National University
of computer and emerging sciences

SOFTWARE DESIGN ANALYSIS

FINAL PROJECT

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Submitted To:	Ma'am Javeria Imtiaz

ElectoVerse

Election Voting System

Management Information System | Software Design and Analysis

Company Name: LogicSculpt Innovators

Founders

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Introduction

Purpose:

The online electoverse serves to modernize the voting process by providing an efficient, transparent, and accessible platform for conducting elections. It aims to streamline tasks such as candidate and voter registration, ballot creation, and result tabulation while ensuring security measures to prevent tampering and enhancing overall participation convenience for voters.

Product Scope:

The core of this project is the development of a secure web-based platform that allows eligible voters in Pakistan to cast their votes digitally. This portal will serve as the central hub for all election-related activities. The main focus is to make a secure web election portal for free and fair elections which will lead to less effort, less cost and less labor. The number of voters will also increase as it is easier and more convenient to vote. The scope of this application is Pakistan, as no such reliable facilitating digital voting application exits in the country at the moment.

Title

ElectoVerse -Election Voting System (Vote for your rights, feasibly vote for change).

Objective

This application main objectives are:

To implement an automated voting system in Pakistan

Validate the system to make sure that only legible voters are allowed to vote

Reduce the cost of running elections

Increase the amount of voters

Increase the integrity and credibility

Problem Statement

The current method of voting is paper based voting in which voter gets a ballot and uses thumbprint to seal the vote for his/her favored candidate. This method is time and labor consuming and it is expensive to conduct as a lot of money is spent in printing forms and preparing and managing polling stations. Moreover, it is very unlikely for humans to be perfect throughout whole process so there is always a possibility of rigging.

ElectoVerse is a cutting-edge online voting platform designed to revolutionize the way elections are conducted. It is an online voting platform which aims to make voting easier, reliable, with live counting, statistics and delivering quick efficient results, removing all doubts and concerns.

Overall Description

Product Functions

The functions of an online election management system typically include:

1. **Voter Registration:** Allowing eligible individuals to register securely and verify their eligibility to participate in the election.

2. **Candidate Registration:** Enabling aspiring candidates to register their candidacy and relevant details for the election.
3. **Ballot Creation:** Facilitating the creation of digital ballots containing candidates' names and positions for voters to choose from.
4. **Party Creation:** Parties can be added if a candidate wants to register for a new party or wants to introduce a new party in the elections.
5. **Secure Voting:** Providing a secure platform for voters to cast their votes electronically.
6. **Result Tabulation:** Automatically tallying votes securely and accurately to determine the election outcome.
7. **Data Management:** Storing and managing voter and candidate data securely throughout the election process.
8. **Security Measures:** Implementing encryption, authentication, and other security protocols to prevent tampering and ensure the integrity of the voting system.

Product Perspective

The product perspective of electoverse involves considering it as an integral part of the electoral process. It should be seen as a comprehensive solution that interfaces with various stakeholders, such as voters, election administrators, and potentially other systems (e.g., databases, verification services). The system's design and functionality should align with the larger electoral infrastructure, ensuring seamless integration and effective collaboration between different components involved in conducting elections.

List of Use Cases

- Create Elections
- Register Voter
- Register Candidate
- Administer Candidate
- Administer Election Commissioner
- Manage Election Schedule
- Manage Voter
- Manage Ballot
- Cast Vote
- Generate Result
- Register Parties.

Fully Dressed Use Cases:

1

a. **Use case:** Create Elections

b. **Scope:** Election Management System
c. **Level:** User goal
d. **Primary actor:** Election Commissioner
e. **Stakeholders and interests**

- Election Commissioner: Wants to create fair online elections for candidates.
- Voter: Wants to cast vote to his/her favorite candidate online.
- Candidate: Wants to get votes from voters to win elections fairly.

f. **Precondition:** The Election commissioner logs into the system and no election procedure is currently in progress.
g. **Postcondition:** The Election is created.
h. Main success scenario

actor	**system**
1. Election Commissioner logs in.	
	2. System asks Election Commissioner toenter parameters for a new election into the system, such as time durationand date of election.
3. Election commissioner enters parameters.	

	4. The System asks for confirmation.
5. Election commissioner confirms tocreate new elections.	
	6. The System creates new election.

i. Extensions

1. At any time, System fails:

   Election Commissioner restarts System

3a. Election Commissioner doesn't enter enough parameters.

System generates alert to inform Election Commissioner to provide enough parameters in.

3b. There is an already scheduled election on that day.

System asks the Election Commissioner to change the election date.

2

a. Use case: Register Voter

b. Scope: Election Management System

c. Level: User goal

d. Primary actor: Voter

e. Stakeholders and interests

- Election Commissioner: Wants fast and accurate registration of voters in minimum time, wants to update voter list in the system.
- Voter: Wants successful registration in the system, with minimum effort.

f. **Precondition:** Election Commissioner should be authorized in the system.
g. **Postcondition:** Voter is successfully registered in the system.
h. Main success scenario

actor	**system**
1. Voter arrives at the onlineregistration platform.	
	2. System asks voter to enter credentialslike id, name, age etc.
3. The voter enters his/her credentials.	
	4. The System asks for confirmation.
5. Voter confirms the registration process.	
	6. The System registers the voter.

i. **Extensions**

1. At any time, System fails:

   Election Commissioner restarts System

3. The credentials are invalid i.e., underage, id status etc.

   Requests for valid Voter's credentials to complete registration.

3

a. **Use case:** Manage Voter
b. **Scope:** Election Management System

c. **Level:** User goal
d. **Primary actor:** Election Commissioner

e. Stakeholders and interests

- Election Commissioner: Wants to be able to add, update and remove volunteer successfully with minimal effort.

f. **Precondition:** Election Commissioner should be authorized and logged in the system.
g. **Postcondition:** Election Commissioner successfully updates Voter records.

h. Main success scenario

actor	**system**
1. Election commissioner logs in.	
	2. System asks Election commissioner todelete or update a voter.
3. Election commissioner deletes or updates a voter.	
	4. The System asks for confirmation.
5. Election commissioner confirms the process.	
	6. The System updates the voter record.

i. **Extensions**

1. At any time, System fails:

Election Commissioner restarts System

3a. Voter is ineligible to cast a vote. Election Commissioner remove the voter.

System updates the voter's record.

3b. Voter information needs to be update. Election Commissioner access the voter'srecord and update the voter.

System updates the voter's record.

4

- **Use case:** Administer Election Commissioner
- **Scope:** Election Management System
- **Level:** User goal
- **Primary actor:** Election Commissioner
- Stakeholders and interests
  - Election Commissioner: Wants fast and effortless registration to administer election
- **Precondition:** System should be running
- **Postcondition:** Election Commission is successfully registered in the system.
- Main success scenario

actor	**system**
1. Election Commissioner initiates registration prompt.	
	2. System asks Election Commissioner toinput necessary information.
3. Election Commissioner submitsinformation for authentication.	
	4. System authenticates user through

	validity checks
	5. System updates records and outputs asuccessful registration message.

- **Extensions**
  a. At any time, System fails:
  1. Election Commissioner restarts System
  2. Election Commissioner reattempts registration

  b. Election Commissioner provides invalid information:

  1. System will request Election Commissioner to input a valid personal info
  2. If Election Commissioner inputs valid data, they will be successfully registered

5

a. **Use case:** Administer candidate
b. **Scope:** Election Management System
c. **Level:** User goal
d. **Primary actor:** Election Commissioner
e. Stakeholders and interests

- Election Commissioner: Wants fast and effortless registration of election party and right to edit party records.

f. Precondition: System should be running

g. Postcondition: Election candidate is successfully registered for election.

h. Main success scenario

actor	**system**
1. Election Party initiates registration prompt.	
	2. System asks Election Party to input necessary information.
3. Election Party submits information for authentication.	
	4. System updates records
	5. System outputs a successful registration message.

i. Extensions

a. At any time, System fails:

1. Election Commissioner restarts System
2. Election Party reattempts registration

b. Election Commissioner wants to remove party:

1. Election Commissioner will access Election party records and initiate removal
2. System will update Election party records
3. System will generate removal success

c. Election Commissioner wants to update Election party:

1. Election Commissioner will access Election party records and update Election party details
2. System will update Election party records
3. System will generate update success

6

a. **Use case:** Manage ballot
b. **Scope:** Election Management System
c. **Level:** User goal
d. **Primary actor:** Election Commissioner
e. **Stakeholders and interests**
   - Election Commissioner: Wants to generate ballot successfully with minimum effort for voters to cast vote.
   - Voter: Wants a list of candidates to cast vote.
f. **Precondition:** Election commissioner is registered and authorized.
g. **Postcondition:** Ballot items are created and added to the election.
h. Main success scenario

actor	**system**
1. The election Commissioner asks system to give access to the information of candidates.	
	2. The system gives access.

3. The Election commissioner enters the information about the ballot. Like the candidate's name, party name etc.	
	4. The System asks for confirmation.
5. The Election commissioner gives confirmation.	
	6. The System adds the ballot to the election.

i. Extensions

1. At any time, System fails:

   Election Commissioner restarts System

5. The Election coordinator does not give his confirmation.

   The System displays a menu: delete ballot item, modify ballot item etc.

7

a. Use case: Cast Vote
b. Scope: Election Management System
c. Level: User goal
d. Primary actor: Voter
e. Stakeholders and interests

- Voter: Wants to cast a vote of his/her own will.
- Candidate: Wants to get votes from voters.

f. **Preconditions:** The Voter is a registered voter and has passed verification.
g. **Postcondition:** The Voter casts his vote and the authorized individual records are updated.
h. Main success scenario

actor	**system**
1. The voter asks system to present ballot	
	2. The System presents appropriate ballot to Voter.
3. The Voter casts his vote and submits itto the System.	
	4. The System asks the voter to verify thevote.
5. The Voter confirms the vote.	
	6. The System updates the appropriate records and displays a receipt, confirming the Voter has voted.

i. **Extensions**

2a) Voter selects more than 1 candidate for a position

The system displays message saying that only one candidate needs to beselected.

2b) Voter does not select any candidate for a position

The system displays message asking voter to select a candidate.

6.The Voter does not confirm the vote.

The System presents him the ballot to cast his vote.

8

a. **Use case:** Generate Results
b. **Scope:** Election Management System
c. **Level:** User goal
d. **Primary actor:** Election Commissioner
e. **Stakeholders and interests**
    - Election Commission: Wants to generate fair result of the elections.
    - Voter: Wants to know about the winner and opposition of the election.
    - Candidate: Wants to know how many votes they got and who is the winner.
f. **Precondition:** At least one voter has voted in the election and election procedure has ended.
g. **Postcondition:** A summary of results display.
h. Main success scenario

actor	system
1. Election Commissioner logs in and askssystem to tally votes and determine results of election.	

	2. The system displays vote count of winning party along with other opposition parties.
3. The Election commissioner publishes result	
	4. System display result

i. Extensions

1. At any time, System fails:

   Election Commissioner restarts System

3. The Election coordinator does not give his confirmation.

   The System displays a menu: delete ballot item, modify ballot item etc.

9

a. Use Case: Register Candidate
b. Scope: Election Management System

c. Level: User goal
d. Primary actor: Election Commissioner

e. Stakeholders and Interests:

- Election Commissioner: Wants to ensure a fair and transparent candidate registration process.
- Candidates: Want to officially register as candidates for the election.

- Voters: Want to have access to a list of registered candidates for the upcoming election.

f. Precondition: The election management system is in an operational state, and the candidate registration period is open**.**

g. Postcondition: The candidate's information is successfully registered in the system, and the candidate is officially recognized as a participant in the election**.**

h. Main Success Scenario:

actor	**system**
1. Candidate arrives at the onlineregistration platform.	
	2. Candidate Enters the personal information, including name, party affiliation (if any), constituency, andcontact details.
3. The Candidate enters his/her credentials as well as party details ifaffiliated with any.	
	4. The System asks for confirmation.
5. Candidate confirms the registration process.	
	6. The System registers the Candidate.

i. Extensions:

1. If the system encounters any errors during the registration process (e.g., invalid information or system failure), it displays an error message and allows the Election Commissioner to correct the information or restart the process.
2. If the Election Commissioner decides not to complete the registration, they can choose to exit the registration process without saving the candidate's information.

10

a. Use Case: Manage Election Schedule

b. Scope: Election Management System
c. Level: User goal
d. Primary actor: Election Commissioner
e. Stakeholders and Interests:

- **Election Commissioner:** Wants to ensure a well-defined and accurate election schedule that aligns with legal requirements and operational constraints.
- **Election Commission:** Wants the election schedule to be set efficiently to ensure the timely execution of all election-related activities.

f. Precondition: The election management system is in an operational state, and the Election Commissioner is authorized to configure the election schedule.

g. Postcondition: The election schedule is successfully configured and saved in the system, and all stakeholders have access to the official dates.

h. Main Success Scenario:

actor	**system**
1. The Election Commissioner logs intothe election management system.	
	2. The system provides access to the "Configure Election Schedule" functionality.
3. The Election Commissioner specifiesthe start/end time for the election.	
	4. The system validates the proposed schedule to ensure it adheres to legalrequirements and operational constraints, Update the Record.
	5. System outputs a successful ElectionSet date and time message.

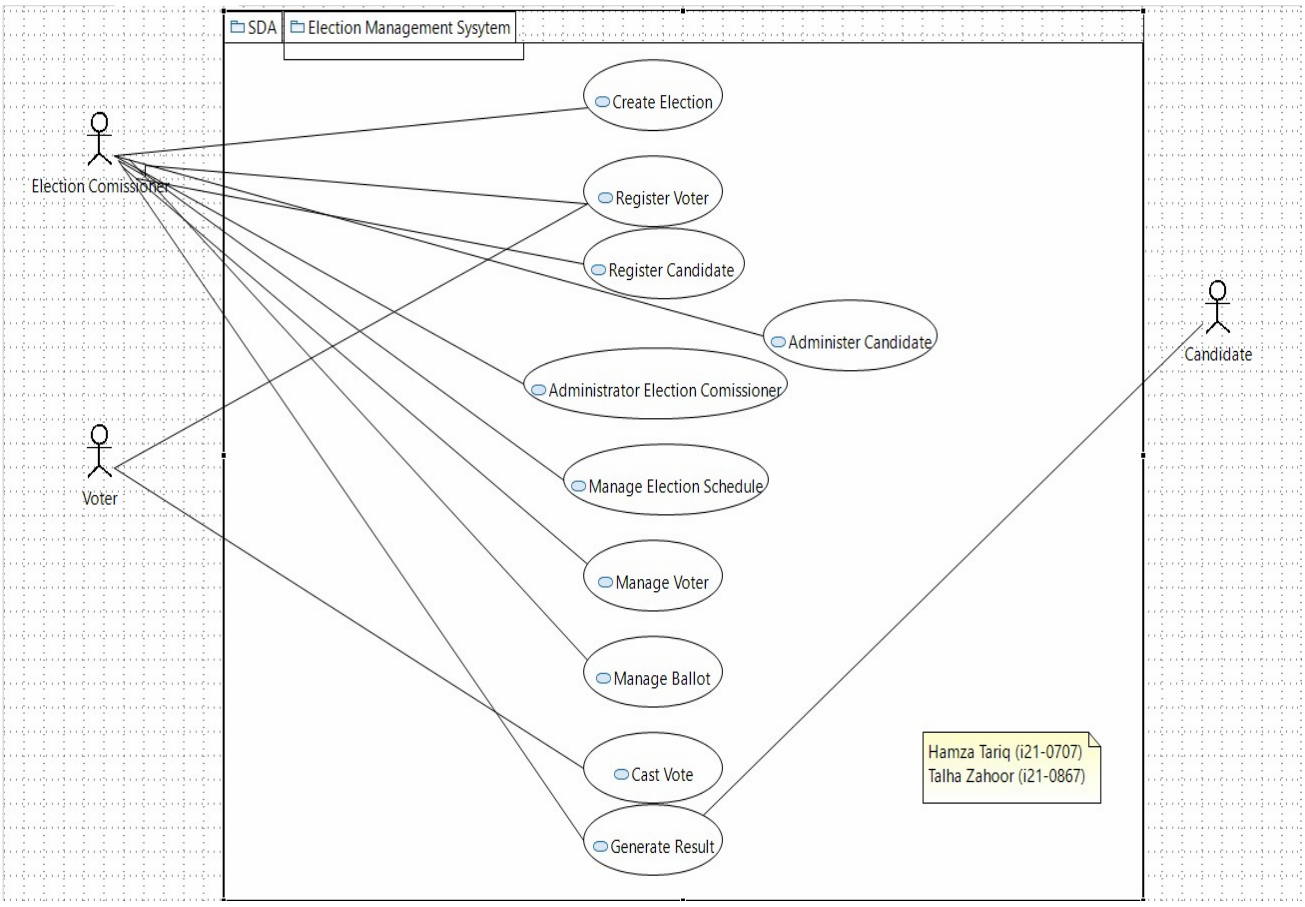
i. Extensions:

1. If the system encounters any errors during the scheduling process (e.g., conflictswith legal requirements or system failure), it displays an error message and allows the Election Commissioner to correct the schedule or

restart the process.

2. If the Election Commissioner decides not to complete the scheduling, they canchoose to exit the process without saving the schedule.

Use Case Diagram:



Non Functional Requirements

Performance Requirements

1. Reliable Operation: Ensure uninterrupted availability during the entire election period.
2. Scalability: Handle increased user traffic efficiently without performance issues.
3. Security and Integrity: Implement strong measures to protect data and prevent unauthorized access.

Safety Requirements

Safety requirements for the product encompass implementing stringent data protection measures, robust user authentication protocols, and defenses against cyber threats. It involves securing sensitive information, ensuring authorized access, and safeguarding the system from potential security breaches to maintain the integrity of the election process.

Security Requirements

Security requirements for the product involve stringent measures like encryption for data protection, multi-factor authentication to verify user identities, regular security audits, and constant monitoring to detect and prevent potential cyber threats. These measures are crucial to ensure the system's integrity, prevent unauthorized access, and maintain trust in the election process.

Software Quality Attributes

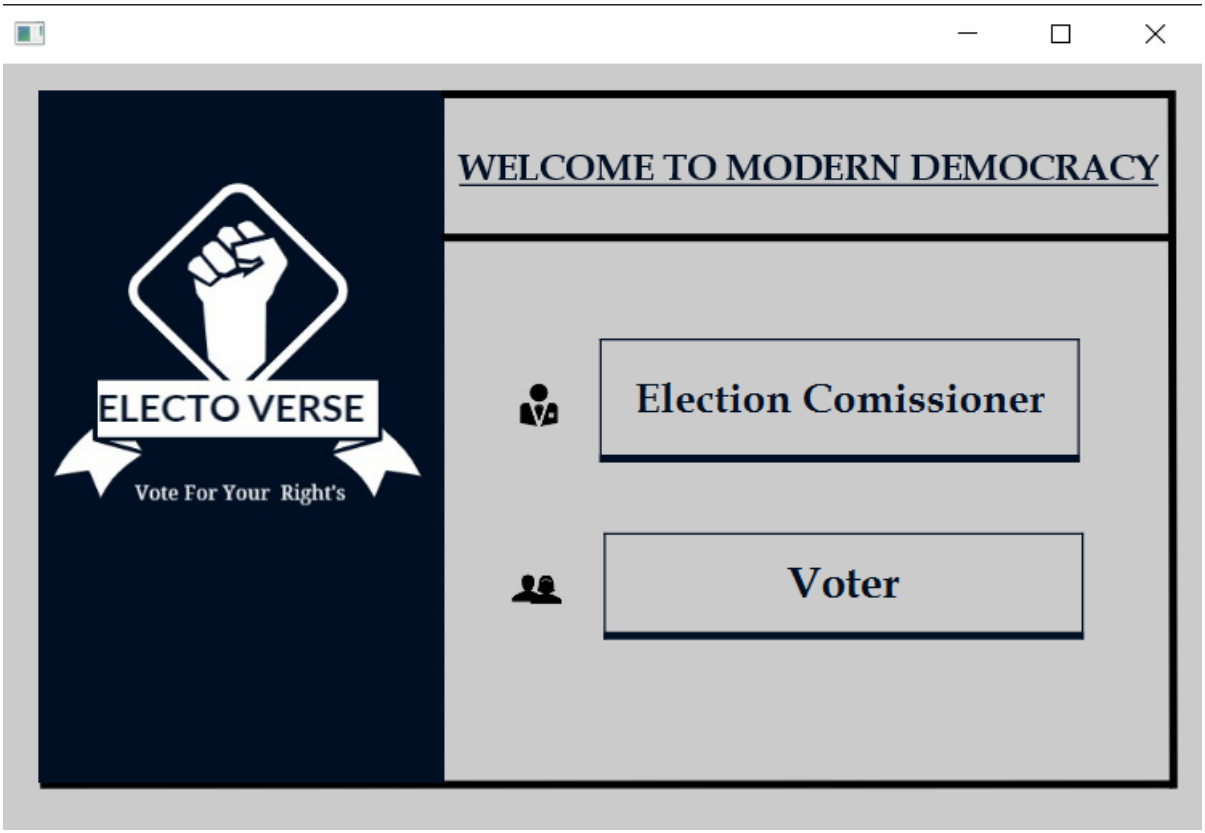
Software quality attributes for electoverse include reliability to ensure uninterrupted operation, scalability to handle increased user traffic, security to safeguard data integrity, usability for intuitive user interaction, and maintainability for efficient updates and system enhancements. These attributes collectively ensure a robust, secure, and user-friendly system throughout the election process.

Business Rules

Business rules for electoverse may involve criteria for voter eligibility, candidate registration guidelines, voting period duration, ballot creation protocols, result calculation methodologies, and security standards. These rules dictate how the system operates, ensuring fairness, accuracy, security, and transparency throughout the electoral process.

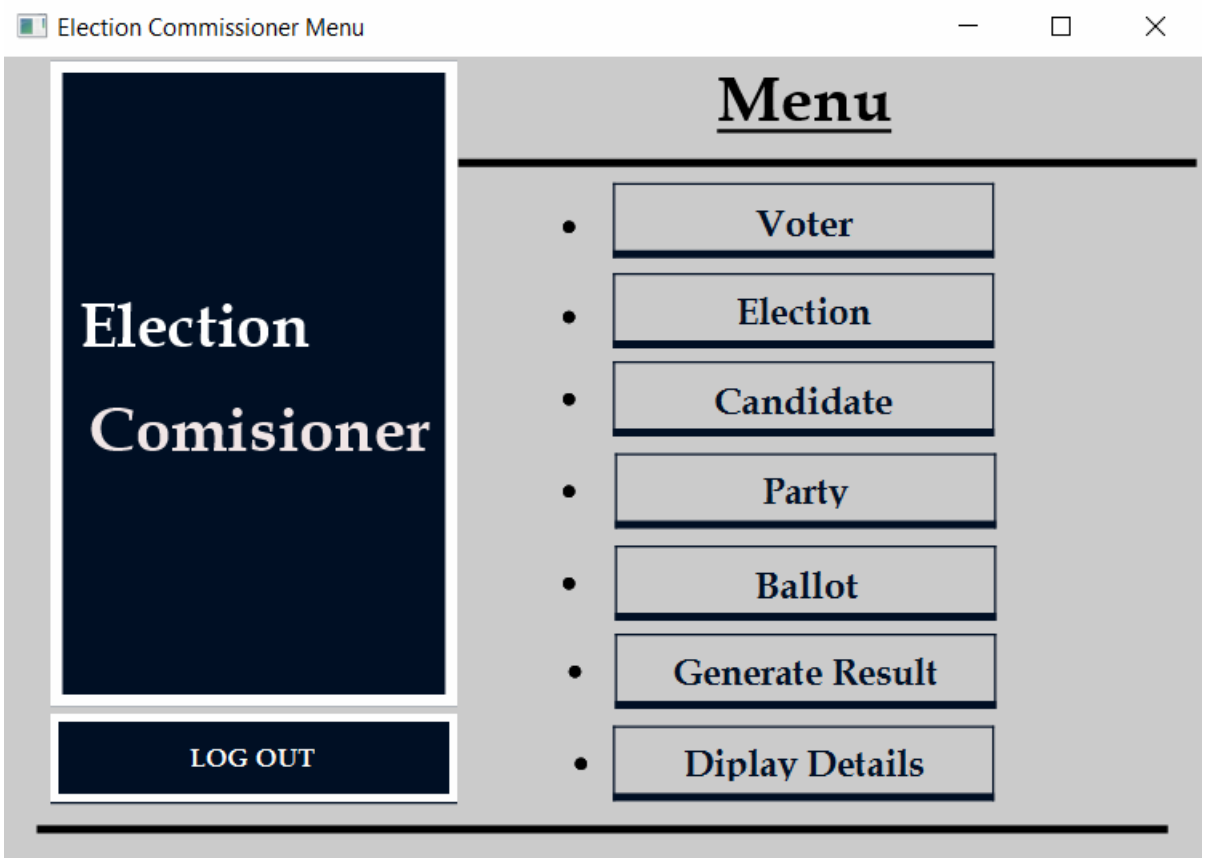
Operating Environment

Windows, Linux.

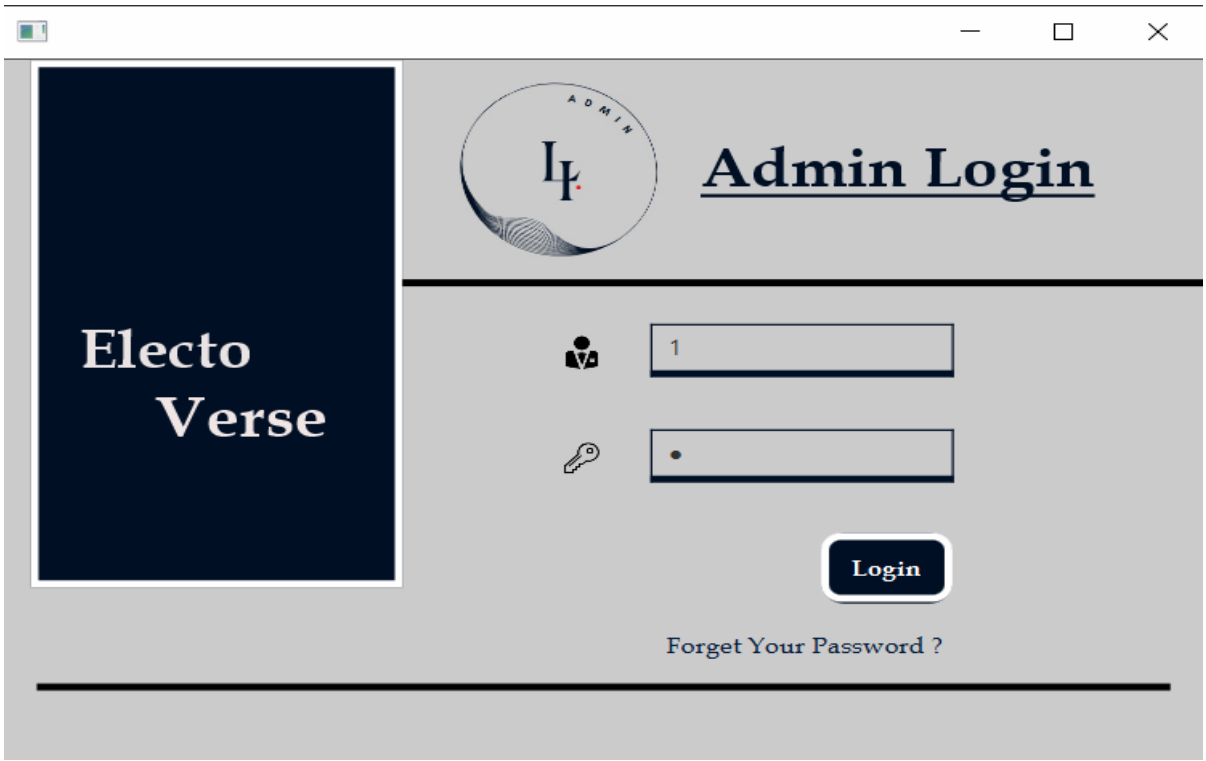


Election Commisioner Main PAGE

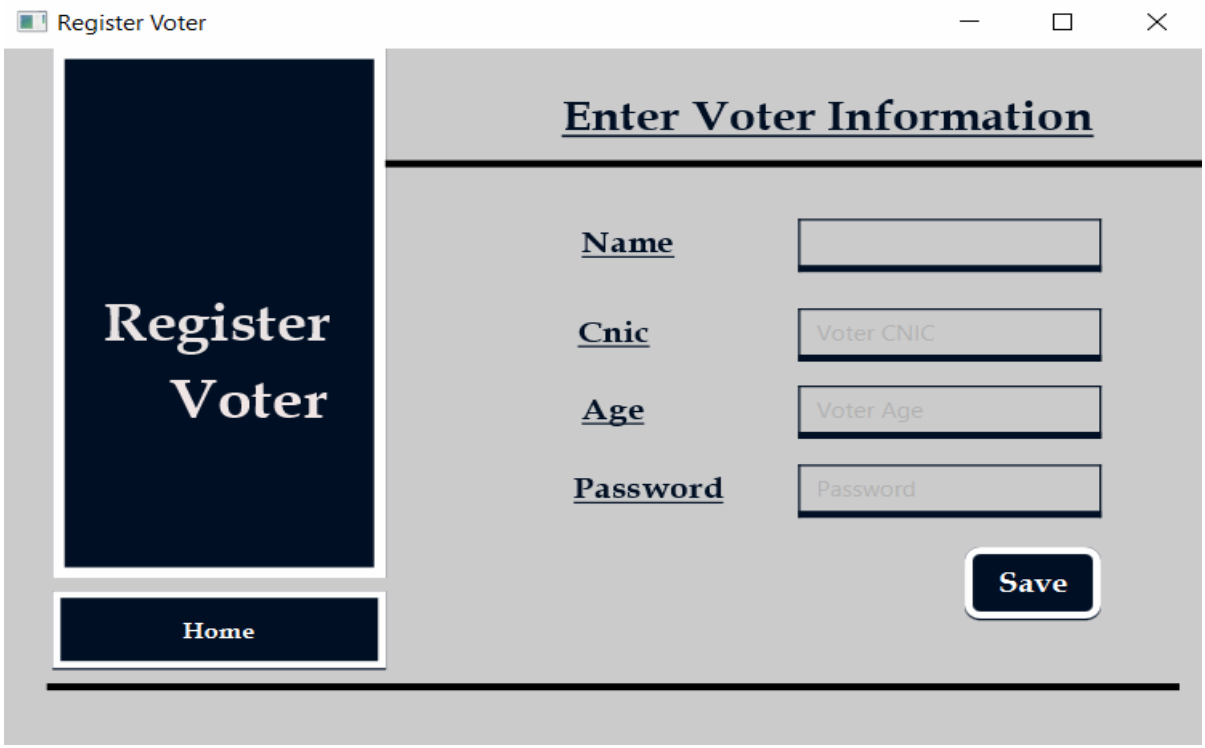
ElectionCommisioner Menu


Election Commissioner Menu
Menu
Election
Comisioner
Voter
Election
Candidate
Party
Ballot
Generate Result
Diplay Details
LOG OUT

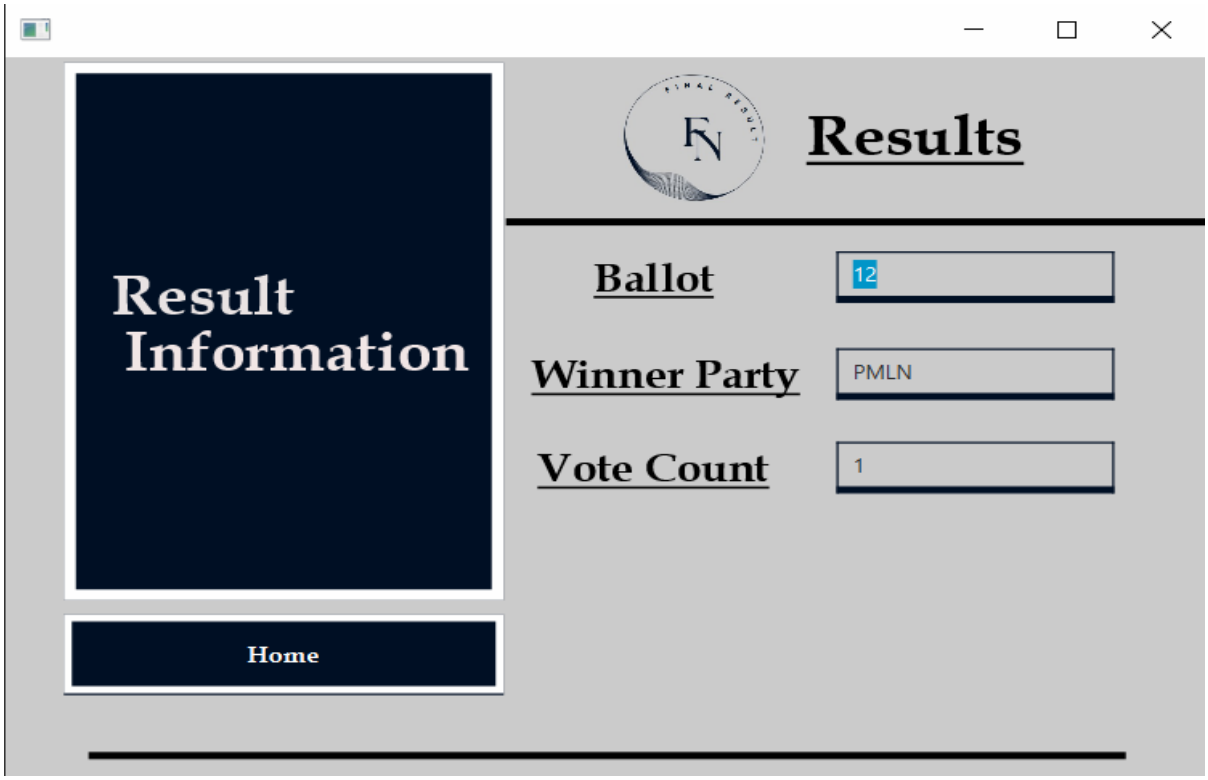
Login PAGE


Admin Login
Electo
Verse
1
Login
Forget Your Password ?

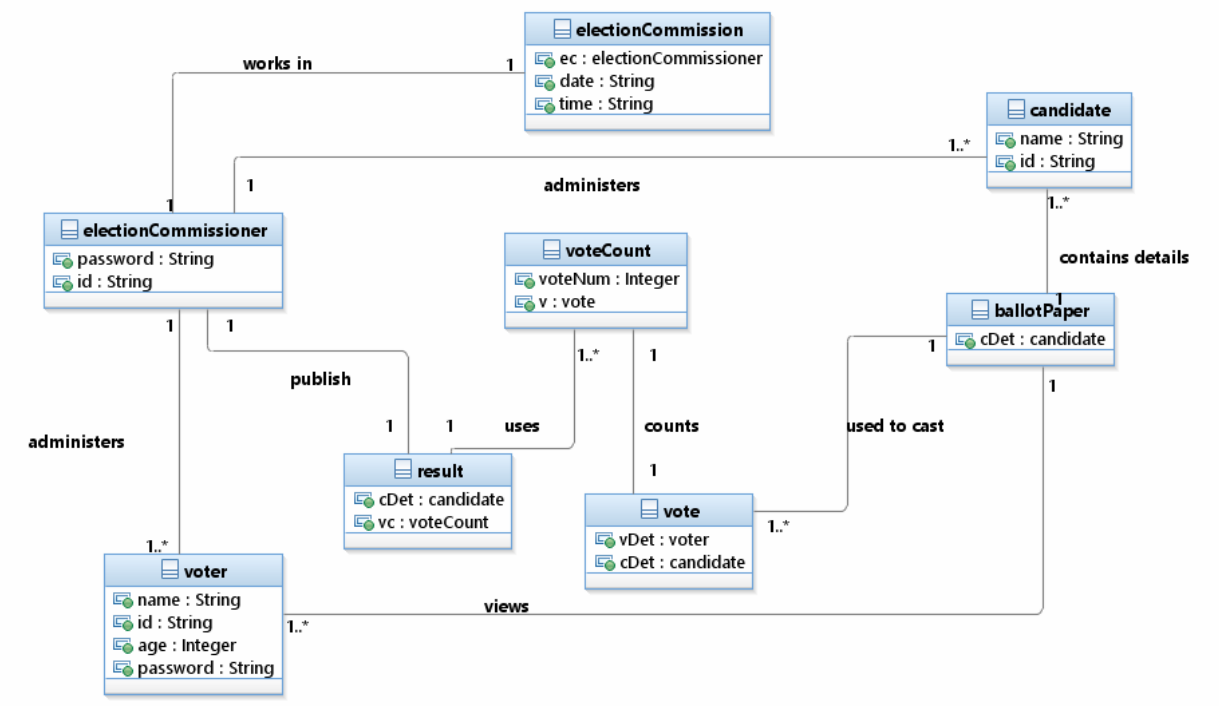
RegisterVoter PAGE



Result PAGE

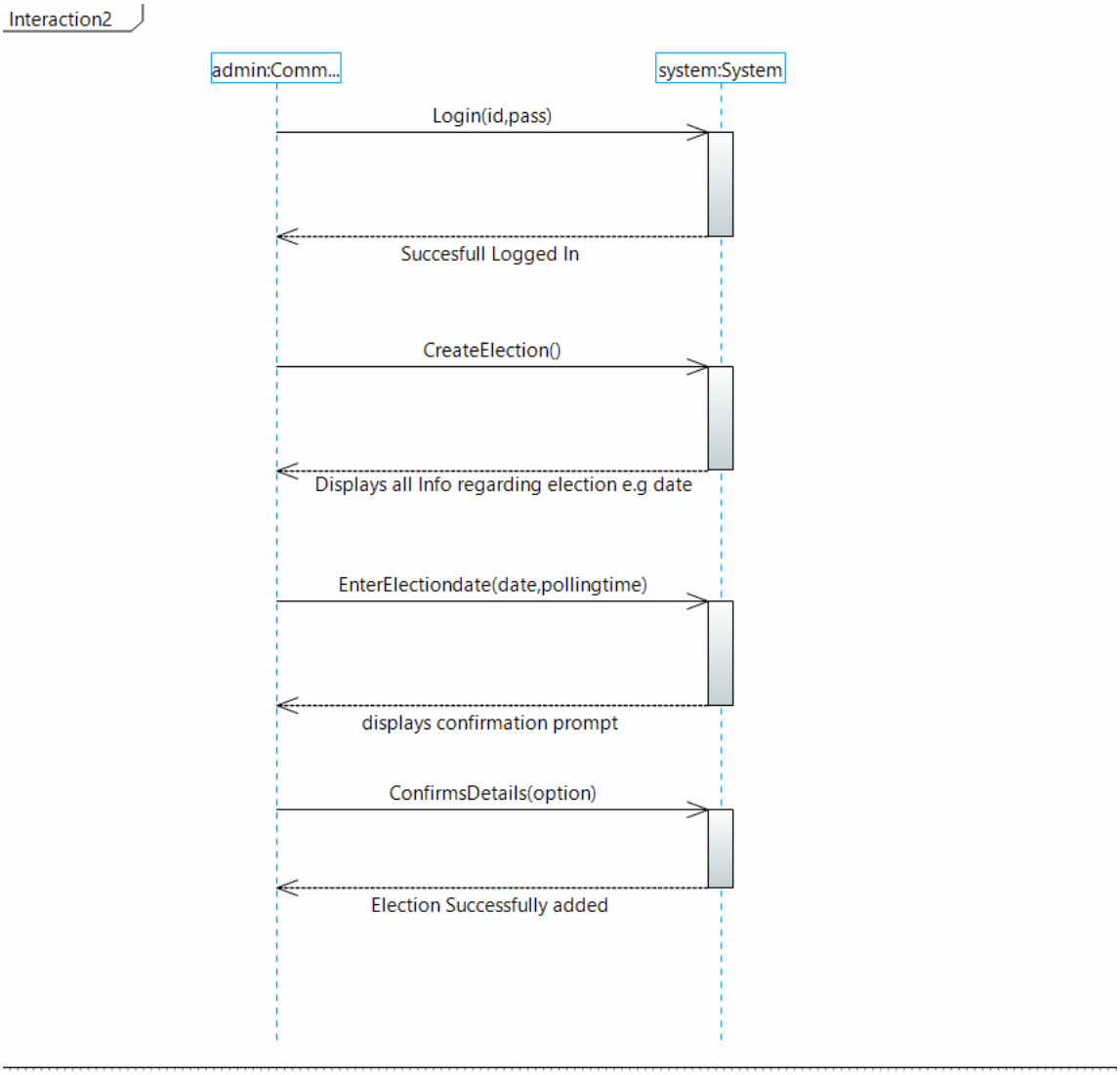


Domain Model Diagram

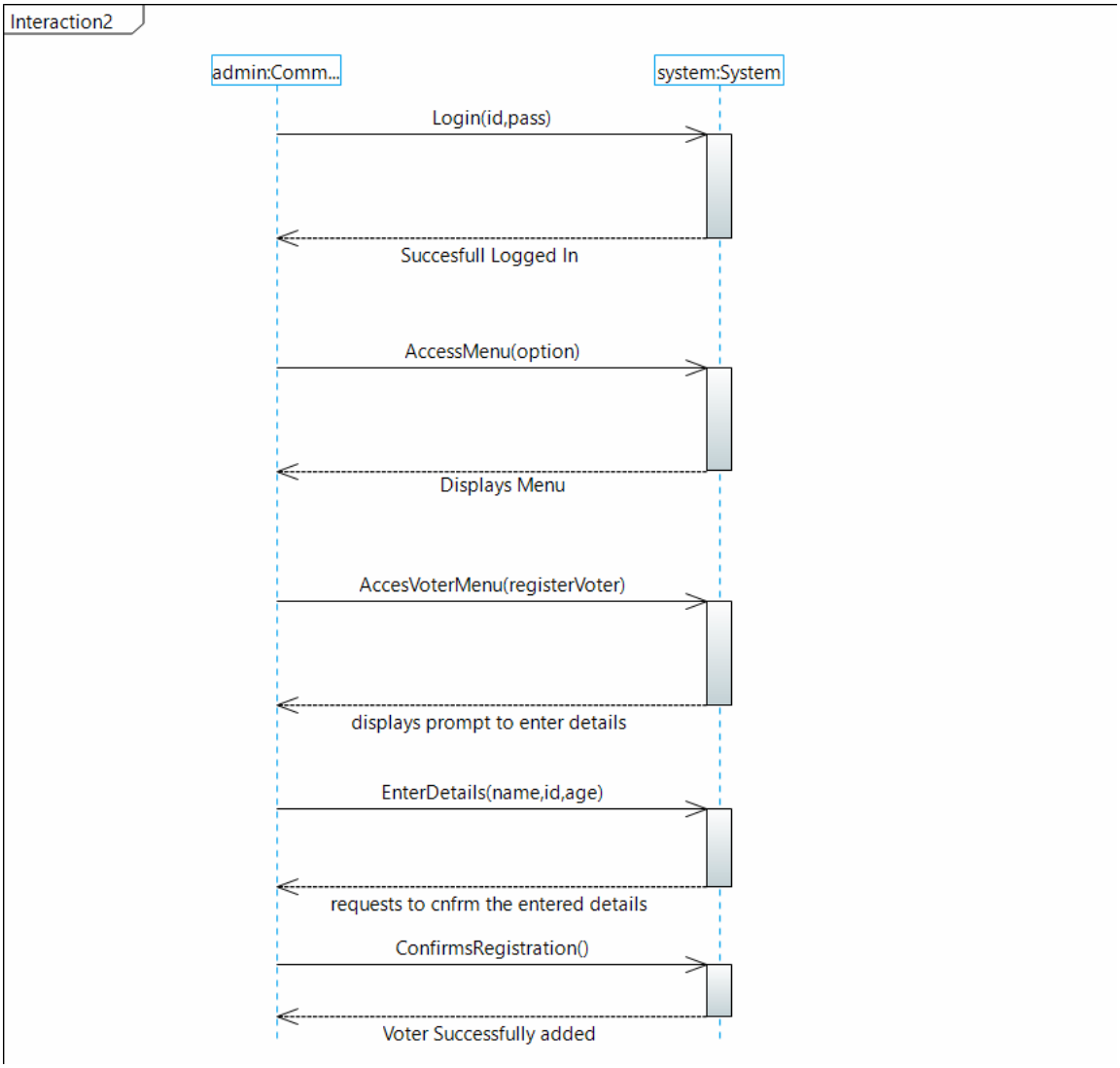


System Sequence Diagram

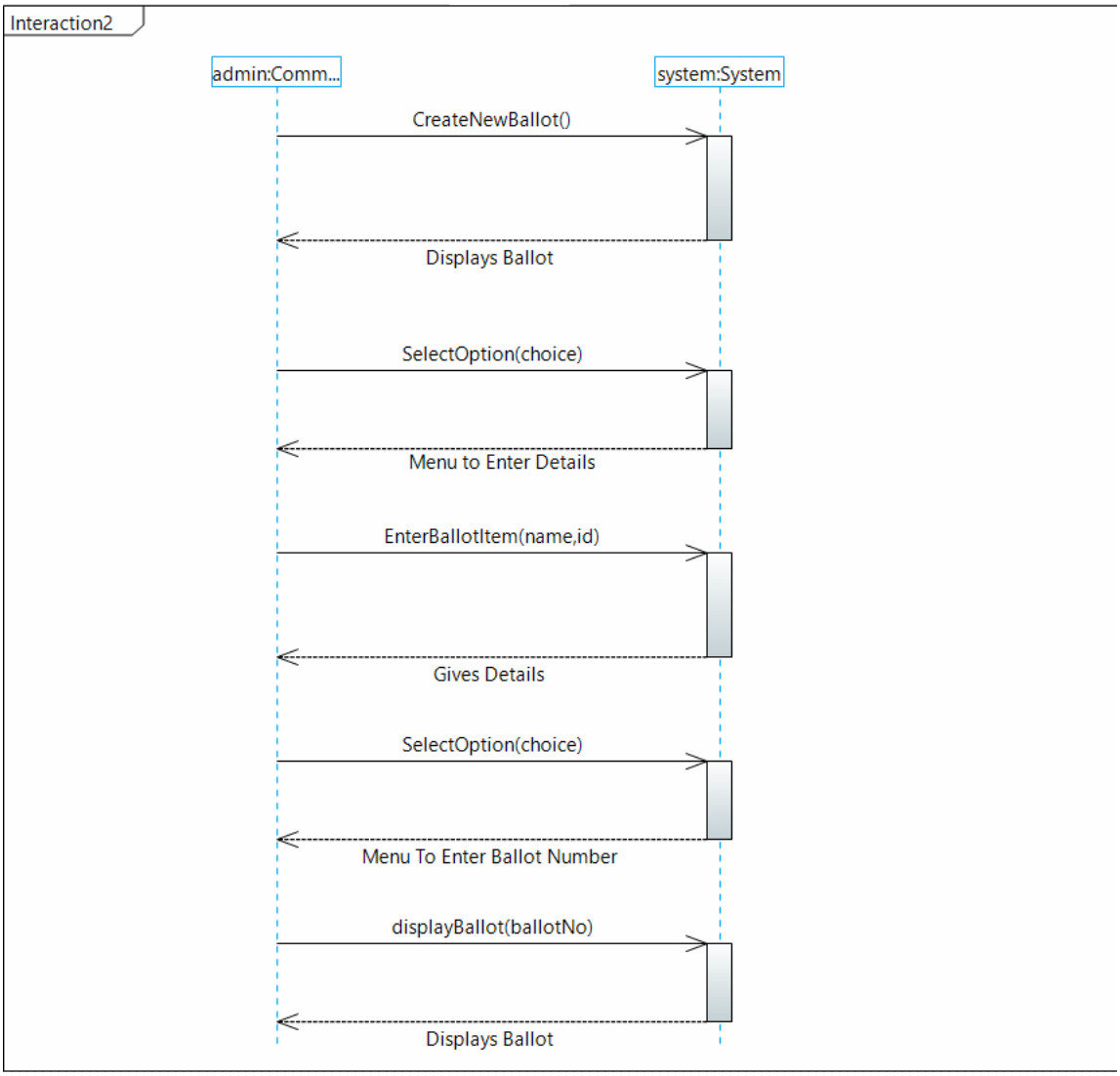
Use case: Create elections

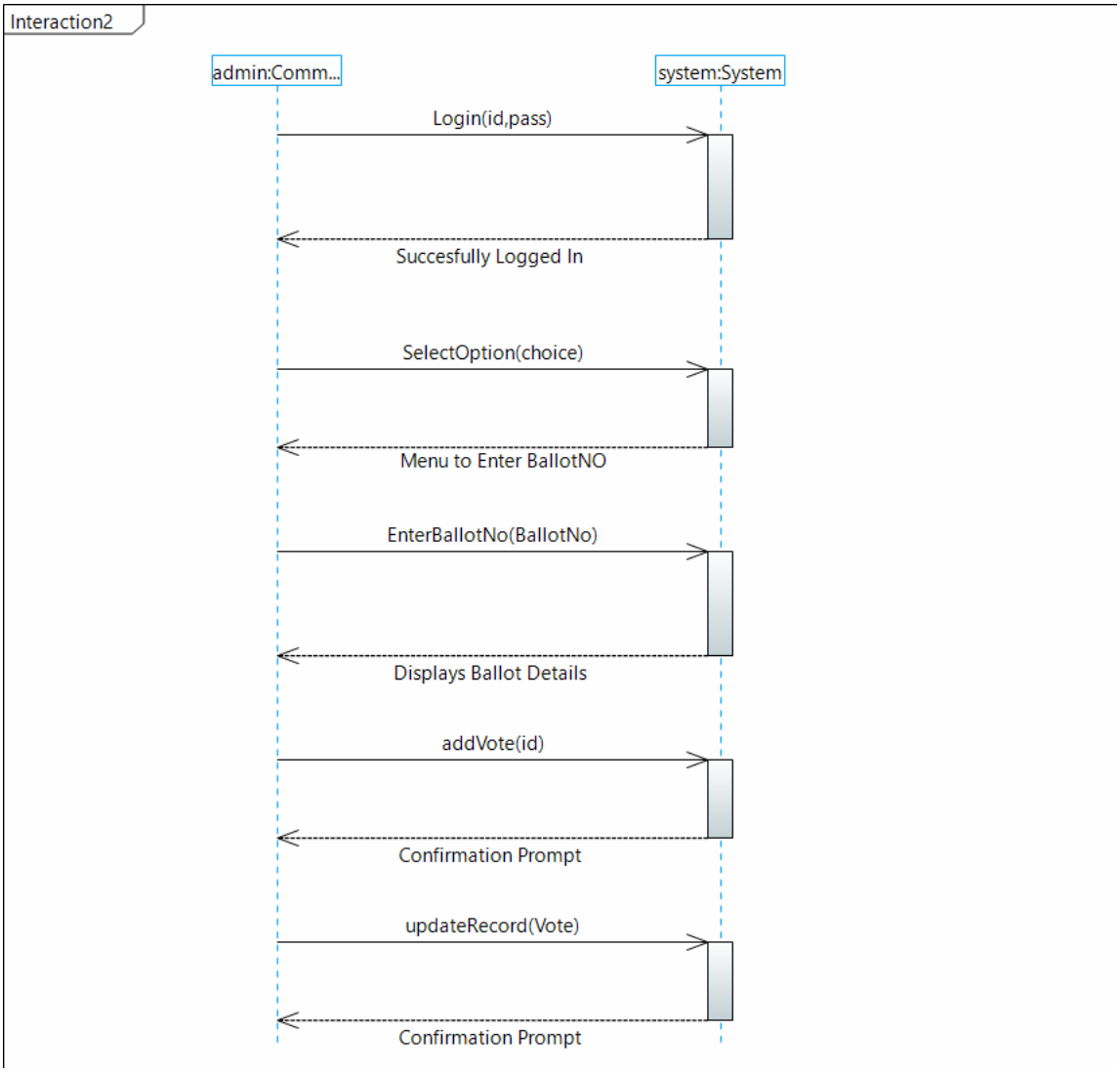


Use case: register voter

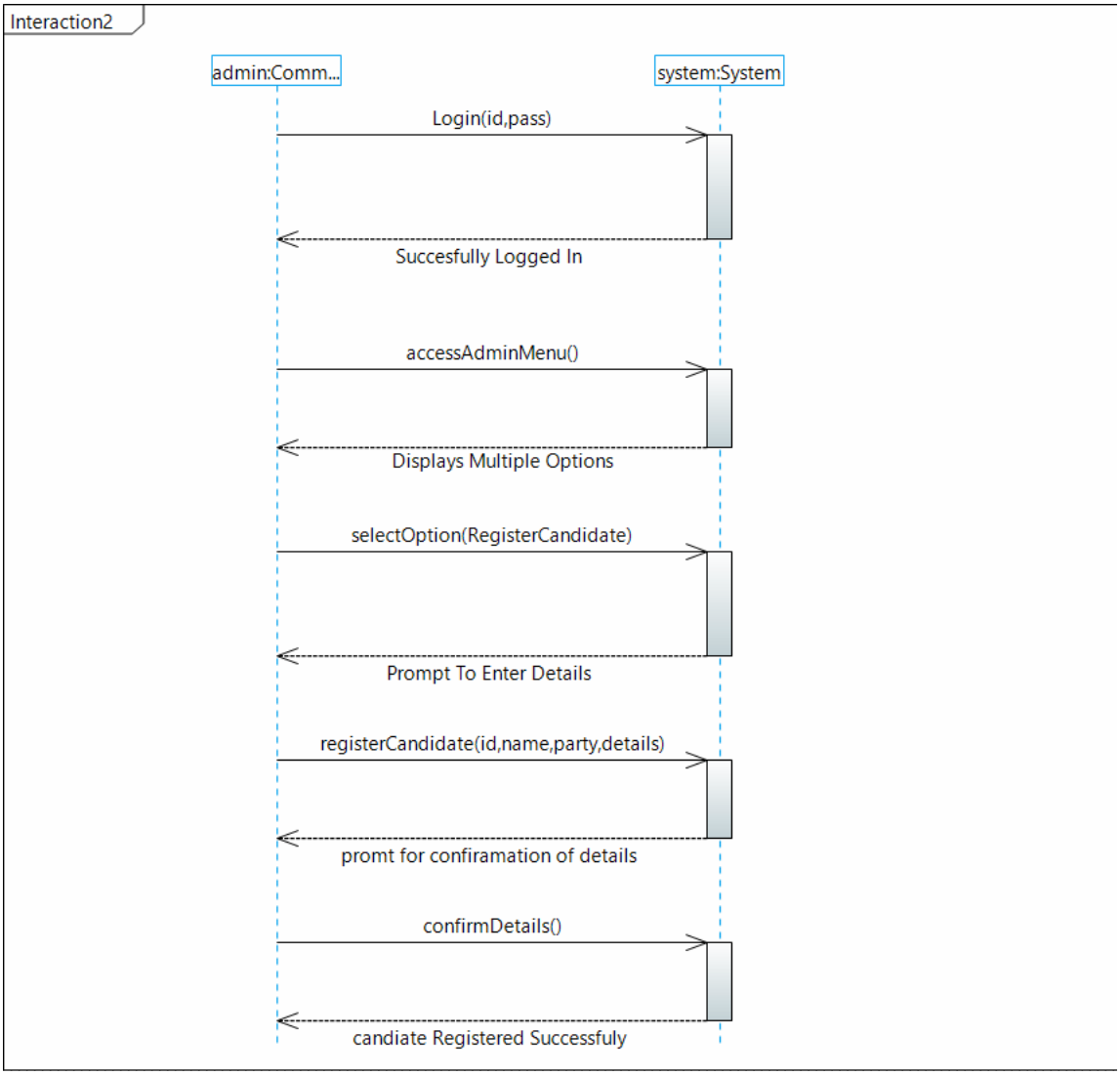


Use case: manage ballot

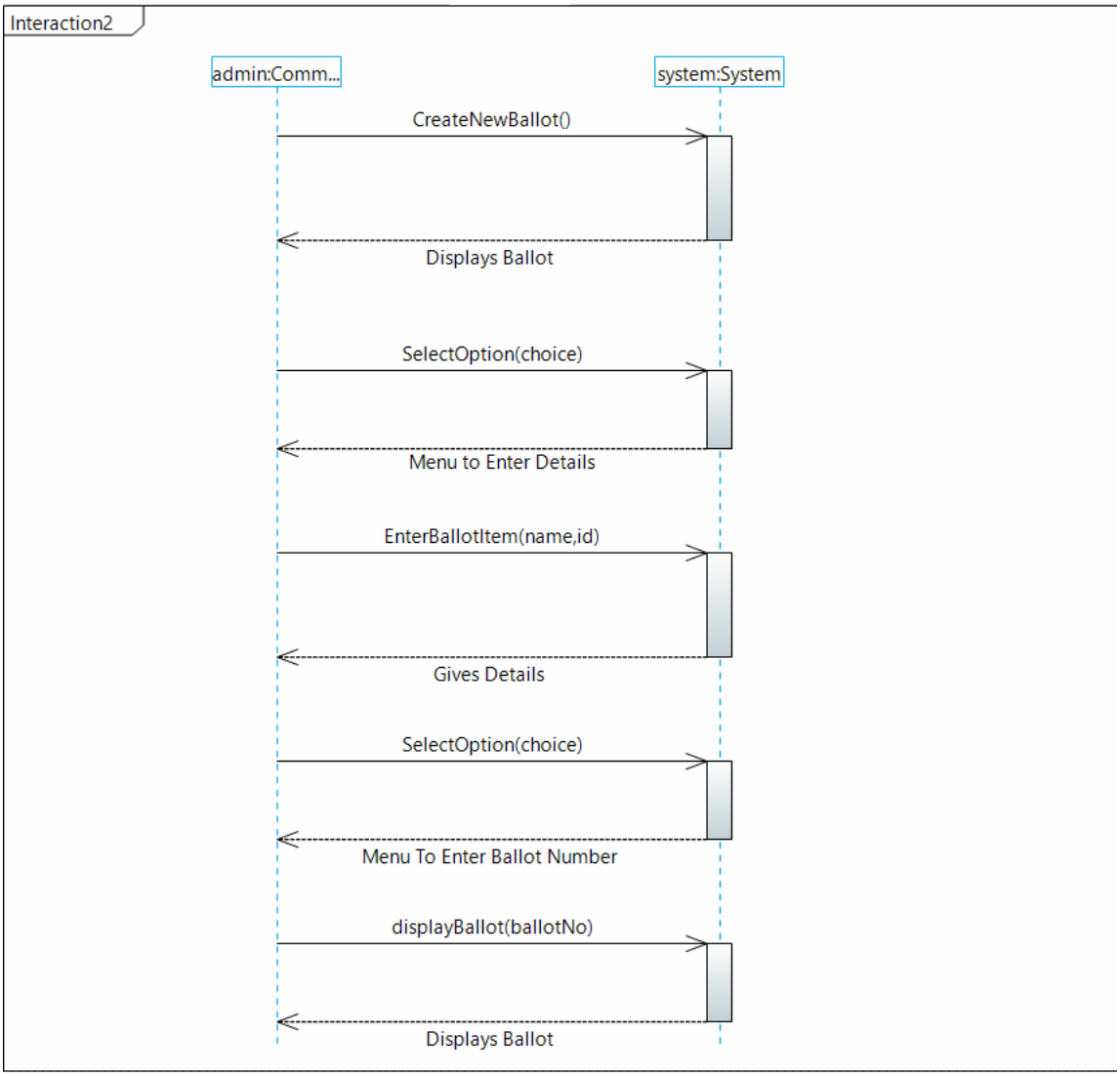

Interaction2
admin:Comm...
system:System
CreateNewBallot()
Displays Ballot
SelectOption(choice)
Menu to Enter Details
EnterBallotItem(name,id)
Gives Details
SelectOption(choice)
Menu To Enter Ballot Number
displayBallot(ballotNo)
Displays Ballot

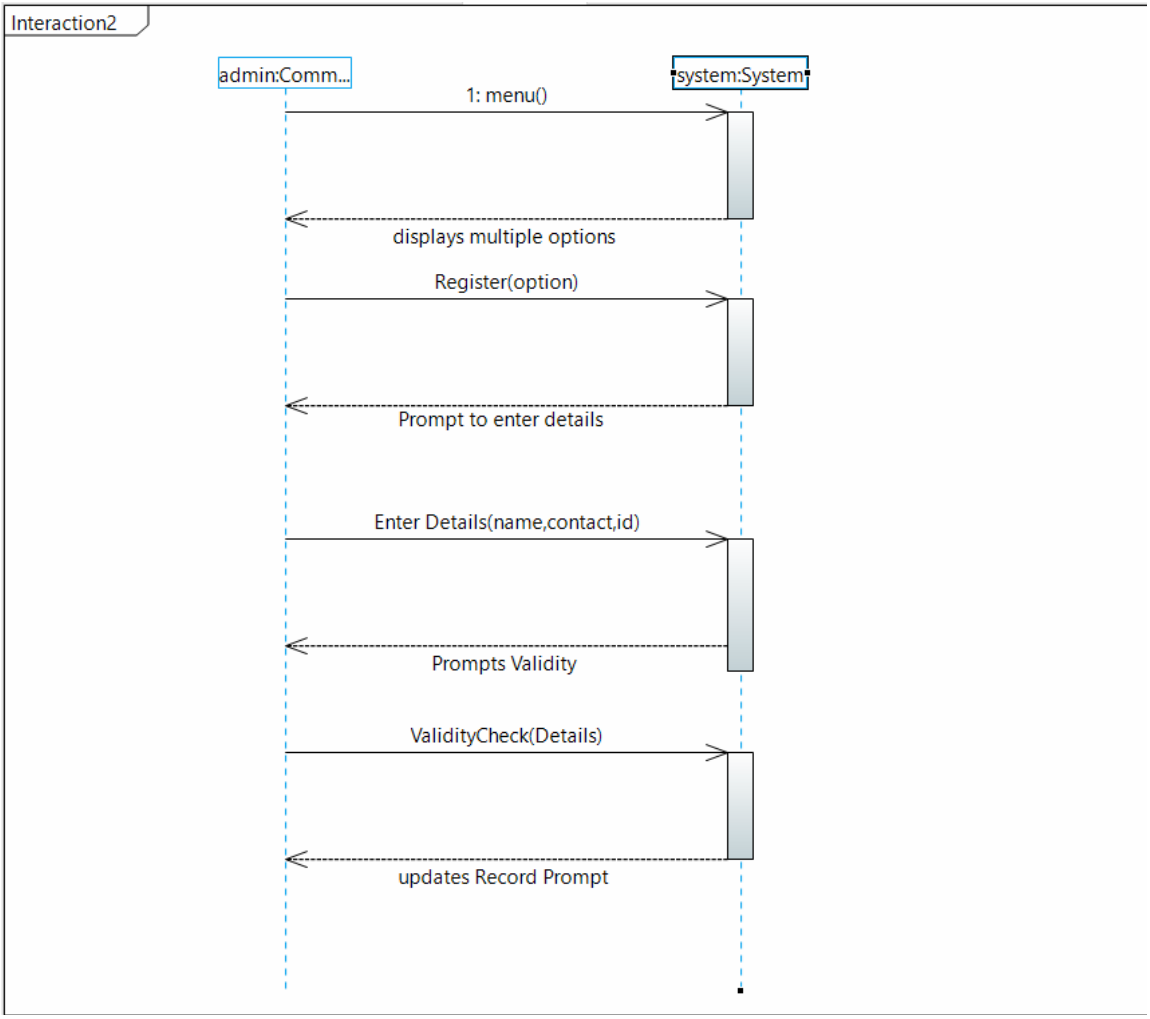


Use case: Register Candidate

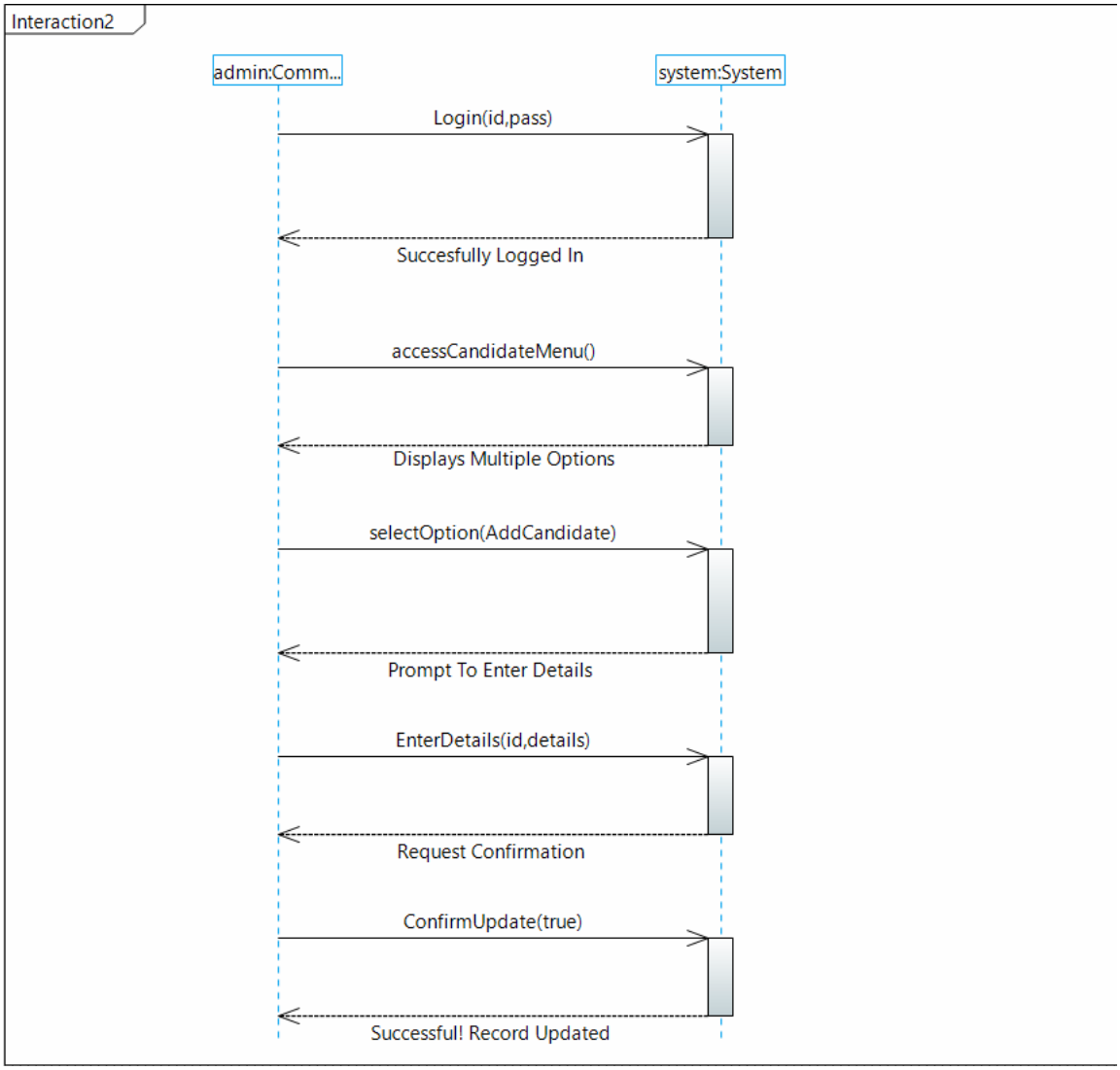


Use case: manage voter

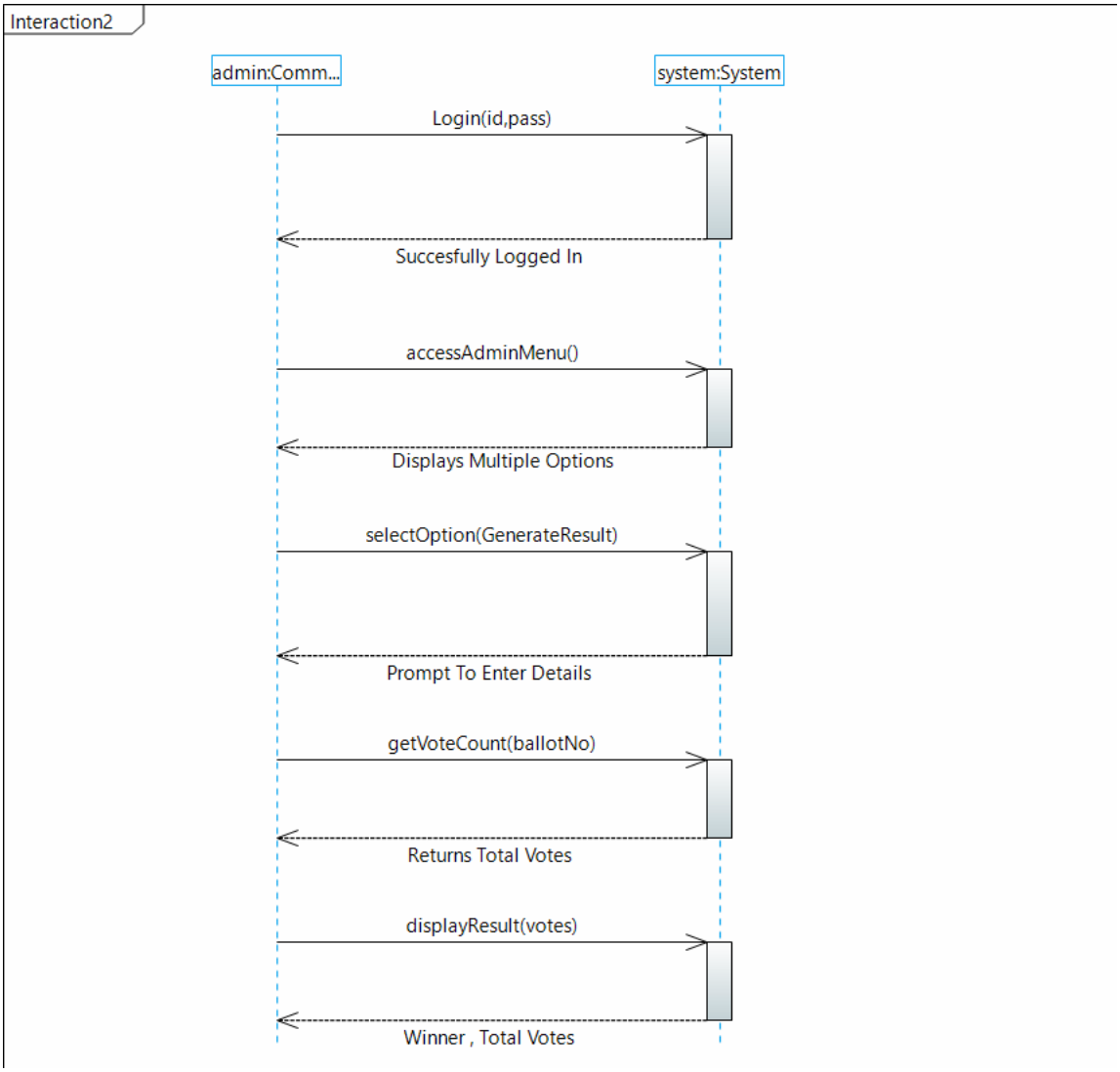

Interaction2
admin:Comm...
system:System
CreateNewBallot()
Displays Ballot
SelectOption(choice)
Menu to Enter Details
EnterBallotItem(name,id)
Gives Details
SelectOption(choice)
Menu To Enter Ballot Number
displayBallot(ballotNo)
Displays Ballot



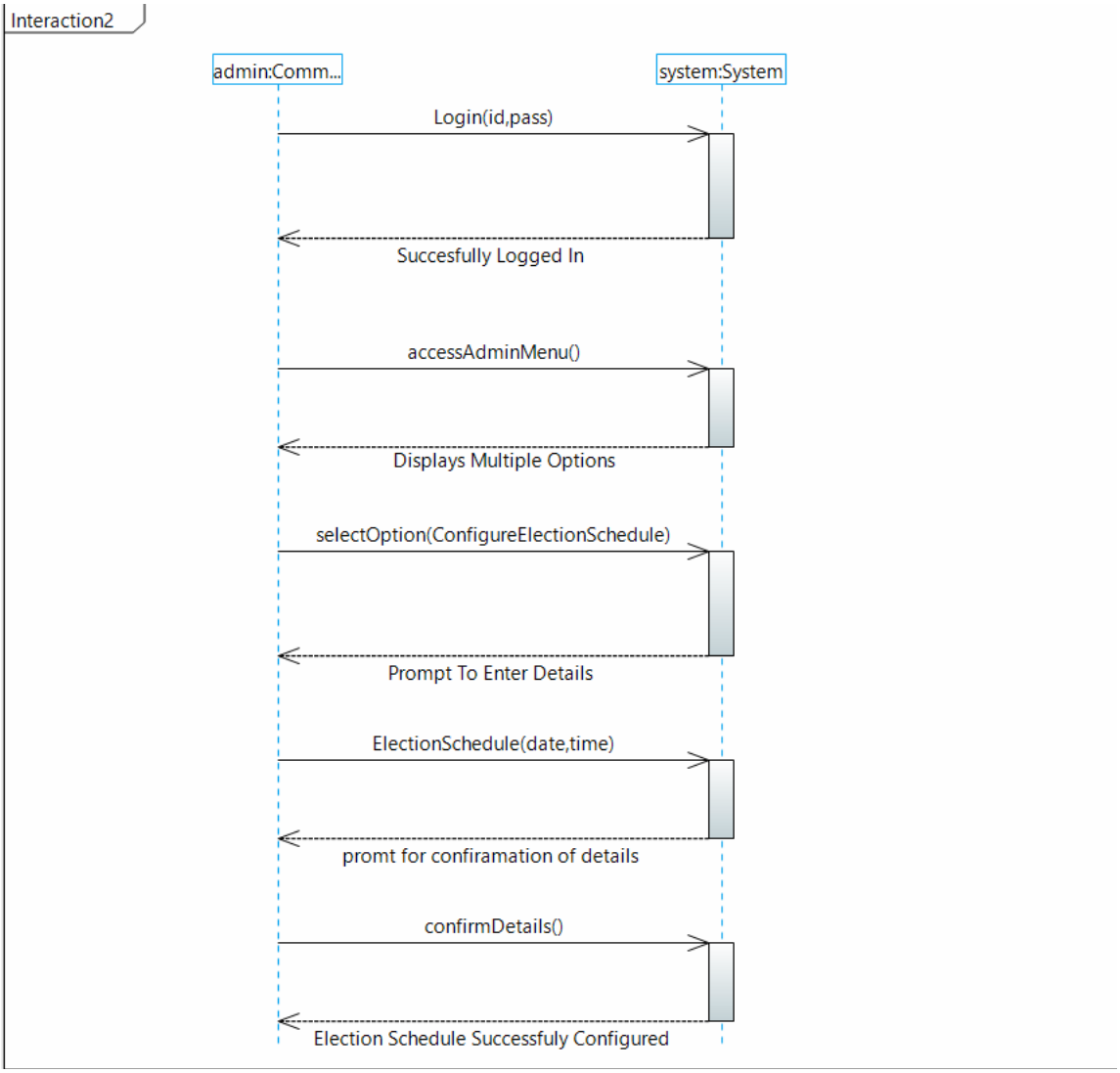
Use case: administer candidate



Use case: generate results

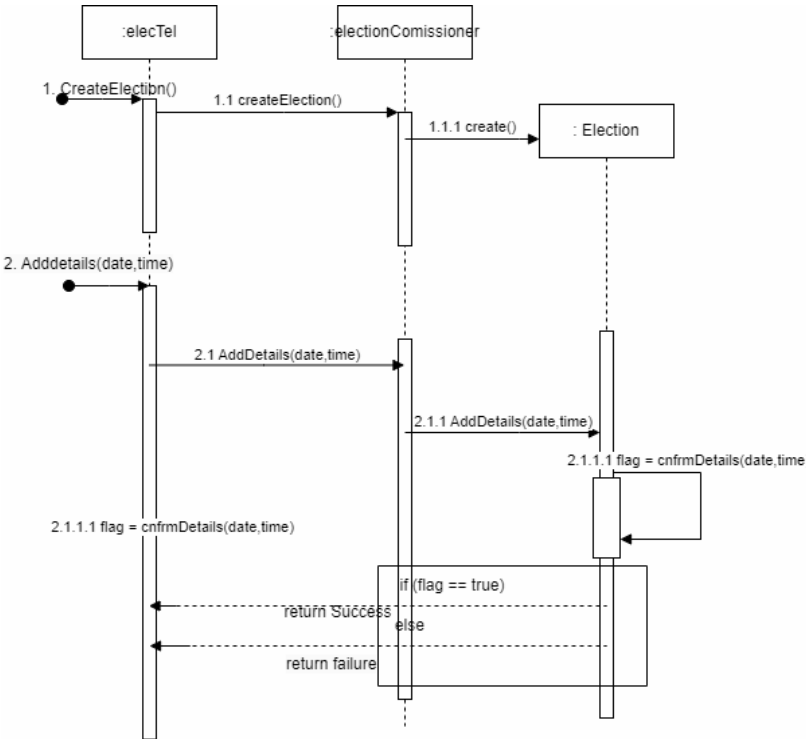


Use case: Manage Election Schedule

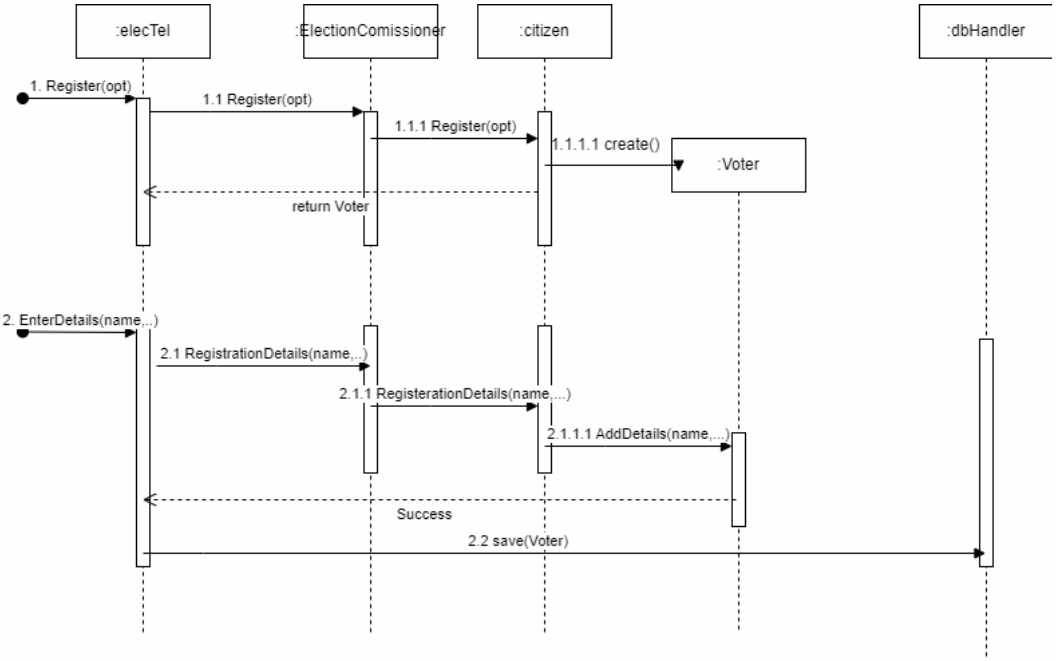

Interaction2
admin:Comm...
system:System
Login(id,pass)
Succesfully Logged In
accessAdminMenu()
Displays Multiple Options
selectOption(ConfigureElectionSchedule)
Prompt To Enter Details
ElectionSchedule(date,time)
promt for confiramation of details
confirmDetails()
Election Schedule Successfuly Configured

Sequence Diagram

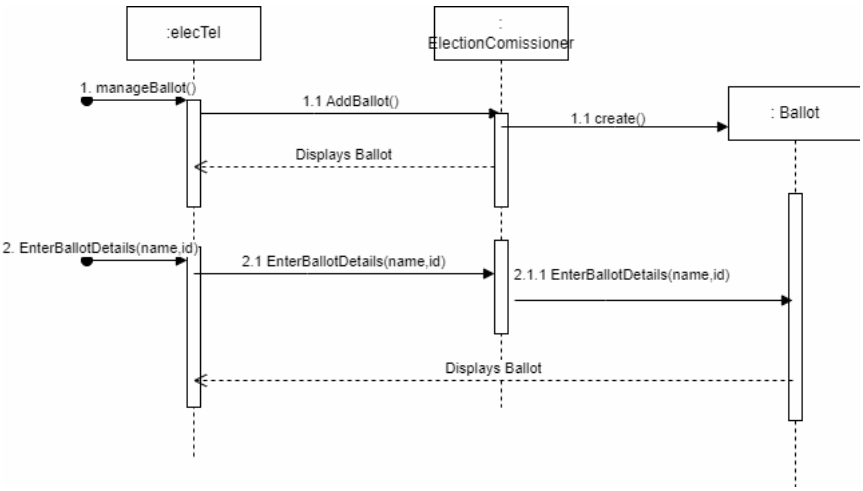
1. Create Election



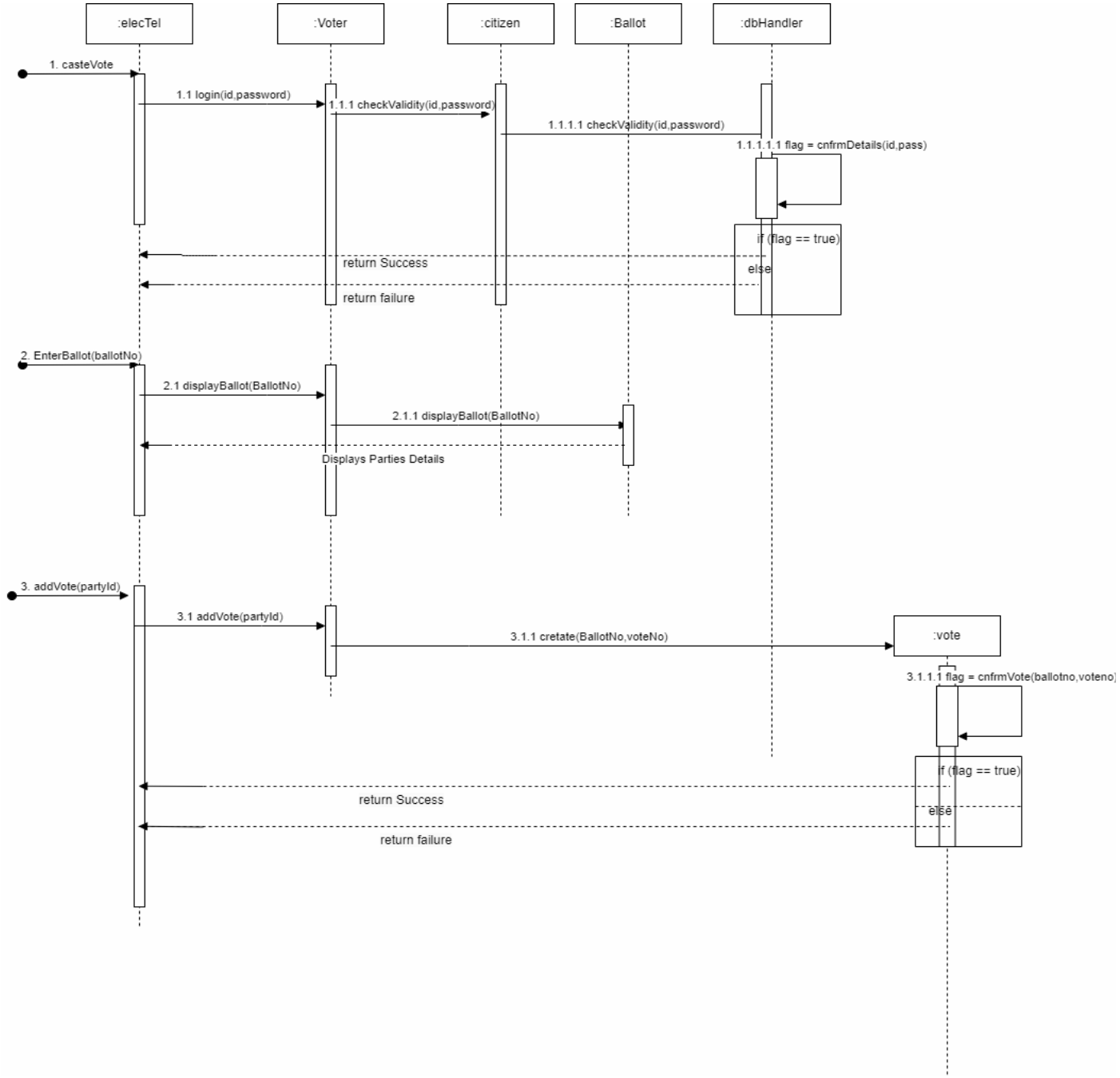
2. Register Voter



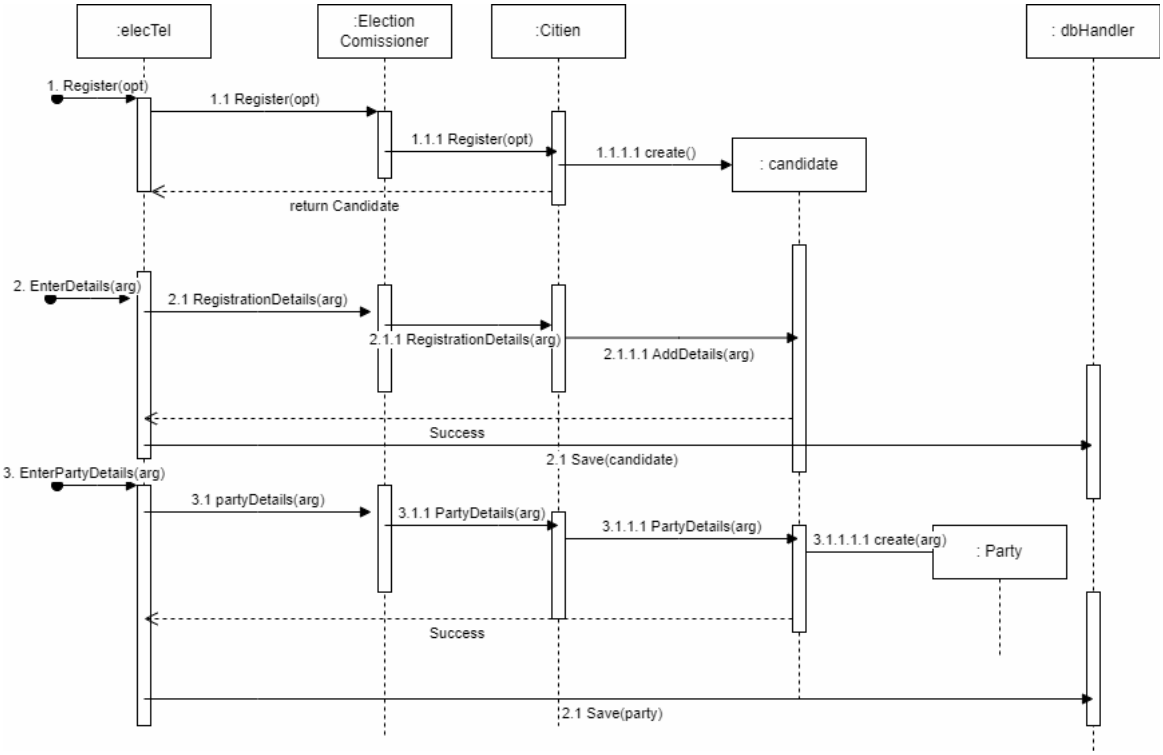
3. Manage Ballot



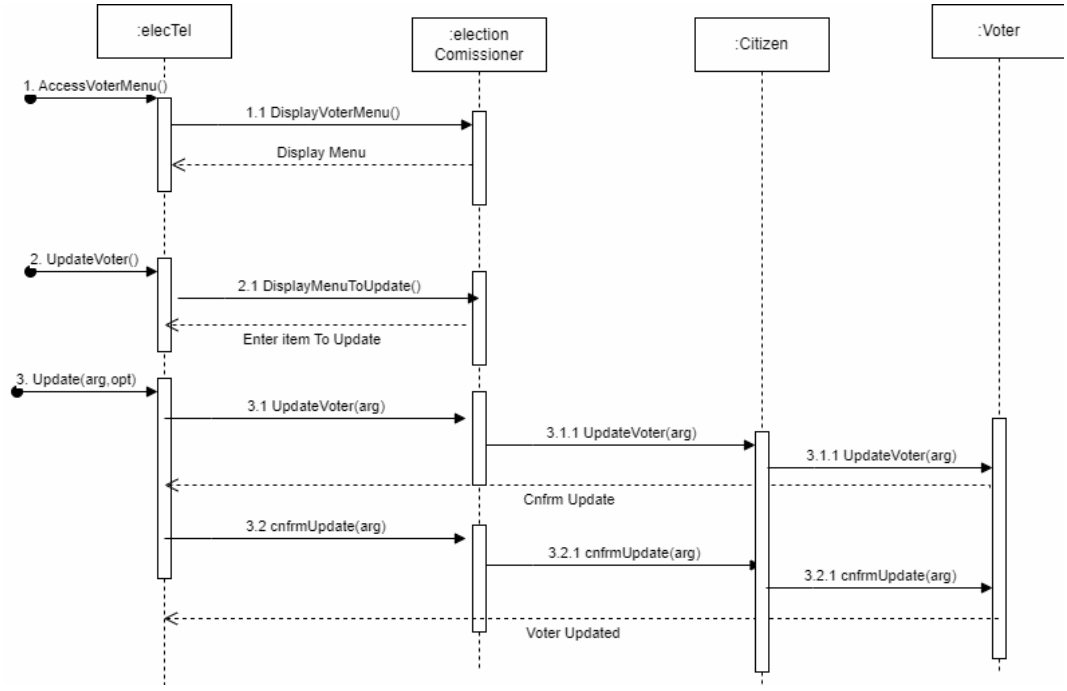
4.Caste Vote



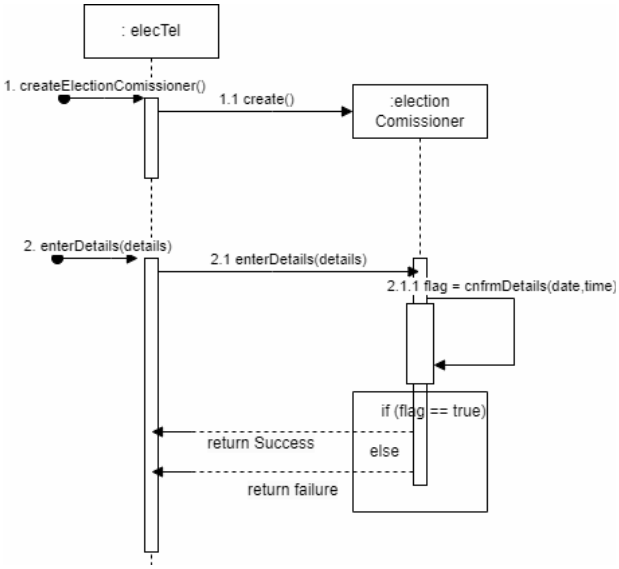
5. Register Candidate



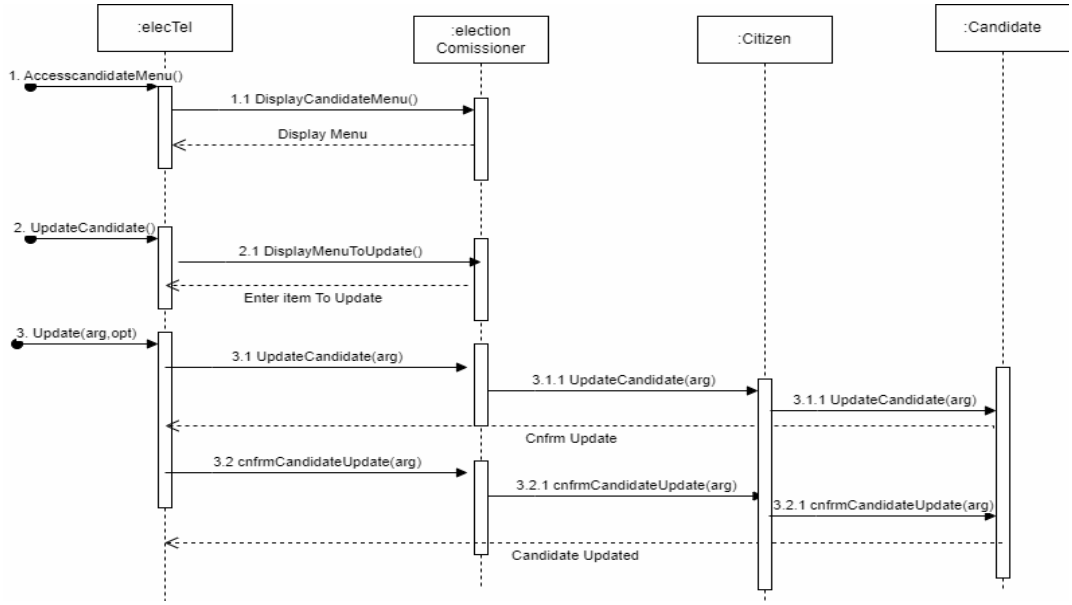
6. Manage Voter



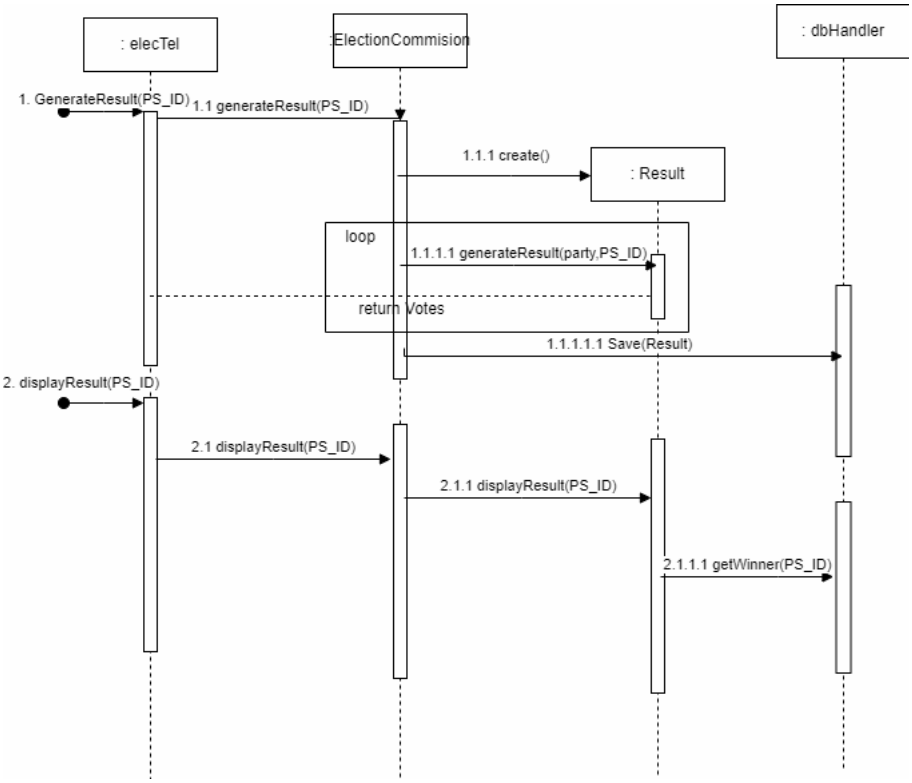
7. AdministerElectionComissioner



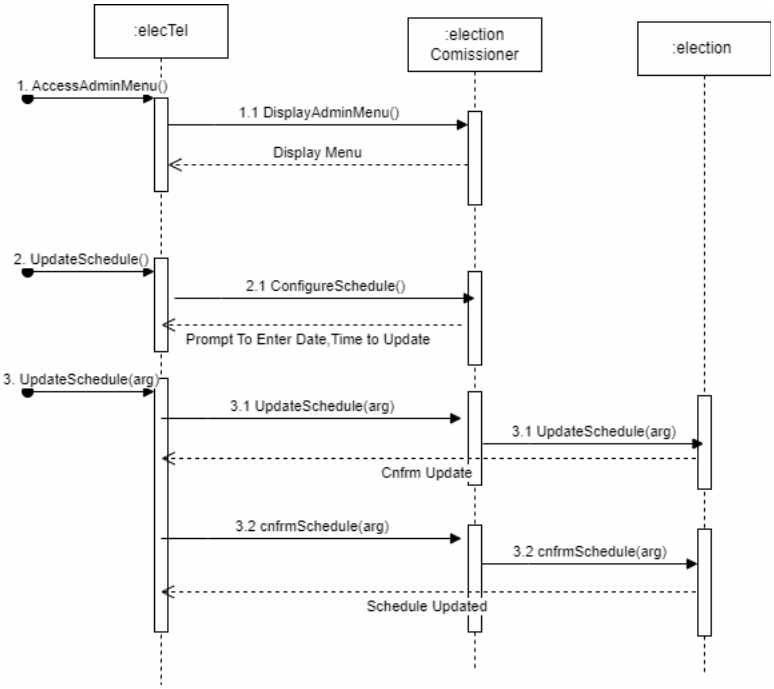
8. Administer Candidate



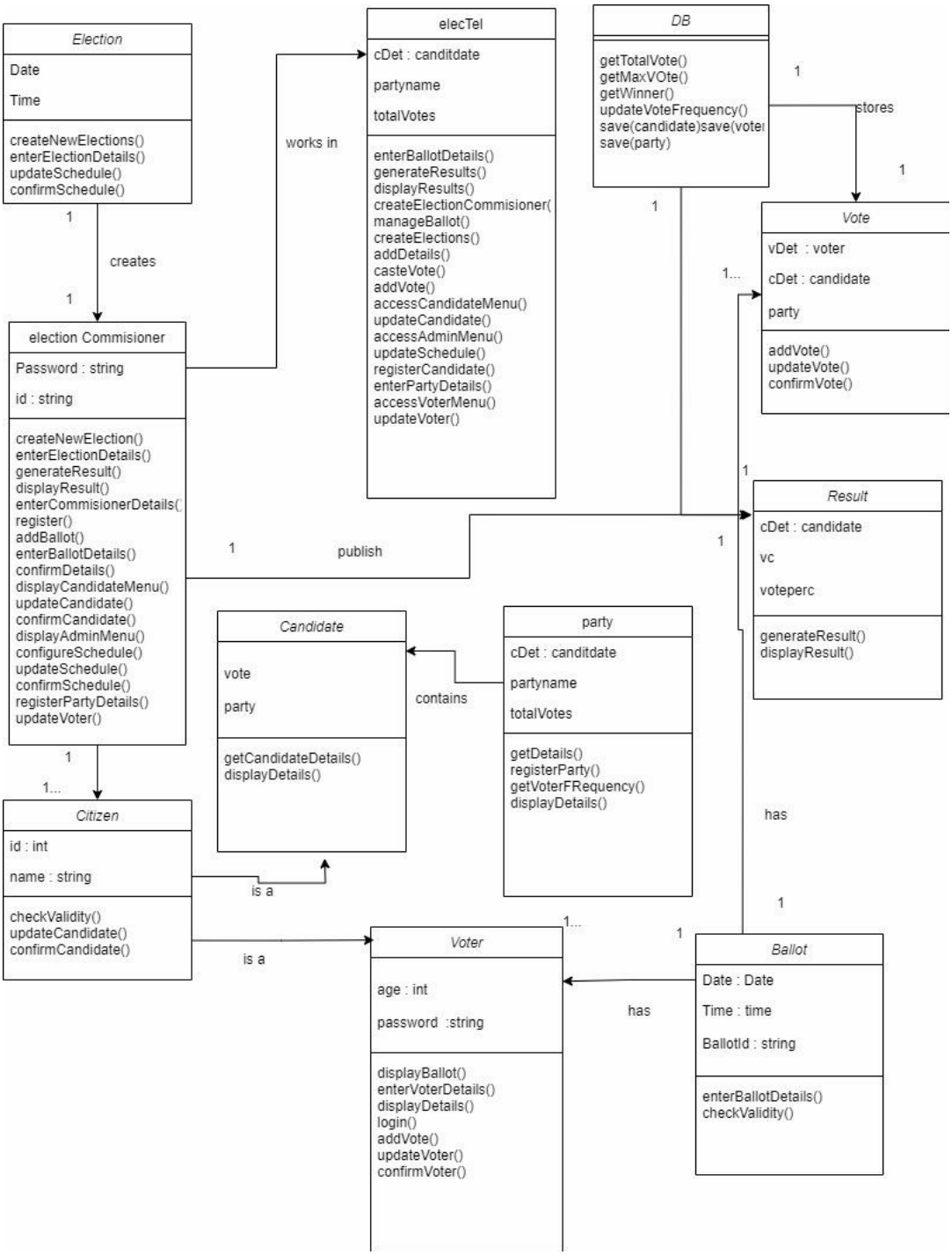
9. Generate Result



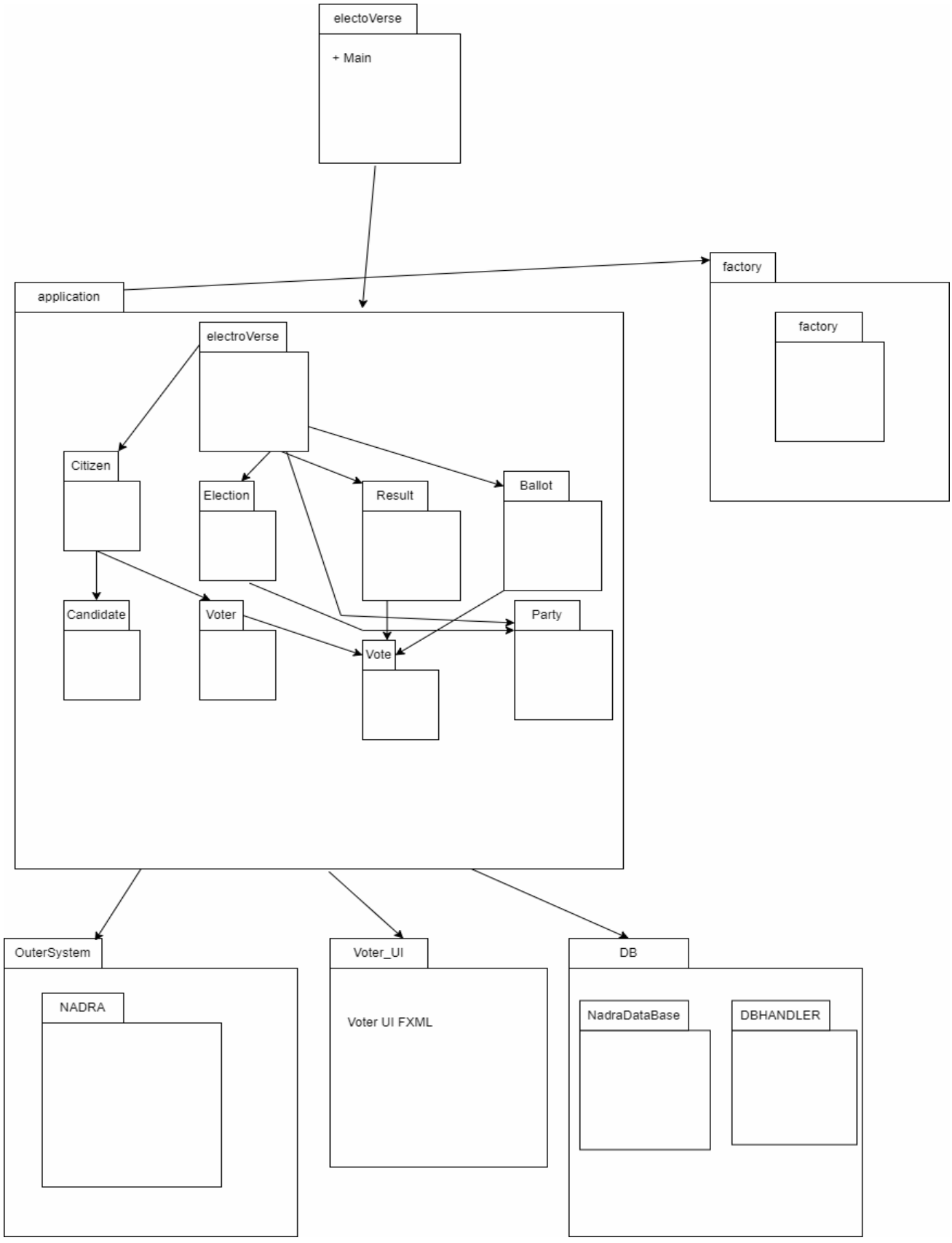
10. Manage Election Schedule



Class Diagram



Package Diagram


electoVerse
+ Main
application
factory
factory
electroVerse
Citizen
Election
Result
Ballot
Candidate
Voter
Party
Vote
OuterSystem
NADRA
Voter_UI
Voter UI FXML
DB
NadraDataBase
DBHANDLER

Deployment Diagram