

CS 5780

Project Report

Secure Election System

Group ID: 7
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Project Description

The implementation will provide a secure way for people to vote electronically, which eliminates the hassle of physically being present at designated election locations.

Since computerized voting will not replace general elections unless there is a protocol that both maintains individual privacy and prevents cheating, the ideal protocol must meet these requirements:

- ✓ Only authorized voters can vote before the election ends.
- ✓ No one can vote more than once.
- ✓ No one can determine for whom anyone else voted.
- ✓ No one can duplicate anyone else's votes.
- ✓ Every voter can make sure that his vote has been taken into account in the final tabulation.
- ✓ Everyone knows who voted and who didn't

Your design should use two central facilities: Central Tabulating Facility (CTF) and Central Legitimization Agency (CLA). CLA's main function is to certify the voters. Each voter will send a message to the CLA asking for a validation number, and CLA will return a random validation number to the user. The CLA retains a list of validation numbers as well as a list of validation numbers' recipients to prevent a voter from voting twice. Then, the CLA sends the same number the CTF. After a voter gets the validation number from CLA, the voter sends his/her vote and the validation number to CTF. CTF's main function is to count votes. CTF checks the validation number against a list of numbers received from the CLA. If the validation number is there, the CTF crosses it out (to prevent someone from voting twice). The CTF adds the identification number to the list of people who voted for a particular candidate and adds one to the tally. After the election ends, the CTF publishes the outcome.

All the data sent between a voter and CLA, between CLA and CTF, and between a voter and CTF should be encrypted. For simplicity, RSA will be used for encryption and decryption. Suppose each party involved in the protocol has a public key/private key pair. All voters know the public keys of CTF and CLA. CTF keeps a list of eligible users and their public keys in a text file. CTF and CLA know the public key of each other.

How to Run the Application?

Run program in eclipse:

1. Run ctf.java:

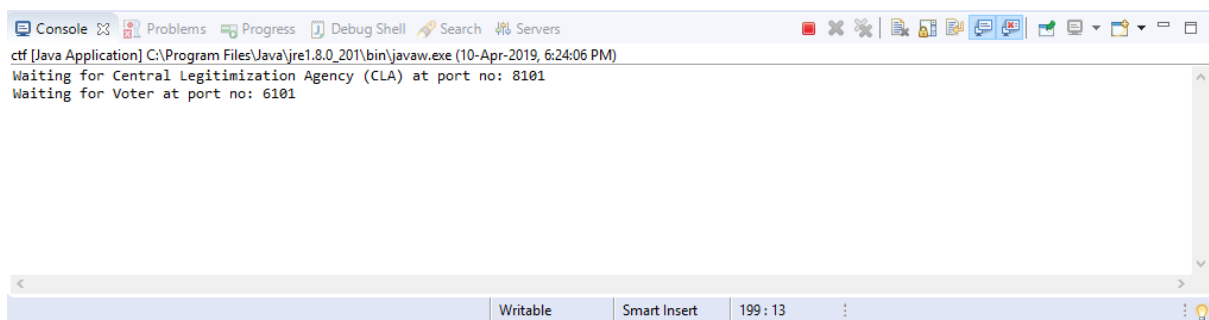
For data management below files are being used in program ctf.java

Raw_Data.txt: Stores data related to voter public keys

candidateList.txt: Contains candidate name, candidate id and total vote received

CTF_Login.txt: contains voter username and password

First run: Agency server will start-up listening at localhost on port 8101



Ctf.java handles voter request and manages voting related activities

2. Cla.java

First run: establish connection with CTF facility listening on port 8101. If connection established, starts listening on localhost at port 7101 and handle voter request in reference to validation no. Generate validation number and update the data in below file. Also provide the validation no of voter on request received for vote.

ValidationNos.txt: contains username and validation no separated by ','.

3. Voter_1.java:

This is the client application establish the connection with ctf.java and allow user to generate validation number, cast vote and allow user to see the no of votes received to all candidates.

4. Candidate_1.java

It is an entity class for a candidate that stores information about the candidate:

1. Candidate name

2. Candidate id

3. Candidate votes received (initially kept 0)

The cla.java create objects of candidate_1.java according to the information available in the candidateList.txt

5. RSA.java

The java file does encryption and decryption tasks whenever server needed to generate RSA key for a user.

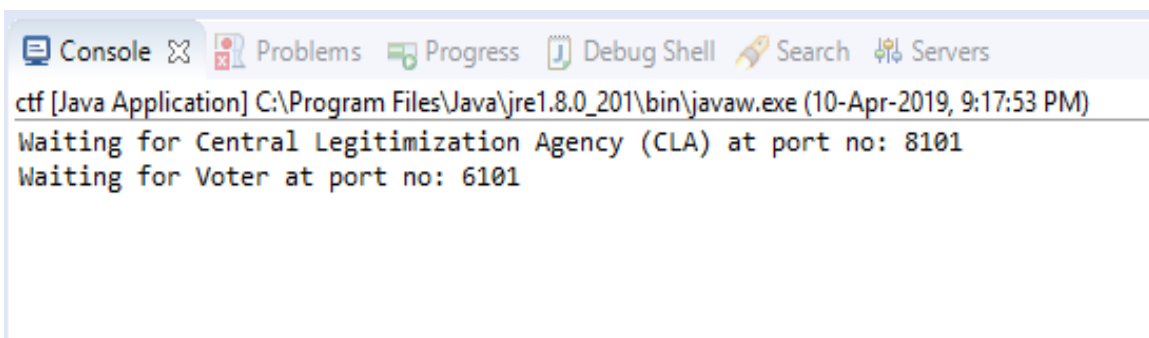
Output

Run Application in eclipse:

1. Create a new project with any name
2. Copy the Java files to the source directory
3. Copy the text files to the root directory of the project

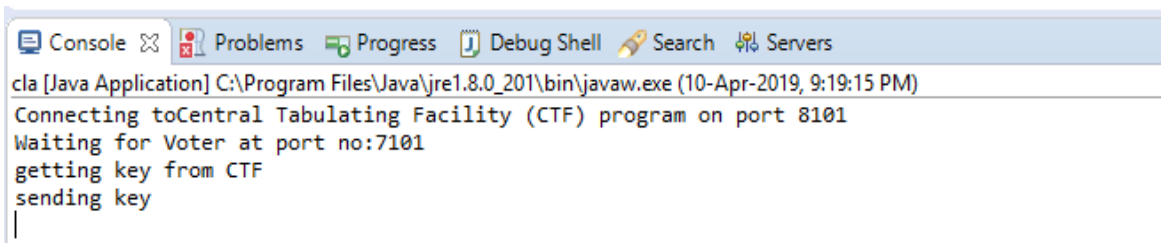
Screen shots of application run:

1. Run ctf.java (SERVER):



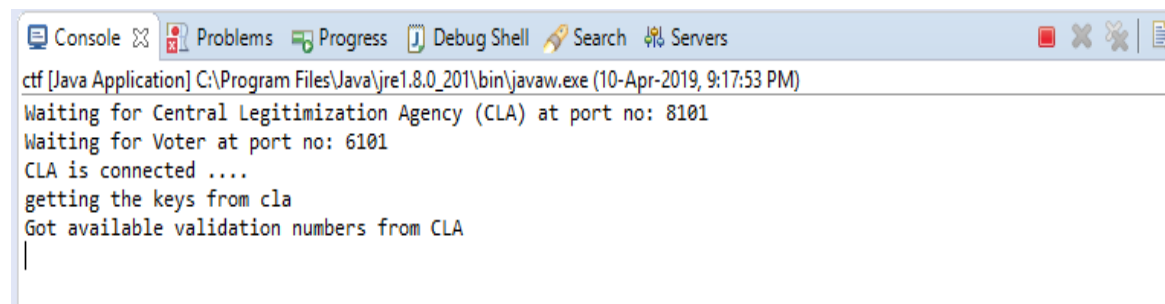
```
ctf [Java Application] C:\Program Files\Java\jre1.8.0_201\bin\javaw.exe (10-Apr-2019, 9:17:53 PM)
Waiting for Central Legitimization Agency (CLA) at port no: 8101
Waiting for Voter at port no: 6101
```

2. Run cla.java:



```
cla [Java Application] C:\Program Files\Java\jre1.8.0_201\bin\javaw.exe (10-Apr-2019, 9:19:15 PM)
Connecting toCentral Tabulating Facility (CTF) program on port 8101
Waiting for Voter at port no:7101
getting key from CTF
sending key
|
```

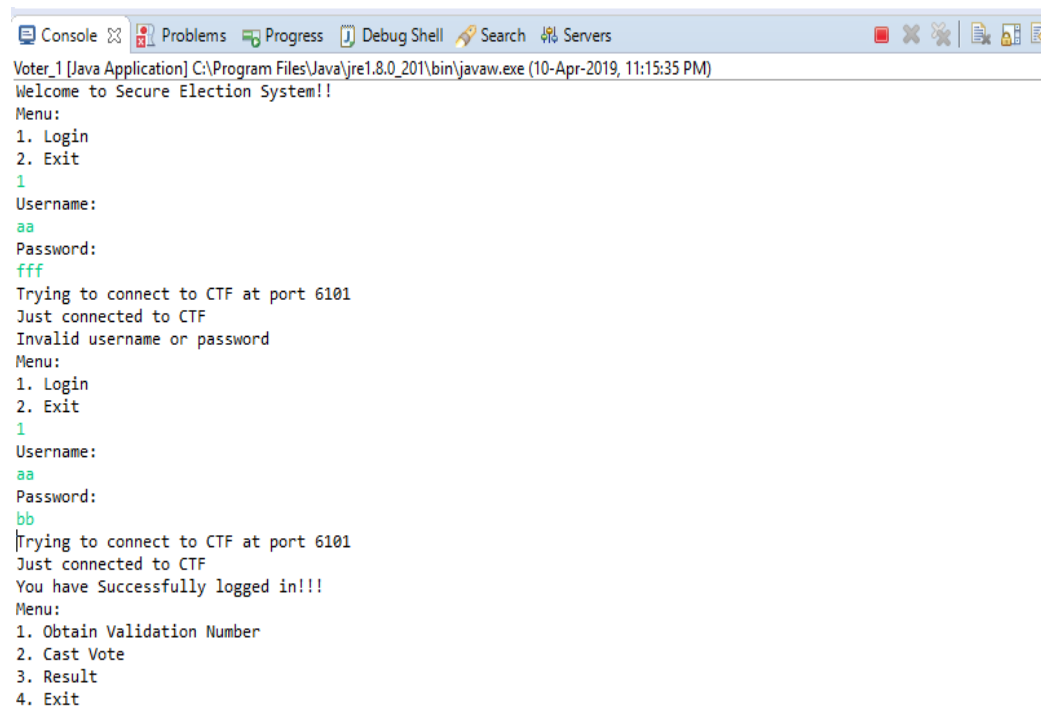
Updates on ctf server console:



```
ctf [Java Application] C:\Program Files\Java\jre1.8.0_201\bin\javaw.exe (10-Apr-2019, 9:17:53 PM)
Waiting for Central Legitimization Agency (CLA) at port no: 8101
Waiting for Voter at port no: 6101
CLA is connected ....
getting the keys from cla
Got available validation numbers from CLA
|
```

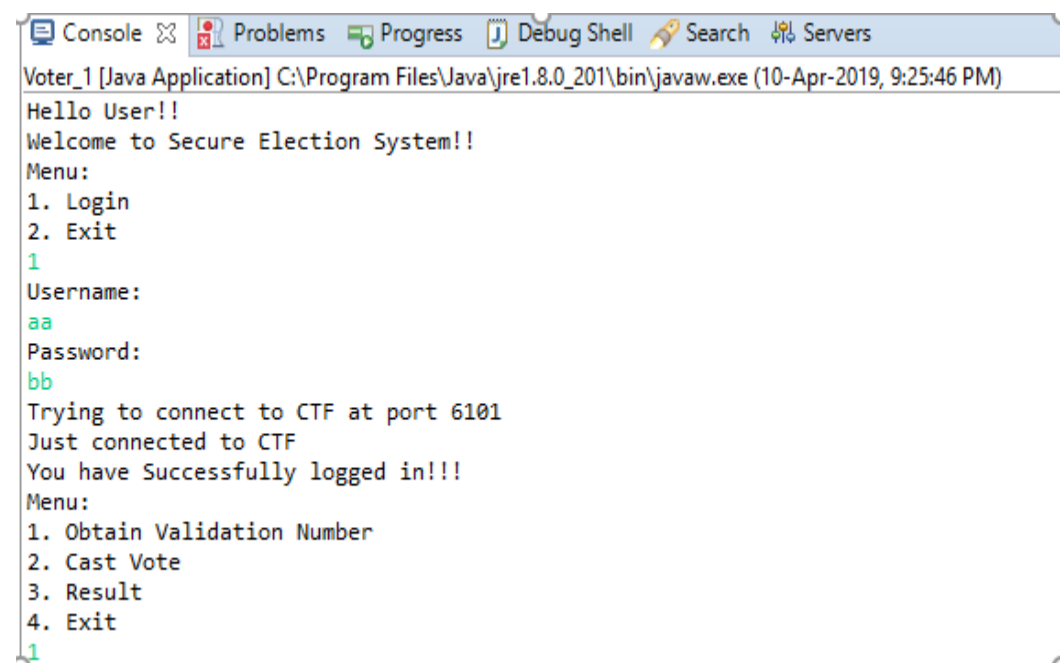
3. Run Voter_1.java

1. Login:



```
Voter_1 [Java Application] C:\Program Files\Java\jre1.8.0_201\bin\javaw.exe (10-Apr-2019, 11:15:35 PM)
Welcome to Secure Election System!!
Menu:
1. Login
2. Exit
1
Username:
aa
Password:
fff
Trying to connect to CTF at port 6101
Just connected to CTF
Invalid username or password
Menu:
1. Login
2. Exit
1
Username:
aa
Password:
bb
Trying to connect to CTF at port 6101
Just connected to CTF
You have Successfully logged in!!!
Menu:
1. Obtain Validation Number
2. Cast Vote
3. Result
4. Exit
```

2. Login, getting validation no and casting vote:



```
Voter_1 [Java Application] C:\Program Files\Java\jre1.8.0_201\bin\javaw.exe (10-Apr-2019, 9:25:46 PM)
Hello User!!
Welcome to Secure Election System!!
Menu:
1. Login
2. Exit
1
Username:
aa
Password:
bb
Trying to connect to CTF at port 6101
Just connected to CTF
You have Successfully logged in!!!
Menu:
1. Obtain Validation Number
2. Cast Vote
3. Result
4. Exit
1
```

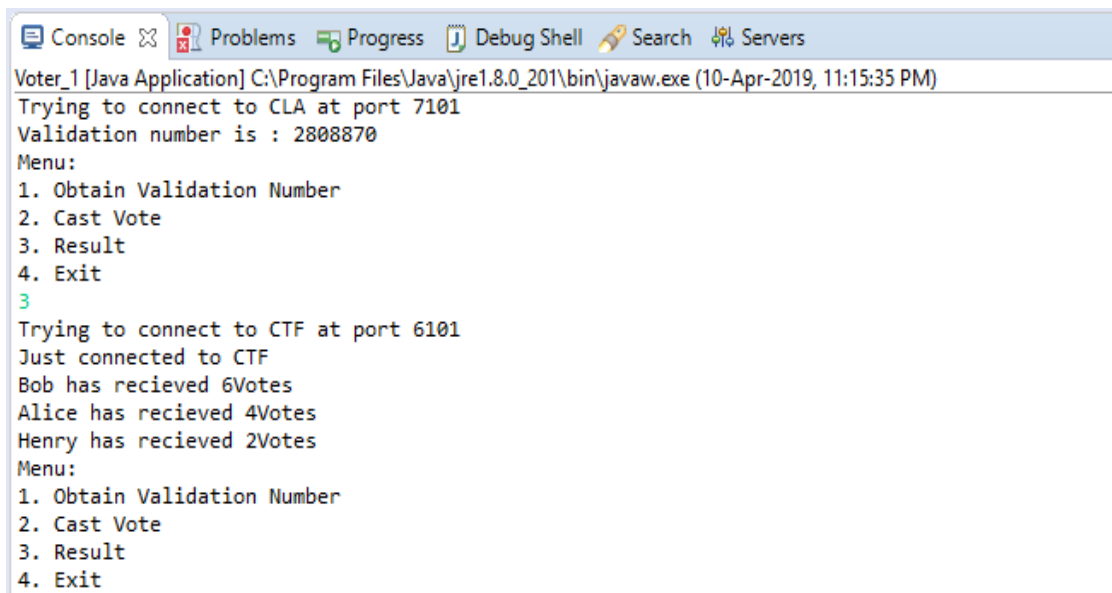
```

~
Trying to connect to CLA at port 7101
Validation number is : 2808870
Menu:
1. Obtain Validation Number
2. Cast Vote
3. Result
4. Exit
2
Candidates are:

1. Bob
2. Henry
3. Alice
Enter the candidate number you want to vote
3
Trying to connect to CTF at port 6101
You have Successfully Voted for the :Alice
Menu:
1. Obtain Validation Number
2. Cast Vote
3. Result
4. Exit

```

3. Show result:



The screenshot shows an IDE console window with the following content:

```

Voter_1 [Java Application] C:\Program Files\Java\jre1.8.0_201\bin\javaw.exe (10-Apr-2019, 11:15:35 PM)
Trying to connect to CLA at port 7101
Validation number is : 2808870
Menu:
1. Obtain Validation Number
2. Cast Vote
3. Result
4. Exit
3
Trying to connect to CTF at port 6101
Just connected to CTF
Bob has recieved 6Votes
Alice has recieved 4Votes
Henry has recieved 2Votes
Menu:
1. Obtain Validation Number
2. Cast Vote
3. Result
4. Exit

```

Contribution:

We equally contributed on this project together. Riddhi designed the project and Smit coded the module, helped each other debugging and solving errors.