CSE 426 – Project 1

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Title – Shareholders Voting

Abstract

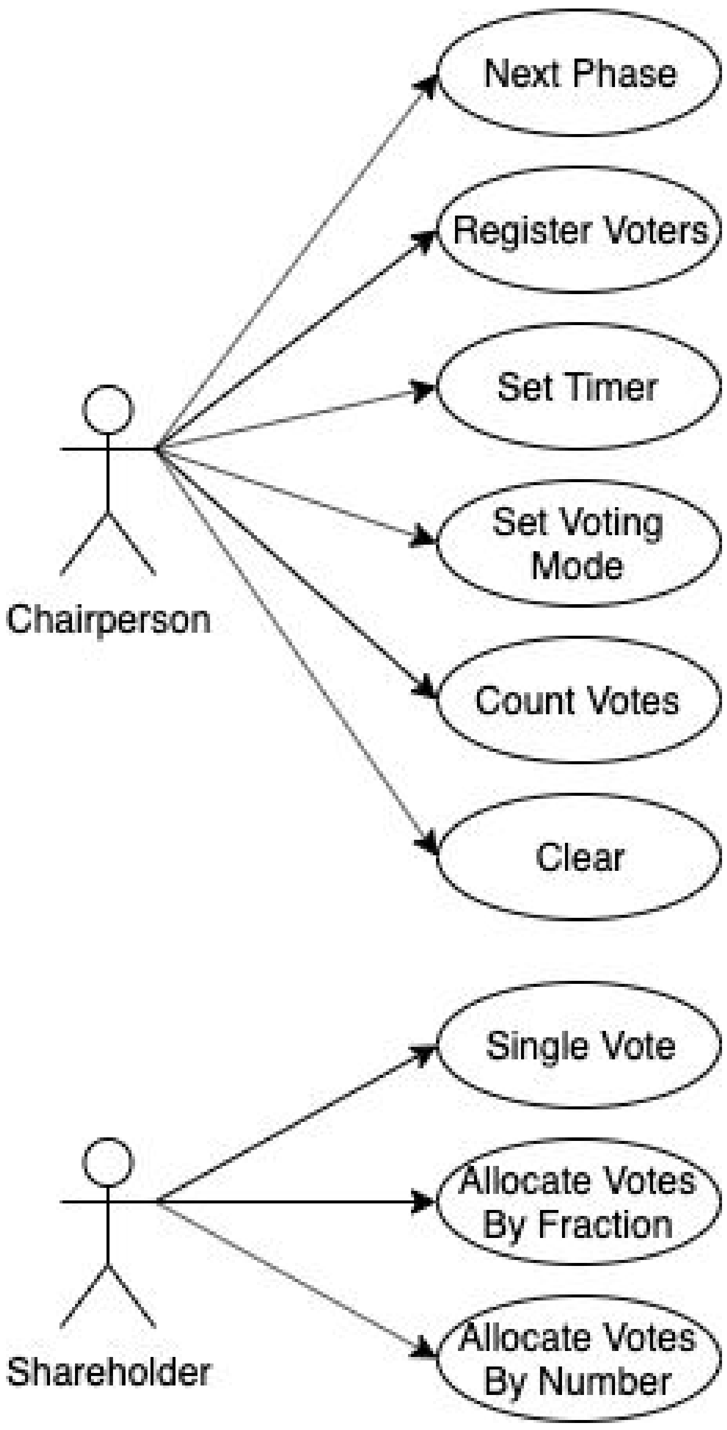
Source: https://www.investopedia.com/ask/answers/040315/what-can-shareholders-vote.asp

Shareholders to a company have the right to vote in elections that deal with matters that directly affect their stock ownership. The nature of these voting rights and the issues shareholders are entitled to vote on can vary from one company to another. Some companies grant shareholders one vote per share (more shares you own, the more votes), other companies grant shareholders only one vote, regardless of the number of shares owned. These voting rights allow shareholders to influence the company's corporate direction. Our project idea essentially takes this idea and breaks it down into two actors: company and shareholders. The company is the ultimate deciding factor of the weight of the shareholders' votes and the issues they can vote upon, while the shareholders can allocate their votes.

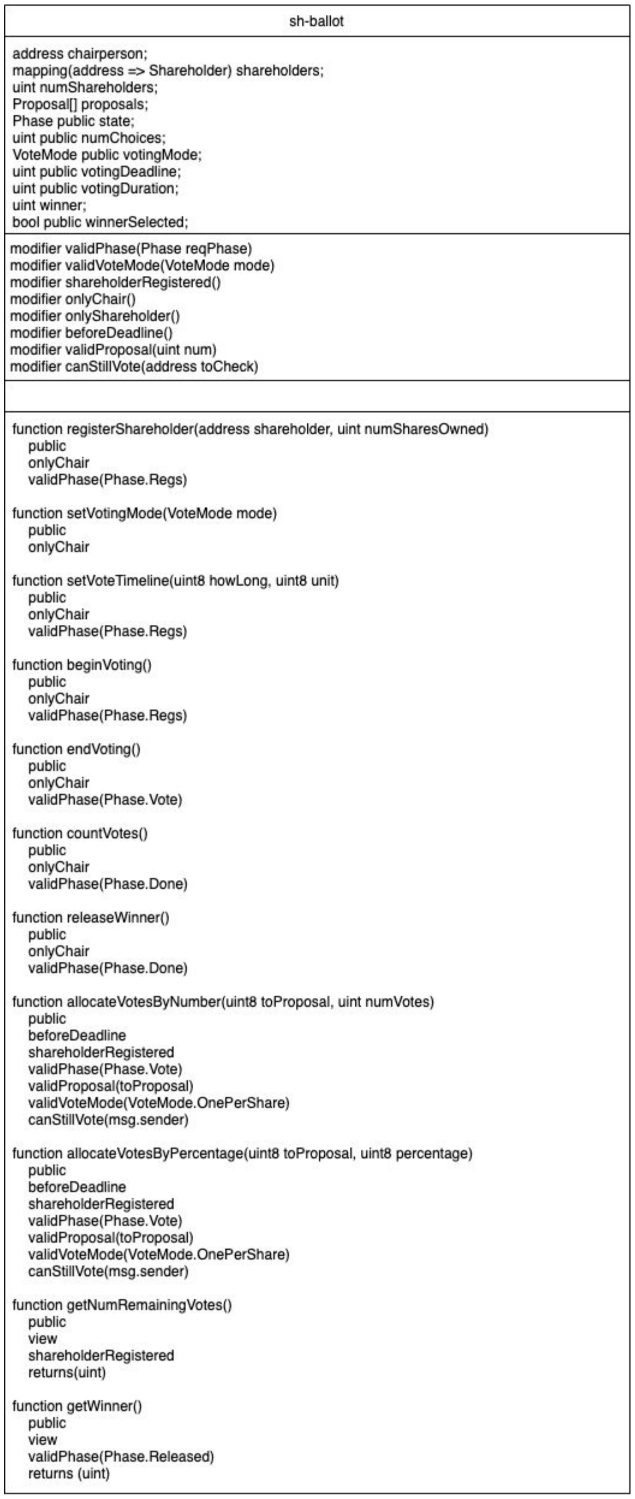
Notes

- This idea was brought up to Bina Ramamurthy following the lecture on 5-6:20PM Wednesday, September 25th, 2019.

Use Case Diagram

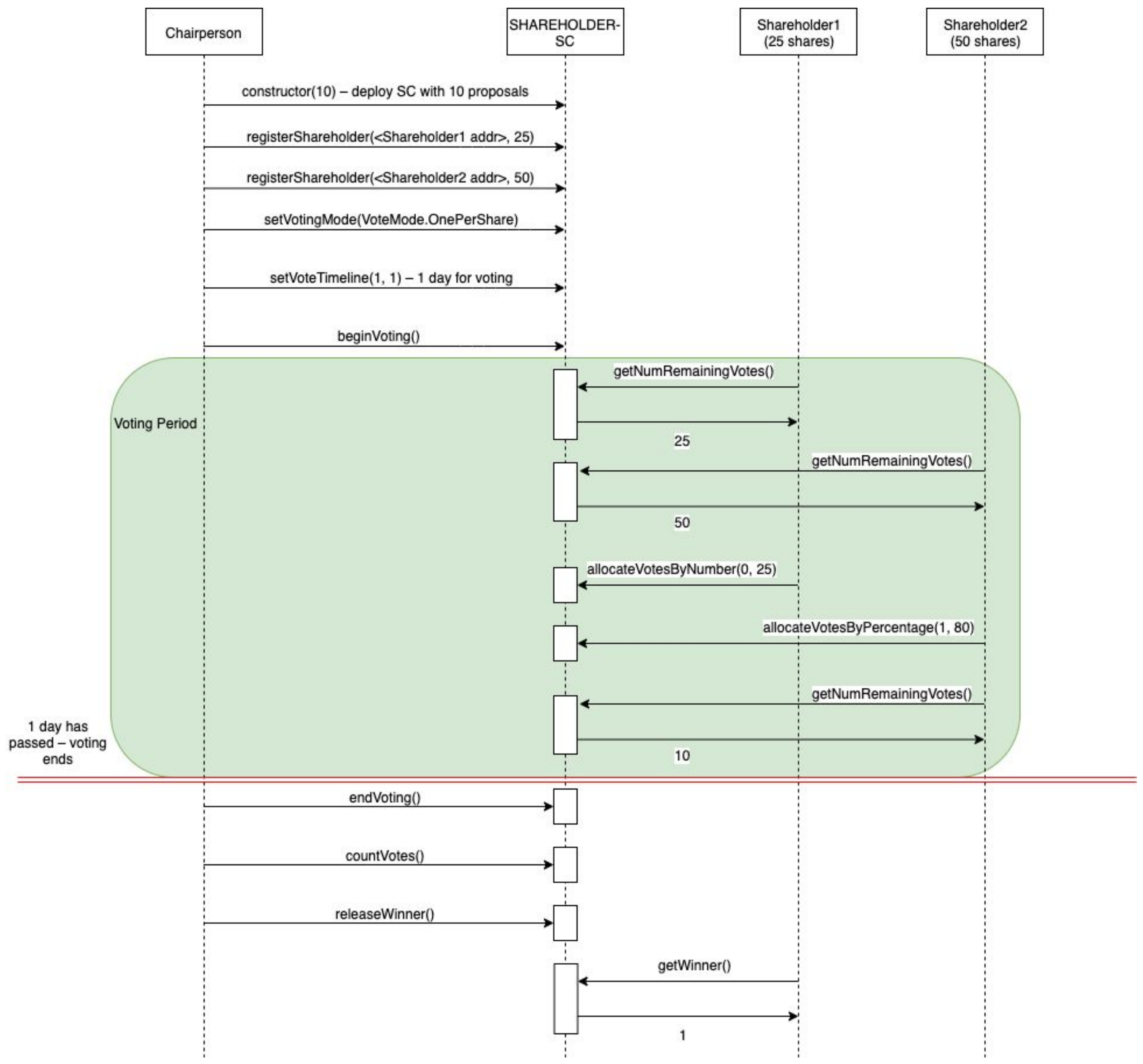


Smart Contract Diagram

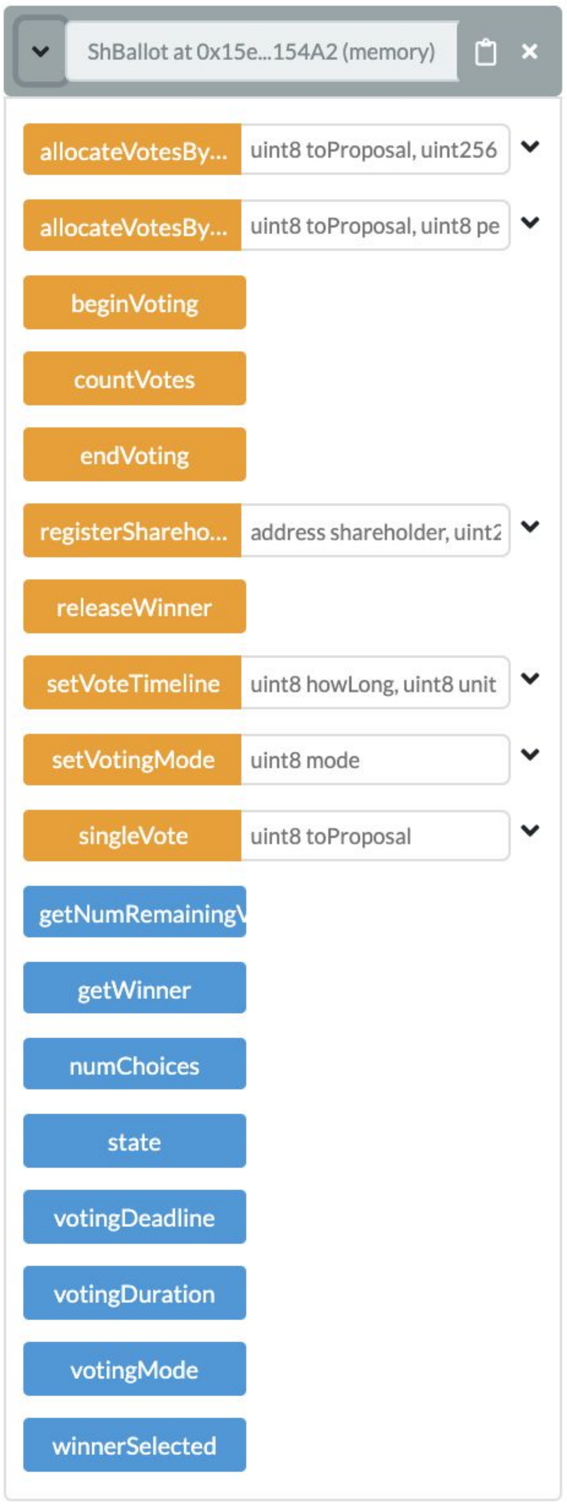


```
sh-ballot

address chairperson;
mapping(address => Shareholder) shareholders;
uint numShareholders;
Proposal[] proposals;
Phase public state;
uint public numChoices;
VoteMode public votingMode;
uint public votingDeadline;
uint public votingDuration;
uint winner;
bool public winnerSelected;

modifier validPhase(Phase reqPhase)
modifier validVoteMode(VoteMode mode)
modifier shareholderRegistered()
modifier onlyChair()
modifier onlyShareholder()
modifier beforeDeadline()
modifier validProposal(uint num)
modifier canStillVote(address toCheck)

function registerShareholder(address shareholder, uint numSharesOwned)
   public
   onlyChair
   validPhase(Phase.Regs)

function setVotingMode(VoteMode mode)
   public
   onlyChair

function setVoteTimeline(uint8 howLong, uint8 unit)
   public
   onlyChair
   validPhase(Phase.Regs)

function beginVoting()
   public
   onlyChair
   validPhase(Phase.Regs)

function endVoting()
   public
   onlyChair
   validPhase(Phase.Vote)

function countVotes()
   public
   onlyChair
   validPhase(Phase.Done)

function releaseWinner()
   public
   onlyChair
   validPhase(Phase.Done)

function allocateVotesByNumber(uint8 toProposal, uint numVotes)
   public
   beforeDeadline
   shareholderRegistered
   validPhase(Phase.Vote)
   validProposal(toProposal)
   validVoteMode(VoteMode.OnePerShare)
   canStillVote(msg.sender)

function allocateVotesByPercentage(uint8 toProposal, uint8 percentage)
   public
   beforeDeadline
   shareholderRegistered
   validPhase(Phase.Vote)
   validProposal(toProposal)
   validVoteMode(VoteMode.OnePerShare)
   canStillVote(msg.sender)

function getNumRemainingVotes()
   public
   view
   shareholderRegistered
   returns(uint)

function getWinner()
   public
   view
   validPhase(Phase.Released)
   returns (uint)
```

Sequence Diagram


Chairperson
SHAREHOLDER-SC
Shareholder1 (25 shares)
Shareholder2 (50 shares)
constructor(10) – deploy SC with 10 proposals
registerShareholder(<Shareholder1 addr>, 25)
registerShareholder(<Shareholder2 addr>, 50)
setVotingMode(VoteMode.OnePerShare)
setVoteTimeline(1, 1) – 1 day for voting
beginVoting()
Voting Period
getNumRemainingVotes()
25
getNumRemainingVotes()
50
allocateVotesByNumber(0, 25)
allocateVotesByPercentage(1, 80)
getNumRemainingVotes()
10
1 day has passed – voting ends
endVoting()
countVotes()
releaseWinner()
getWinner()
1

Smart Contract Screenshot



Test Plan

1. Go the Remix IDE. Select \`Solidity\` for your Environment. Copy the code from the \`sh-ballot.sol\` file. Then create a new file within Remix IDE and paste the code from \`sh-ballot.sol\`.
2. Click on the \`Deploy\` tab and then make sure you have \`JavaScript VM\` set as your Environment. Select an account to deploy the Smart Contract (i.e. 0xCA35b...). This account will also act as the "chairperson". Enter 3 for numProposals. Then click \`Deploy\` to deploy the Smart Contract.
3. While acting as the chairperson, you must register shareholders so that they can vote on proposals. For the smart contract, we're going to register these two shareholders and assign them a certain amount of shares that they own. We need addresses and a number of shares.
    a. Within the deployed Smart Contract, navigate to **registerShareholder** and paste the following two inputs:

```
0x14723A09ACff6D2A60DcdF7aA4AFf308FDDC160C, 25
0x4B0897b0513fdC7C541B6d9D7E929C4e5364D2dB, 50
```

4. As the chairperson, we need to set the voting mode. We will set the voting mode to **OnePerShare** – meaning each shareholder will get one vote per share that they own.
    a. Within the deployed Smart Contract, navigate to **setVotingMode** and set the argument to **0**.
5. As the chairperson, we need to set the voting deadline.
    a. Within the deployed Smart Contract, navigate to **setVoteTimeline** and set the argument to **1, 1**
6. Now that we have registered two shareholders, we can begin voting.
    a. Within the deployed Smart Contract, click on **beginVoting** to allow the shareholders to begin voting.
7. Now set your Account to **0x147….** Verify that you have 25 votes by clicking on **getNumRemainingVotes()**
8. Allocate 20 votes to proposal 0. Navigate to **allocateVotesByNumber** and paste the following input:

```
0, 20
```

9. Verify that you now only have 5 votes remaining by clicking on **getNumRemainingVotes()**
10. Now set your account to **0x4B0...** . Verify that you have 50 votes by clicking on **getNumRemainingVotes()**

11. Allocate 80% of your votes to proposal 1. Navigate to **allocateVotesByPercentage** and paste the following input:

```
1, 80
```

12. Verify that you only have 10 votes remaining by clicking on **getNumRemainingVotes()**
13. Switch the account back to the chairperson (**0xCA3...**). End the voting period by clicking on **endVoting**
14. Count the votes by clicking on **countVotes**
15. Release the winner to the shareholders by clicking **releaseWinner**
16. Switch over to a shareholder (**0x147…**) and click on **getWinner** and verify that it is proposal 1.