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COIS2240H
Assignment 2
Due: February, 25th, 2019

Screenshot of output for question 1

(Note that I changed the toString methods slightly in order for them to make more sense in a sentence).

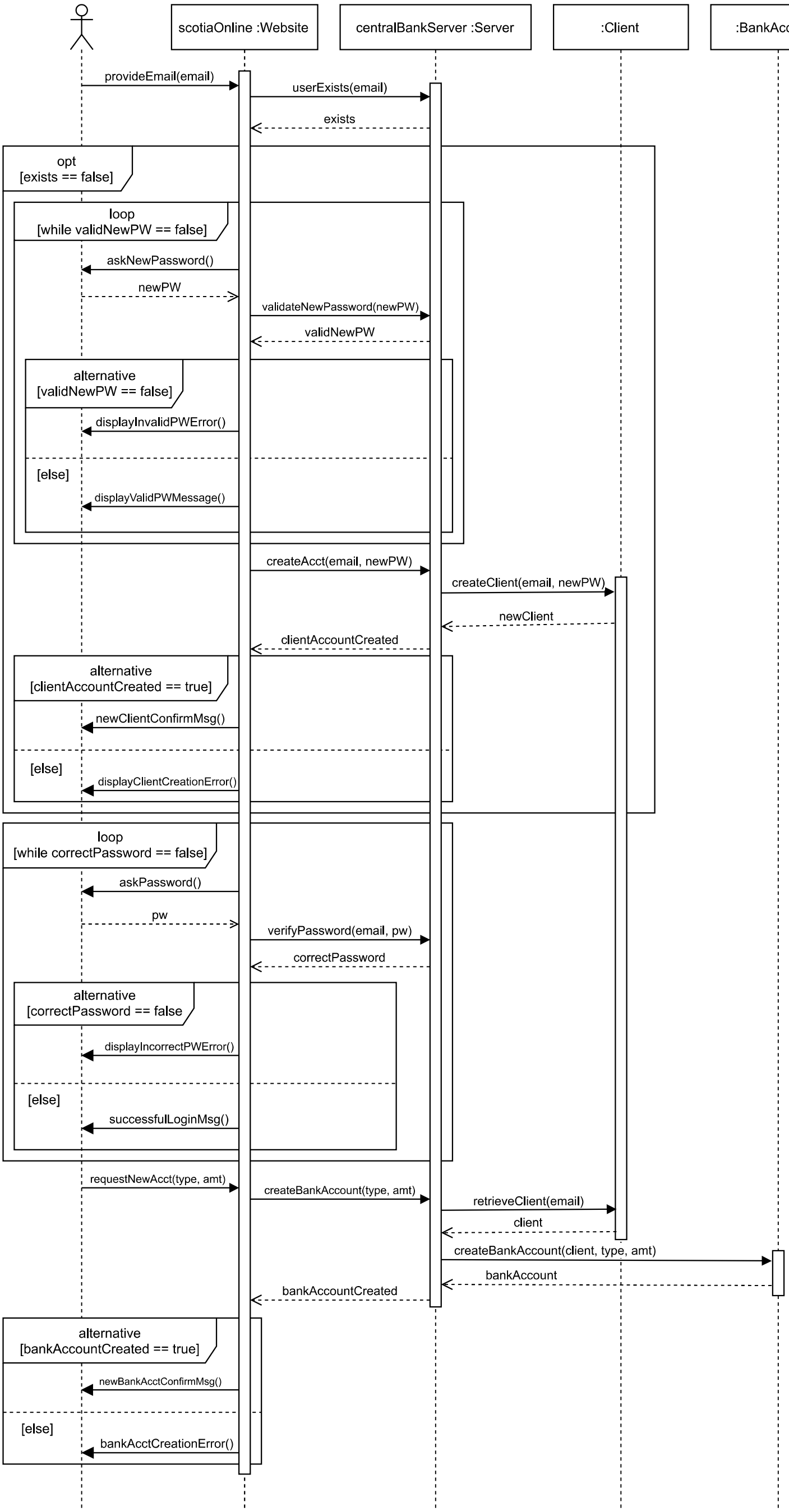
```
"C:\Program Files\Java\jdk1.8.0_131\bin\java.exe" ...
The geometric object created on Mon Feb 18 20:34:07 EST 2019 has the following:
color: white
filled: false
type of object: class Circle
area: 78.53981633974483
perimeter: 31.41592653589793

The geometric object (Triangle) has the following:
side1 = 5.0, side2 = 5.0, side3 = 5.0
type of object: class EquilateralTriangle
area: 10.825317547305483
perimeter: 15.0

The geometric object (Triangle) has the following:
side1 = 5.0, side2 = 5.0, side3 = 5.0
type of object: class Triangle
area: 10.825317547305483
perimeter: 15.0

The geometric object created on Mon Feb 18 20:34:07 EST 2019 has the following:
color: white
filled: false
type of object: class Rectangle
area: 25.0
perimeter: 20.0

The geometric object created on Mon Feb 18 20:34:07 EST 2019 has the following:
color: white
filled: false
type of object: class Square
area: 25.0
perimeter: 20.0
```

Question 2: Sequence Diagram

For my sequence diagram I made the following assumptions:

- In the real world, there would be some kind of interface between the user and the central bank server, so I assumed that this interface would be a website. I called it scotiaOnline since that is the name of Scotiabank's website.
- In the real world, you wouldn't be able to open up a bank account with so little information (typically you have to show ID etc.), but for the sake of the diagram I made the assumption that you can open a bank account simply by signing up with your email.
- I assumed that in order to create a new bank account, the user would have to log in to their existing client account. To do this, they provide their email. If their email is already in the system, they log in. If their email is not already in the system, they create a new account (during this process, their new password has to be validated to ensure it meets security requirements such as being 8+ characters long)
- Once the user has an account (either because they already had one or because they just made one), they have to log in by providing their password. Their password has to be verified as correct.
- Once the user has successfully logged in, they can create a new bank account by saying which type of account they'd like (e.g., savings or chequing) and the amount that they will deposit when they create the account. For the purpose of this diagram I made the assumption that the payment for the new account would be handled by a third party (in real life you would typically open an account in person, with cash, and not online – so there wouldn't be a need for this). Thus, in my diagram, the handling of the payment is not depicted, and we just have the method call requestNewAccount(type, amt).
- Once the central bank server receives the request, it has to retrieve the specific instance of client. Then the bank account is instantiated and the user is informed that the account creation was either successful or unsuccessful.

Here is my sequence diagram:


scotiaOnline :Website
centralBankServer :Server
:Client
:BankAccount
provideEmail(email)
userExists(email)
exists
opt
[exists == false]
loop
[while validNewPW == false]
askNewPassword()
newPW
validateNewPassword(newPW)
validNewPW
alternative
[validNewPW == false]
displayInvalidPWError()
[else]
displayValidPWMessage()
createAcct(email, newPW)
createClient(email, newPW)
newClient
clientAccountCreated
alternative
[clientAccountCreated == true]
newClientConfirmMsg()
[else]
displayClientCreationError()
loop
[while correctPassword == false]
askPassword()
pw
verifyPassword(email, pw)
correctPassword
alternative
[correctPassword == false
displayIncorrectPWError()
[else]
successfulLoginMsg()
requestNewAcct(type, amt)
createBankAccount(type, amt)
retrieveClient(email)
client
createBankAccount(client, type, amt)
bankAccount
bankAccountCreated
alternative
[bankAccountCreated == true]
newBankAcctConfirmMsg()
[else]
bankAcctCreationError()

Question 3: Voting system

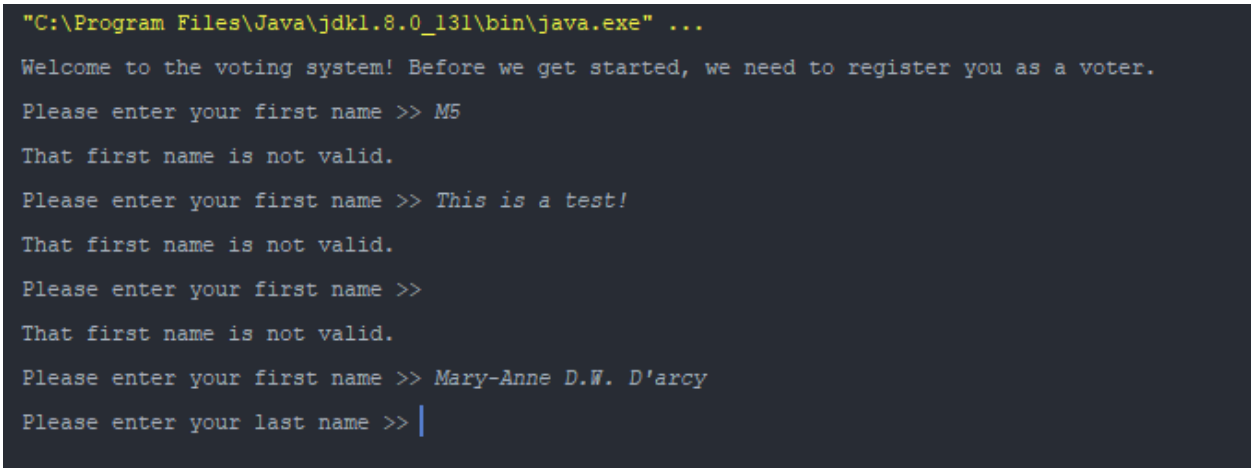
For this question, I assumed the following:

- The program will allow a voter to register, and then vote.
- I made the voterID be the current time converted into a string. For example, if the date / time was February 18th, 2019 at 9:07:05, the voterID would be 20190218090705. This would ensure that every time you run the program, you get a different voterID.
- I made up some candidates and ballots. The voter can vote for “President” and “Vice President”.
- I implemented getters and setters as well as default (no argument) and argument constructors for each class. I also overrode the toString method for each class. Sometimes this was unnecessary / a bit redundant, but the question asked you to assume getters/setters/constructors and toString.
- In the toString method for VotePersonalIdentification class, I used asterisks to block out the first 6 numbers of the voter’s SIN (to simulate the fact that a real voting system would not print out someone’s SIN to the screen, but might show part of it, similar to what is done with credit card numbers).
- I used regex to validate all of the user’s inputted voter information (not just the ones specified in the diagram)
- In real life, a voter’s vote / ballot would NOT be tied to them since voting is typically done anonymously. However, because the diagram asks for the BallotCreation class to inherit from the VotePersonalIdentification class, I made the assumption that the votes are not anonymous and that each instance of ballot is tied to a voter.

Testing screenshots

Since the output from my program is quite long, I will only show the part of the screenshot that is relevant to each case. A screenshot of the entire program will follow at the end.

Voter’s first name must consist only of letters, hyphens, spaces, periods and apostrophes. Name must not be an empty string.



Voter’s last name must consist only of letters, hyphens, spaces, commas, periods, and apostrophes. Name must not be an empty string.

```
Please enter your last name >> B67
That last name is not valid.
Please enter your last name >> hi!
That last name is not valid.
Please enter your last name >>
That last name is not valid.
Please enter your last name >> d'Eau-Rideau King, Jr.
Please enter your SIN (example: 123456789) >>
```

Voter's SIN must consist of exactly 9 digits. Zero is considered a digit. SIN cannot be an empty string.

```
Please enter your SIN (example: 123456789) >>
That is not a valid SIN. Please enter all 9 digits, without any spaces.
Please enter your SIN (example: 123456789) >> 012-345-678
That is not a valid SIN. Please enter all 9 digits, without any spaces.
Please enter your SIN (example: 123456789) >> 012 345 678
That is not a valid SIN. Please enter all 9 digits, without any spaces.
Please enter your SIN (example: 123456789) >> 0123Four5
That is not a valid SIN. Please enter all 9 digits, without any spaces.
Please enter your SIN (example: 123456789) >> Hello
That is not a valid SIN. Please enter all 9 digits, without any spaces.
Please enter your SIN (example: 123456789) >> 012345678
Please enter your street address >>
```

Voter's address must contain only letters and numbers. This is to ensure that users don't use abbreviations that might be hard to interpret. Address cannot be an empty string.

```
Please enter your street address >>
That is not a valid address. Addresses must be composed only of letters and numbers. Do not use abbreviations (such as St.).
For apartments or units, attach the apartment / unit number to the street numberFor example, 123B Anywhere Street
Please enter your street address >> 123 Anywhere St.
That is not a valid address. Addresses must be composed only of letters and numbers. Do not use abbreviations (such as St.).
For apartments or units, attach the apartment / unit number to the street numberFor example, 123B Anywhere Street
Please enter your street address >> 123-B Anywhere Street
That is not a valid address. Addresses must be composed only of letters and numbers. Do not use abbreviations (such as St.).
For apartments or units, attach the apartment / unit number to the street numberFor example, 123B Anywhere Street
Please enter your street address >> 123 Anywhere Street!
That is not a valid address. Addresses must be composed only of letters and numbers. Do not use abbreviations (such as St.).
For apartments or units, attach the apartment / unit number to the street numberFor example, 123B Anywhere Street
Please enter your street address >> 123B Anywhere Street
Please enter your city >>
```

Voter’s city must consist only of letters, hyphens, periods, and spaces. City cannot be an empty string.

```
Please enter your city >>
That is not a valid city.
Please enter your city >> 0hi0
That is not a valid city.
Please enter your city >> Ohio!
That is not a valid city.
Please enter your city >> St. John's-Town
Please enter your province >>
```

Voter’s province must consist only of letters, spaces, and periods only. This is because all provinces in Canada can be represented using those rules. A province cannot be an empty string.

```
Please enter your province >>
That is not a valid province. Province names must contain only letters and periods.
Please enter your province >> 0ntari0
That is not a valid province. Province names must contain only letters and periods.
Please enter your province >> Prince-Edward-Island
That is not a valid province. Province names must contain only letters and periods.
Please enter your province >> Ontario!
That is not a valid province. Province names must contain only letters and periods.
Please enter your province >> Prince Edward Island
Please enter your postal code >>
```

```
Please enter your province >> P.E.I.
Please enter your postal code >>
```

Voter’s postal code must follow the standard format used in Canada. This means all uppercase letters, alternating letters and numbers, starting with a letter and having length 6. The program will allow for a space or no space. A postal code cannot be an empty string.

```
Please enter your postal code >>
That is not a valid postal code. Please use numbers, capital letters, and spaces only.
Please enter your postal code >> 90210
That is not a valid postal code. Please use numbers, capital letters, and spaces only.
Please enter your postal code >> 902 100
That is not a valid postal code. Please use numbers, capital letters, and spaces only.
Please enter your postal code >> ABC 123
That is not a valid postal code. Please use numbers, capital letters, and spaces only.
Please enter your postal code >> 1A2BC3
That is not a valid postal code. Please use numbers, capital letters, and spaces only.
Please enter your postal code >> a1b2c3
That is not a valid postal code. Please use numbers, capital letters, and spaces only.
Please enter your postal code >> a1b 2c3
That is not a valid postal code. Please use numbers, capital letters, and spaces only.
Please enter your postal code >> Hello
That is not a valid postal code. Please use numbers, capital letters, and spaces only.
Please enter your postal code >> A1B2C3!
That is not a valid postal code. Please use numbers, capital letters, and spaces only.
Please enter your postal code >> A1B 2C3
Thank you! You have successfully registered to vote. Voter information:
```

```
Please enter your postal code >> A1B2C3
Thank you! You have successfully registered to vote. Voter information:
```

Screenshot of voter registration being confirmed:

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java.exe" ...
Welcome to the voting system! Before we get started, we need to register you as a voter.
Please enter your first name >> Melissa
Please enter your last name >> Van Bussel
Please enter your SIN (example: 123456789) >> 012012012
Please enter your street address >> 1600 West Bank Drive
Please enter your city >> Peterborough
Please enter your province >> Ontario
Please enter your postal code >> A1B 2C3
Thank you! You have successfully registered to vote. Voter information:
First name: Melissa
Last name: Van Bussel
Social Insurance Number: ******012
Address: 1600 West Bank Drive, Peterborough, Ontario, A1B 2C3
Voter ID: 20190118095226183
```

Voter must choose one of the numbers provided when voting on the President ballot (used Scanner.nextInt() so only integers will work, as we have not learned try / catch blocks in class yet.)

```
Ballot name: President
Candidate 1 name: Bart Simpson
Candidate 1 biography: If elected, I will make homework illegal.
Candidate 2 name: Harry Potter
Candidate 2 biography: If you vote me for President, the next 4 years will be magical.
Candidate 3 name: Robin Hood
Candidate 3 biography: If I'm President, I'll steal from the rich and give to the poor.
This ballot belongs to Melissa Van Bussel, with voter ID 20190118095226188
Who would you like to vote for, for President? Type the number of your desired candidate. >> -10
Your vote was invalid. Please try again.
Who would you like to vote for, for President? Type the number of your desired candidate. >> 0
Your vote was invalid. Please try again.
Who would you like to vote for, for President? Type the number of your desired candidate. >> 4
Your vote was invalid. Please try again.
Who would you like to vote for, for President? Type the number of your desired candidate. >> 50
Your vote was invalid. Please try again.
Who would you like to vote for, for President? Type the number of your desired candidate. >> 1
You voted for candidate number 1, Bart Simpson. Thank you for voting! Your vote for President has been recorded!
```

Similarly for the Vice President ballot:

```
Ballot name: Vice President
Candidate 1 name: Buzz Lightyear
Candidate 1 biography: If I'm Vice President, I'll make sure that the next few years are out of this world!
Candidate 2 name: Squidward Tentacles
Candidate 2 biography: Your life is going to suck no matter who wins, so you may as well vote for me.
Candidate 3 name: Sheldon Cooper
Candidate 3 biography: If you have any brains at all, you'll vote for me.
Candidate 4 name: Scooby Doo
Candidate 4 biography: Rote for me!!! Will share my Rooby snacks!
This ballot belongs to Melissa Van Bussel, with voter ID 20190118095418190
Who would you like to vote for, for Vice President? Type the number of your desired candidate. >> -68
Your vote was invalid. Please try again.
Who would you like to vote for, for Vice President? Type the number of your desired candidate. >> 0
Your vote was invalid. Please try again.
Who would you like to vote for, for Vice President? Type the number of your desired candidate. >> 12
Your vote was invalid. Please try again.
Who would you like to vote for, for Vice President? Type the number of your desired candidate. >> 4
You voted for candidate number 4, Scooby Doo. Thank you for voting! Your vote for Vice President has been recorded!
Thank you for participating in the election. That's all the ballots! Have a good day.
```

Finally, a screenshot of the program from start to finish:

```
"C:\Program Files\Java\jdk1.8.0_131\bin\java.exe" ...
Welcome to the voting system! Before we get started, we need to register you as a voter.
Please enter your first name >> Melissa
Please enter your last name >> Van Bussel
Please enter your SIN (example: 123456789) >> 123456789
Please enter your street address >> 1600 West Bank Drive
Please enter your city >> Peterborough
Please enter your province >> Ontario
Please enter your postal code >> A1B2C3
Thank you! You have successfully registered to vote. Voter information:
First name: Melissa
Last name: Van Bussel
Social Insurance Number: ******789
Address: 1600 West Bank Drive, Peterborough, Ontario, A1B2C3
Voter ID: 20190118095737905
Ballot name: President
Candidate 1 name: Bart Simpson
Candidate 1 biography: If elected, I will make homework illegal.
Candidate 2 name: Harry Potter
Candidate 2 biography: If you vote me for President, the next 4 years will be magical.
Candidate 3 name: Robin Hood
Candidate 3 biography: If I'm President, I'll steal from the rich and give to the poor.
This ballot belongs to Melissa Van Bussel, with voter ID 20190118095737910
Who would you like to vote for, for President? Type the number of your desired candidate. >> 2
You voted for candidate number 2, Harry Potter. Thank you for voting! Your vote for President has been recorded!
Ballot name: Vice President
Candidate 1 name: Buzz Lightyear
Candidate 1 biography: If I'm Vice President, I'll make sure that the next few years are out of this world!
Candidate 2 name: Squidward Tentacles
Candidate 2 biography: Your life is going to suck no matter who wins, so you may as well vote for me.
Candidate 3 name: Sheldon Cooper
Candidate 3 biography: If you have any brains at all, you'll vote for me.
Candidate 4 name: Scooby Doo
Candidate 4 biography: Rote for me!!! Will share my Rooby snacks!
This ballot belongs to Melissa Van Bussel, with voter ID 20190118095743285
Who would you like to vote for, for Vice President? Type the number of your desired candidate. >> 3
You voted for candidate number 3, Sheldon Cooper. Thank you for voting! Your vote for Vice President has been recorded!
Thank you for participating in the election. That's all the ballots! Have a good day.
```