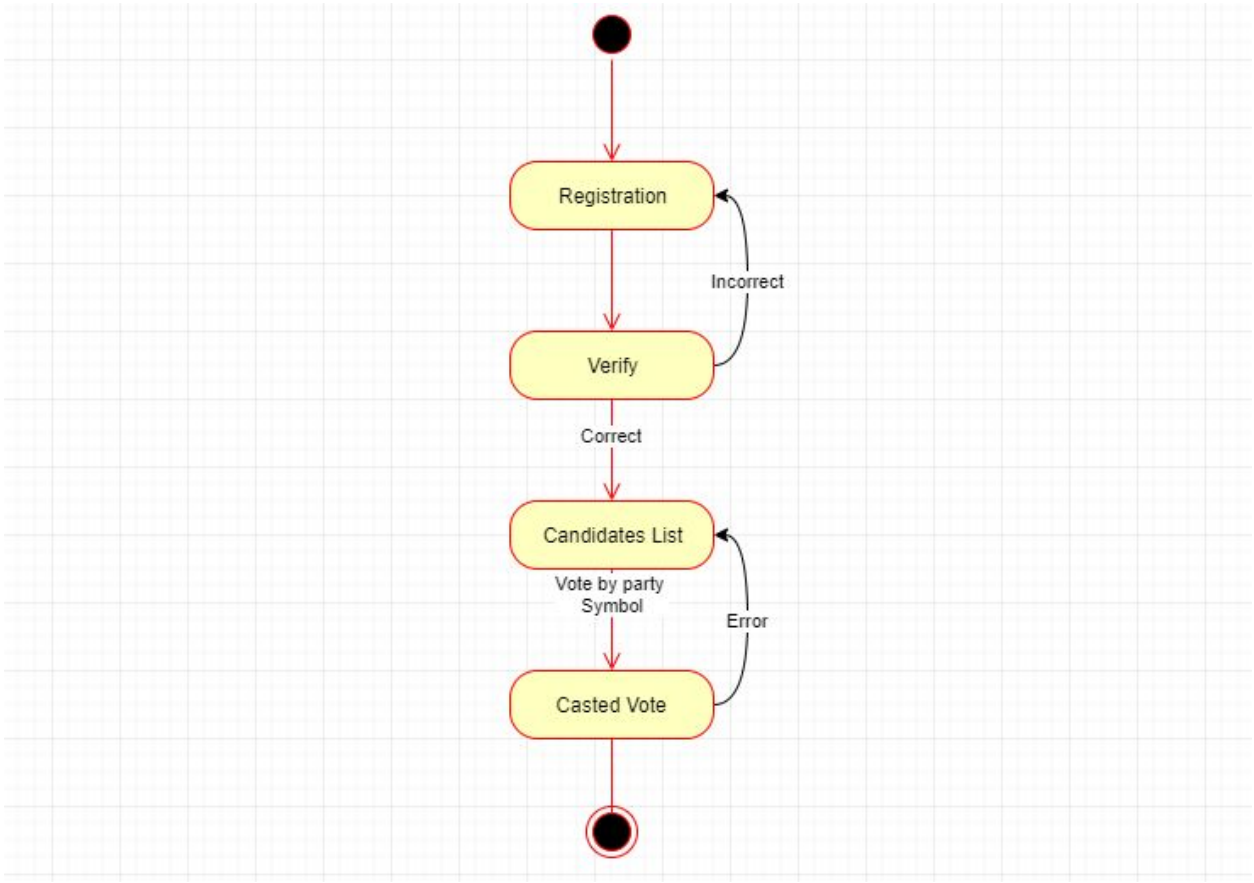

Figure 14

State Transition For Candidates:

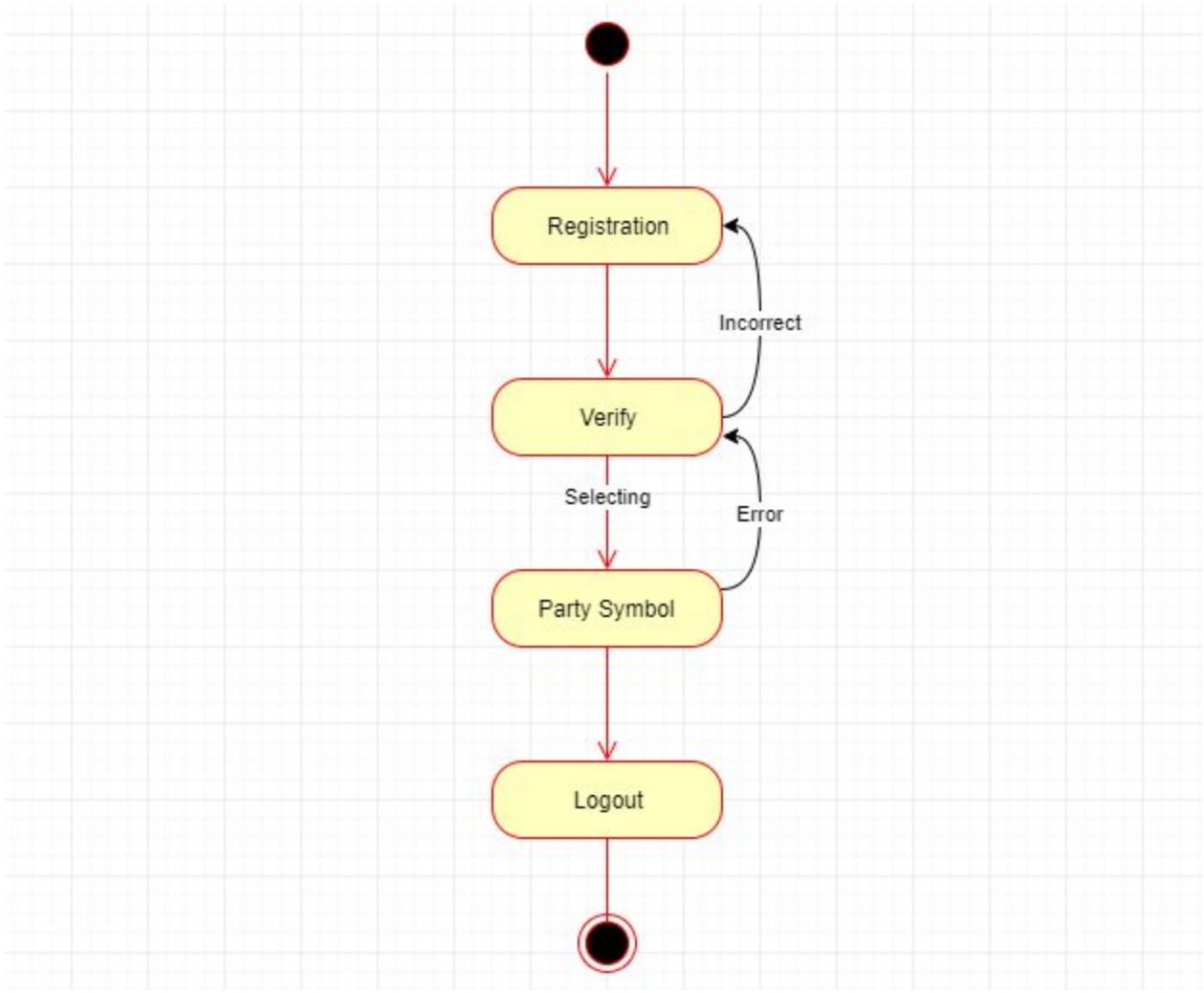

Figure 15

State Transition For Admin:

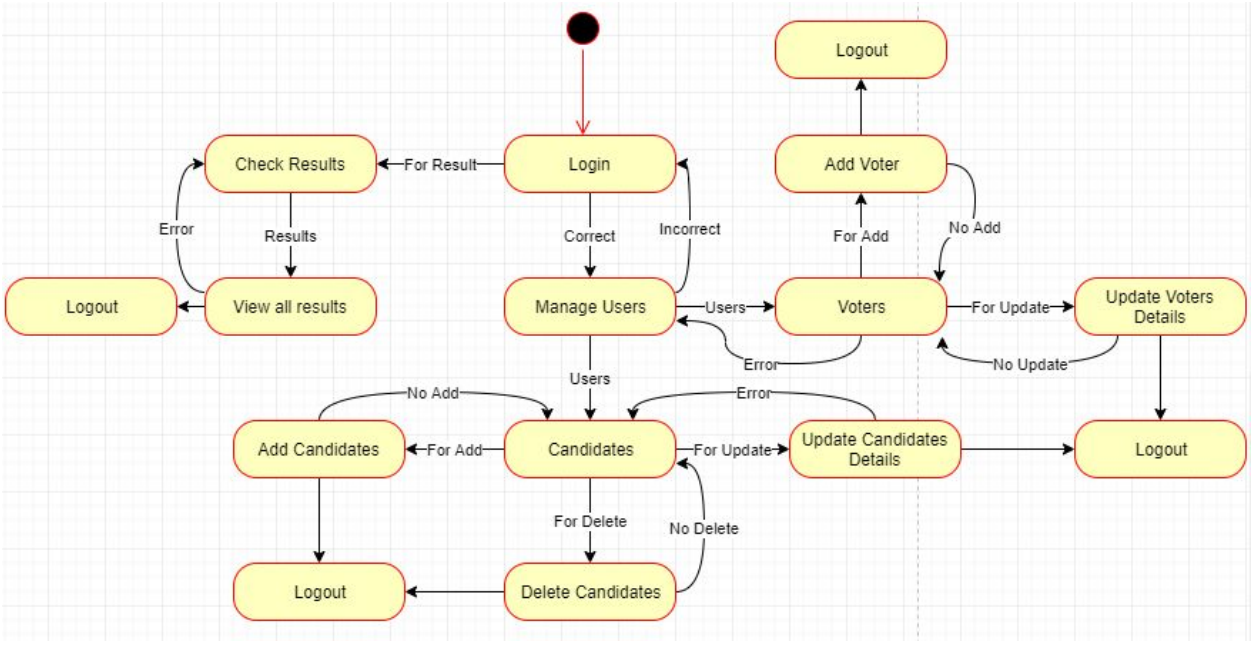

Figure 16

4.9. Component Diagram

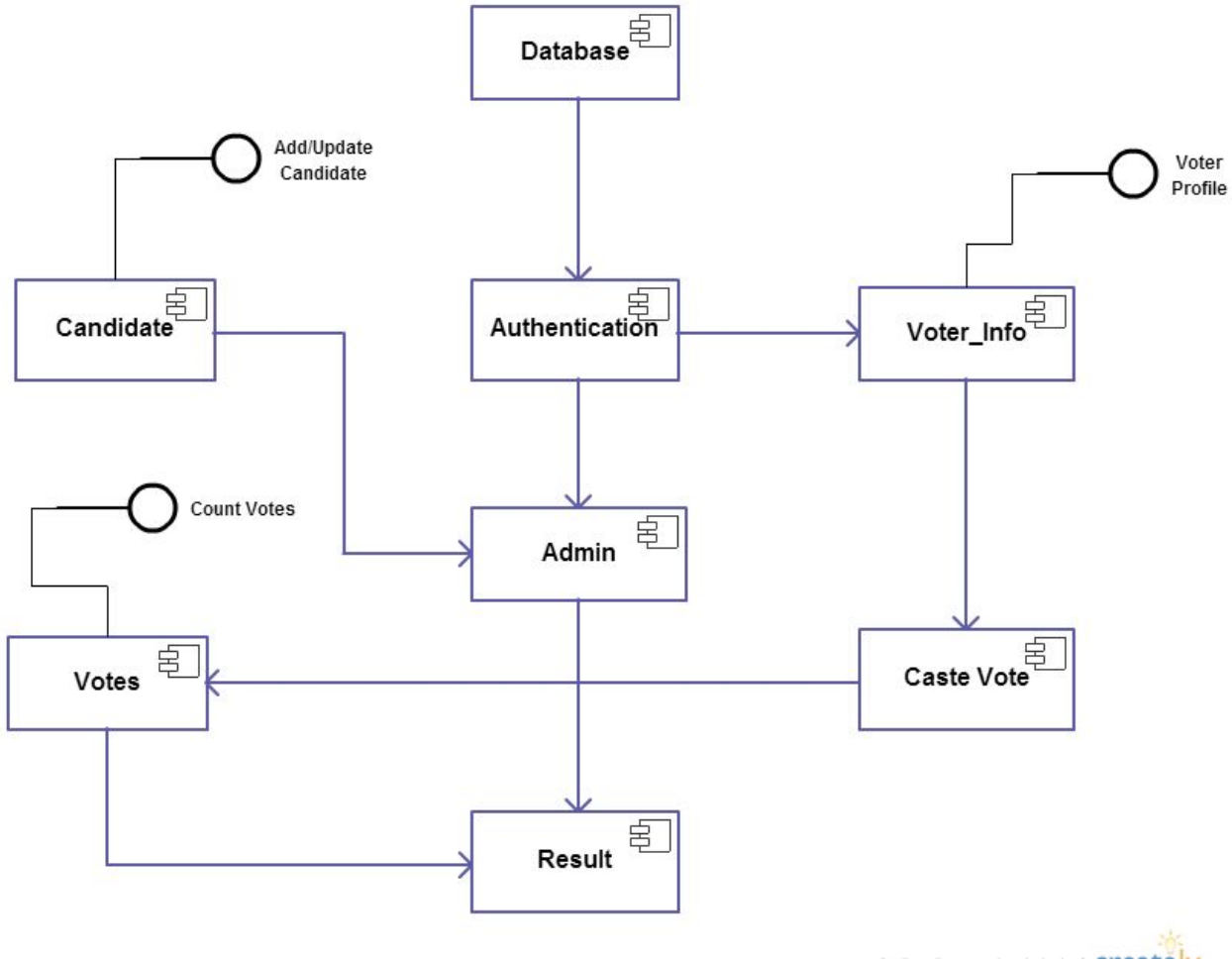

Figure 17

4.10. Deployment Diagram

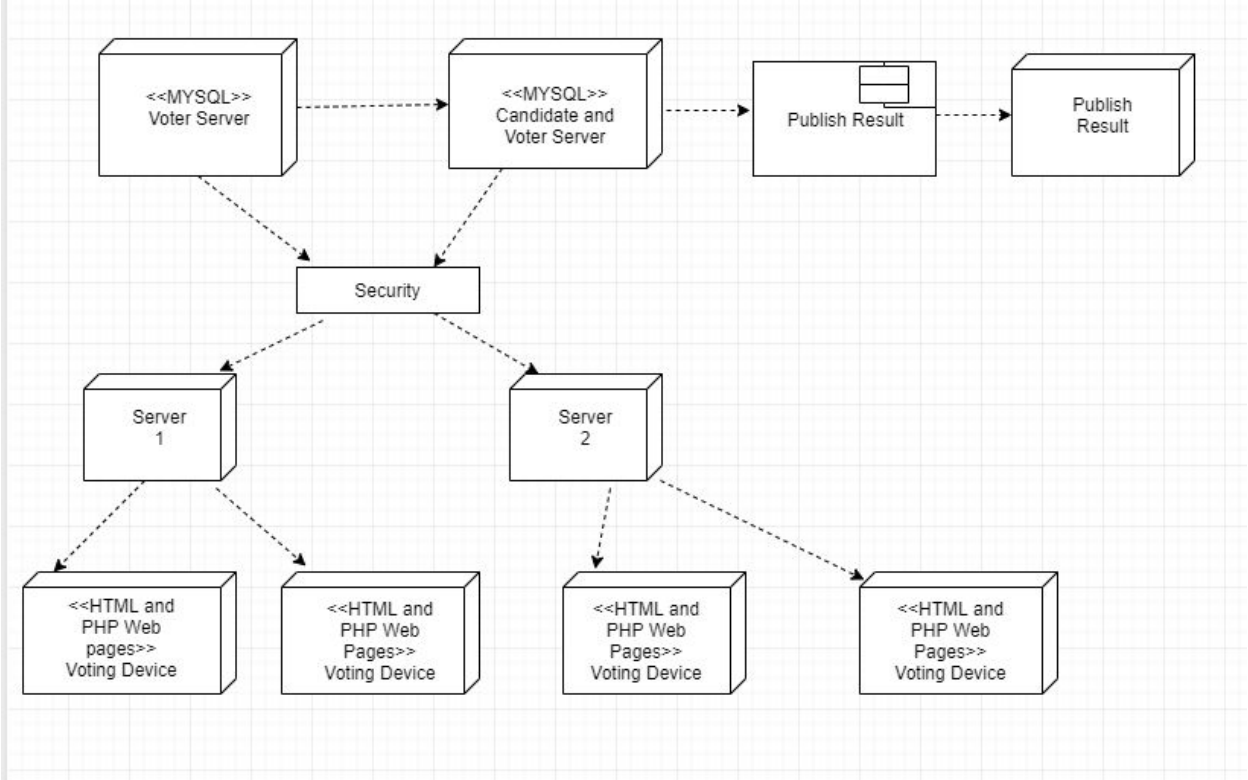

Figure 18

4.11. Data Flow diagram [*only if structured approach is used - Level 0 and 1*]

Level 0:

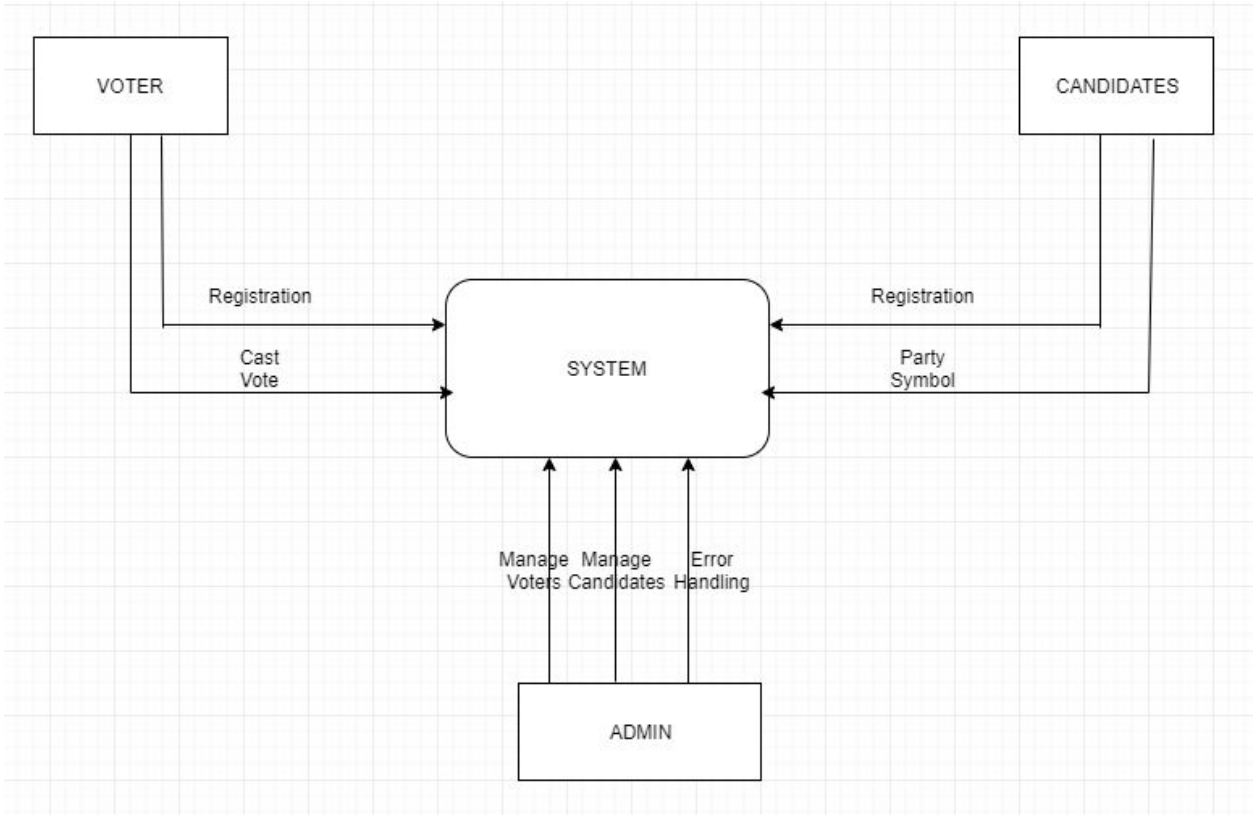

Figure 19

Level 1:

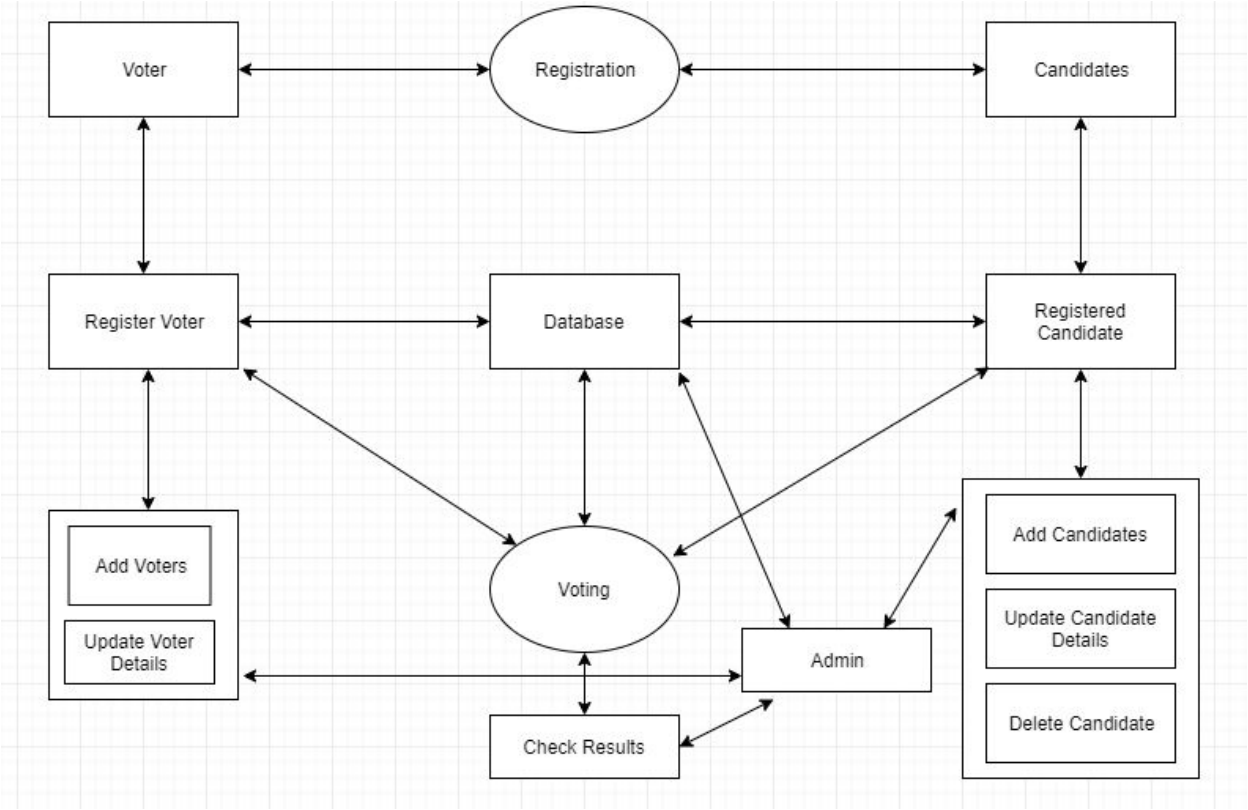

Figure 20

Chapter 5
Implementation

Chapter 5: Implementation

The chapter is just a bird eye view on our project, which technologies, methods, best practices, and standards of code, third party libraries and tools we are going to use to complete our project. The implementation starts from local development environment to product environment.This chapter is all about the implementation of system hardware and system software along with database.

5.1. Important Flow Control/Pseudo codes

Voter Panel:

- Register
- View Profile
- View list of candidates
- Vote casting

Candidates Panel:

- Register
- Select party symbol

Admin Panel:

- Logs in
- Add candidates
- Update candidates
- Delete candidates

5.2. Components, Libraries, Web Services and stubs

This is a Window Application Based Project as per requirement on Visual Studio and Sql Data base is fully dedicated to our kind of projects as it has list of Libraries to perform such operationi.e:

- System;
- System.Collections.Generic;
- System.ComponentModel;
- System.Data;
- System.Drawing;
- System.Linq;
- System.Text;
- System.Windows.Forms;
- System.Data.SqlClient;

5.3. Deployment Environment

This is a desktop application for windows which can also work or run operation on desktop PC.

The Minimum specification to run this project is following

- Intel I3 Processor 4th generation
- 4 GB RAM
- 500 GB Hard Disk
- Cache 4MB
- Mobile Graphics Chipset of 1982 MB.

5.4. Tools and Techniques

The tool that we are going to use in this project is Visual Studio 2010 with SQL Databaseand Ardunio Services for Bio-Metric. To perform functions and operations to meet project requirement.

5.5. Best Practices / Coding Standards

The Code Standards we are going to maintain is by following Anti Patterns Practices to avoid maximum code complexity and Code Errors. Another big advantage we get by using Anti patterns approach is the most critical part of the code is bind together in source code so if something critical happen we do not have to go through all system for resolving issues

5.6. Version Control

GIT

Chapter 6:

Testing and Evaluation

Chapter 6: Testing and Evaluation

Software testing is very important because of the many reasons; Softwaretesting is required to point out the defects and errors that were made during the development phases. It's essential since it makes sure of the Customer's reliability and their satisfaction in the application. It is very important to ensure the Quality of the product. Quality product delivered to the customers helps in gaining their confidence. Evaluation can help you identify areas for improvement and ultimately help you realize your goals more efficiently.

6.1. Use Case Testing

Use Case Testing is a functional black box testing technique that helps testers to identify test scenarios that exercise the whole system on each transaction basis from start to finish.

- Use Cases capture the interactions between 'actors' and the 'system'.
- 'Actors' represents user and their interactions that each user takes part into.
- Test cases based on use cases and are referred as scenarios.

If voter is try to register:

Main Success Scenario	**Step**	**Description**
V: Voter S: System	1	V: Enter Name & Age
	2	S: verify the data
	3	S: Allow Access
Extensions	2a	**Empty Name Box** S :Display Message and ask for retry
	2b	**Empty Age Box** S :Display Message and ask for retry

Table (6.1.1 Use case testing register)

If Admin is try to login:

Main Success Scenario	Step	Description
A: Admin S: System	1	V: Enter Email & Password
	2	S: Verify the password
	3	S: Allow Access
Extensions	2a	**Password not valid** S :Display Message and ask for retry

Table (6.1.2 Use case testing Login)

If Candidate try to register:

Main Success Scenario	Step	Description
V: Candidate S: System	1	V: Enter Name & Age
	2	S: Verify the data
	3	S: Allow Access
Extensions	2a	**Empty Name Box** S :Display Message and ask for retry
	2b	**Empty Age Box** S :Display Message and ask for retry

Table (6.1.3 Use case testing register)

6.2. Equivalence partitioning

Equivalence partitioning is a Test Case Design Technique to divide the input data of software into different equivalence data classes. Test cases are designed for equivalence data class.
A use of this method reduces the time necessary for testing software using less and effective test cases, while validating Sign up form we've set values:

- A text field permits only numeric characters (e.g. age)
- Age must be more than 16 (e.g. age)

In age length numbers 2 are equivalent and are valid & numbers more or less than 2 are invalid.

Test scenario	Test scenario description	Expected outcome
1	Enter 0 to 1 length	System should not accept
2	Enter 1 to 2 length	System should not accept
3	Enter Only 2 length	System should accept

Table (6.2 Equivalence partitioning)

6.3. Boundary value analysis

Boundary value analysis is a test case design technique to test boundary value between partitions (both valid boundary partition and invalid boundary partition).
A boundary value is an input or output value on the border of an equivalence partition, includes minimum and maximum values at inside and outside boundaries.While validating Sign up form we've set values:

- Admin should have the email id for login.
- Password should be with a valid length of 10-20.

In test case 9, 10, 11 are the minimum values which are Boundary Values. And 19, 20, 21 are maximum values of Boundary Values.

Test Scenario Description	Expected Outcome
Boundary Value = 9	System should NOT accept
Boundary Value = 10	System should accept
Boundary Value = 11	System should accept
Boundary Value = 19	System should accept
Boundary Value = 20	System should accept
Boundary Value = 21	System should NOT accept

Table (6.3 Boundary Value analysis)

6.4. Data flow testing

Data flow testing is a family of test strategies based on selecting paths through the program's control flow in order to explore sequences of events related to the status of variables or data objects.

Data Flow testing is very important that can help us to pinpoint many issues:

- A variable that is declared but never used within the program.
- A variable that is used but never declared.
- A variable that is defined multiple times before it is used.
- Deallocating a variable before it is used.

So, while data flow testing some undeclared variables shouldn't be the part of our project. It is better to be removed

6.5. Unit testing

The unit testing was done after the coding phase. The purpose of the unit testing was to locate errors in the current module, independent of the other modules. Some changes in the coding were done during the testing phase. Finally, all the modules were individually tested following bottom to top approach, starting with smallest and lowest modules and then testing one at a time.

Testing

- Checked all the validations on each field.
- Wrong inputs in the fields of forms.
- Database testing.
- Validation of HTML, CSS. Checked error e.g. syntax error.

Benefits of Unit Testing:

- Codes are more reusable. In order to make unit testing possible, codes need to be modular. This means that codes are easier to reuse.
- Unit testing increases confidence in changing/ maintaining code.

6.6. Integration testing

Integration testing is a level of software testing where individual units are combined and tested as a group. The purpose of this level of testing was to expose faults in the interaction between integrated units. *Integration testing* is an *important* part of the testing cycle as it makes it easier to find the defect when two or more modules are integrated.

Integration Test case:

Verifying the interface link between the login page and the home page i.e. when a admin enters the credentials and logs it should be directed to the homepage.

6.7. Performance testing

Performance testing is the process of determining the speed or effectiveness of a computer, network, software program or device.
Software Performance testing is type of testing perform to determine the performance of system to major the measure, validate or verify quality attributes of the system like responsiveness, Speed, Scalability, Stability under variety of load conditions. It is very important to interact with the system.

6.8. Stress Testing

Stress testing is used to test the stability & reliability of the system. This test mainly determines the system on its robustness and error handling under extremely heavy load conditions.

The goal of stress testing is to analyze the behavior of the system after failure. For stress testing to be successful, system should display appropriate error message while it is under extreme conditions.

Tool for Stress Testing

Stress Tester: This tool provides extensive analysis of the web application performance provides results in graphical format, and it is extremely easy to use. No high-level scripting is required and gives good return on investment.

Chapter 7: Summary, Conclusion & Future Enhancements

7.1. Project Summary

We made a project that can be helpful in modern days. This project helps us to eliminate the corruption. Through our project it will be a more secure way of collecting the votes for candidates due to which the deserving candidate can be selected.

7.2. Achievements and Improvements

- Learnt to work in a team.
- Learnt time management.
- Learnt how to survive in a competitive business environment.
- We will try to improve & take care of our project, we will try to make it more secure, maintain its availability and it will be more responsive at a time.

7.3. Critical Review

We know our competitors and we've learnt how to survive in a market, for being stay in a market we must have to take a uniqueness to compete everyone in a business environment.

7.4. Lessons Learnt

Learnt how to make a successful project with absolutely no chances of failure & learnt how to survive in a market.

7.5. Future Enhancements/Recommendations

- Expanding its operation in other universities and main universities of Pakistan it is our main goal.
- We will make it more secure so that we can play a major role by eliminating the corruption in our national elections.

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Reference and Bibliography

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