Decentralized Voting System Using Blockchains

Abstract

Voting is a fundamental part of democratic systems; it gives individuals in a community the faculty to voice their opinion.

In recent years, voter turnout has diminished while concerns regarding integrity, security, and accessibility of current voting systems have escalated.

E-voting was introduced to address those concerns; however, it is not cost-effective and still requires full supervision by a central authority.

The blockchain is an emerging, decentralized, and distributed technology that promises to enhance different aspects of many industries.

Expanding e-voting into blockchain technology could be the solution to alleviate the present concerns in e-voting.

Making the voting process secure

Our System
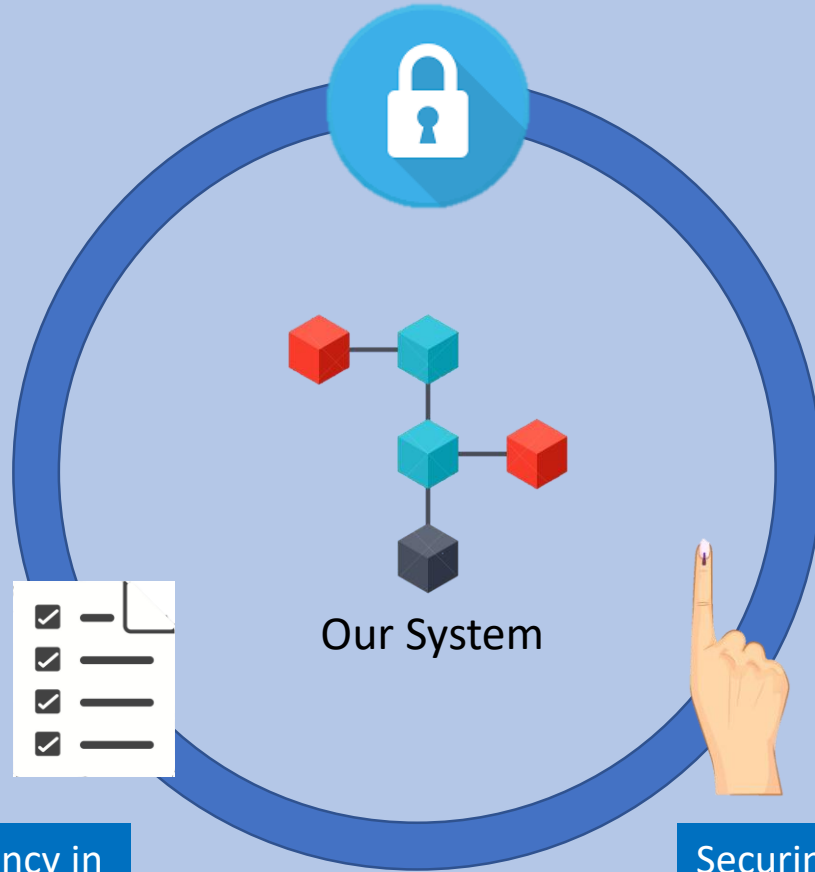
Transparency in voting process

Securing the privacy of voters

Purpose

The purpose of the system is to build a Decentralized Voting Application based on Blockchain Technology for making the regular voting system

✓ More secured
✓ More transparent
✓ Auditable for securing the privacy of the voters.

Limitations in the current system

✓ **Security problem**: The current system does not provide any security characteristic. Any unauthorized user can vulnerably attack on the EVM's.

✓ **Storage problem**: The votes stored in the database could be manipulated or can get damaged.

✓ **Manufacturing problem**: The hardware part may get manufactured incorrectly.

✓ **Accuracy in capturing voter's intent**: The buttons used in the EVM may get damaged during transportation or the sensors used in the EVM may get out of alignment.

BROWSER

Front-End
HTML, CSS, JS

NODE

NODE

NODE

NODE

NODE

Smart Contract,
Blockchain,
Ledger
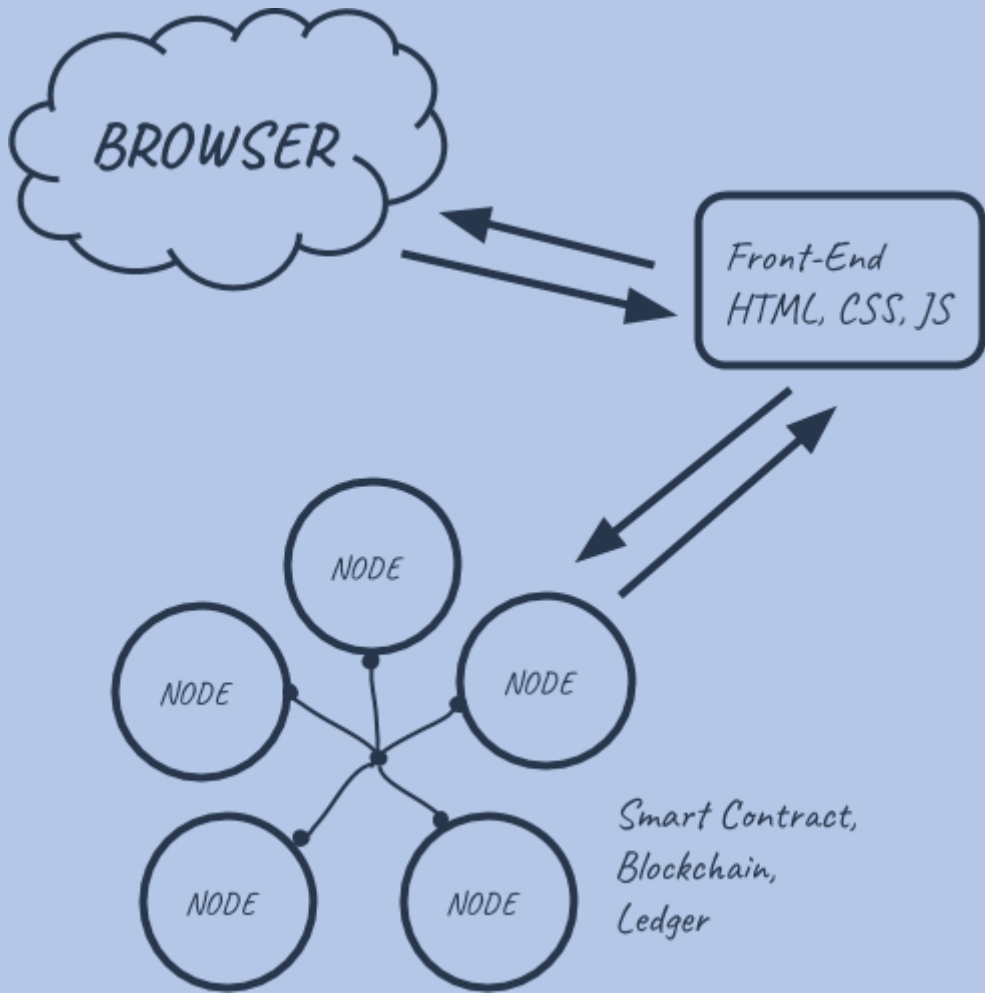
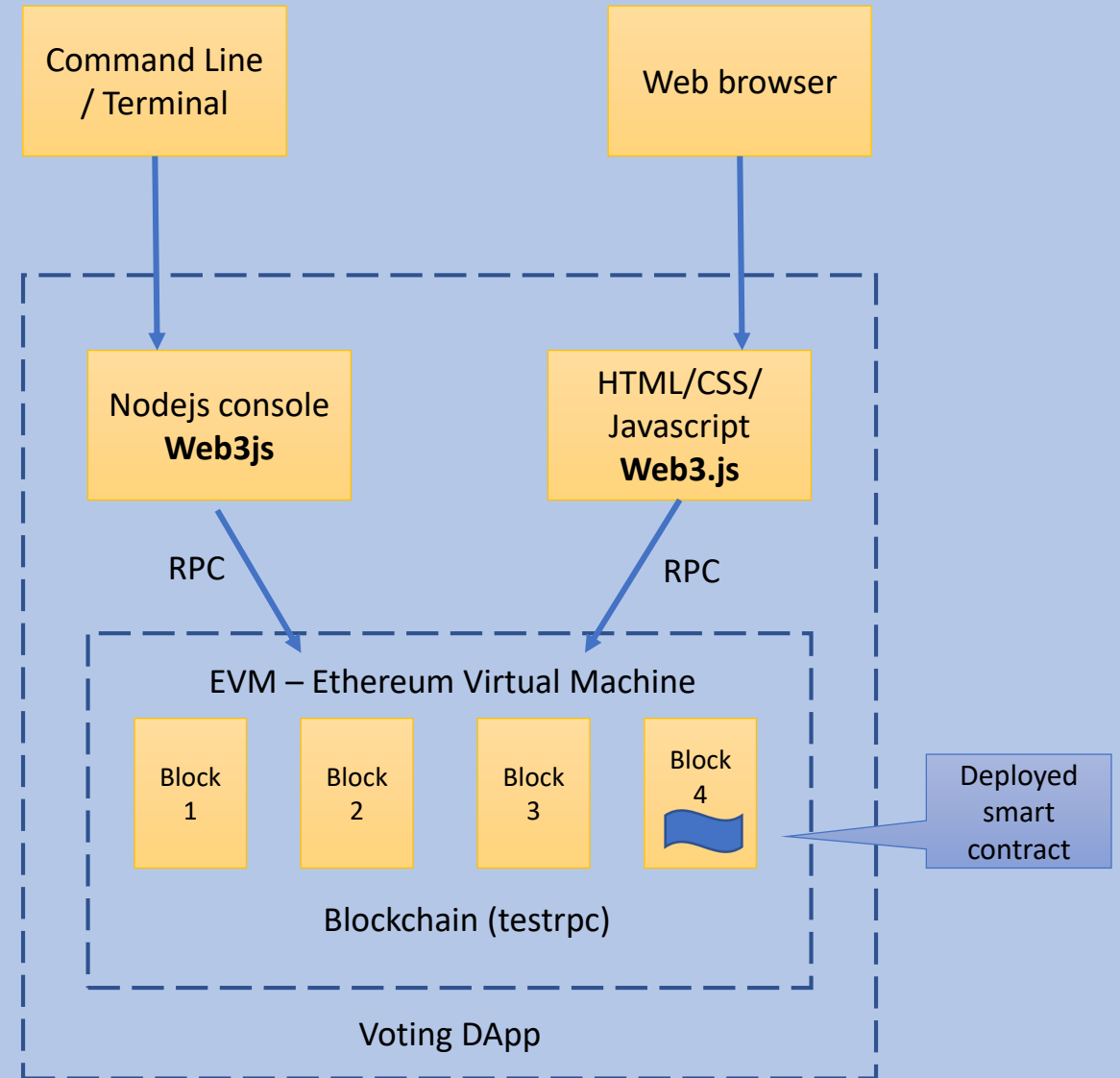Our proposed system also removes any third party interference during the voting process.

Proposed System

- ✓ A few problems that have been stated in the previous slide can be solved by using a decentralized system using blockchain technology.
- ✓ Our implementation consists of smart contracts coded in Ethereum's Solidity language which will be responsible for storing transactions in the blockchains. We also have the frontend which is coded in Angular/HTML5.
- ✓ Every voter will have his/her wallet address and their unique private key. They will use their wallet addresses to cast the votes. Since there is no central authority the vote will be broadcasted through the network.
- ✓ The voters can see the number of votes in real time and thus unlike the current system there is no need of waiting for the counting process.
- ✓ The only action required of users when registering, voting, or creating ballots is to use their passwords to unlock their Ethereum accounts in the MetaMask plugin and securely interact with the blockchain.

Outcome of our proposed system

The proposed system involves a client server architecture integrated with a block chain system which will overcome the problems faced in using a centralized database. Few advantages of using the proposed system are:

- ✓ Security and Transparency
- ✓ Faster Results
- ✓ No manufacturing defects
- ✓ Cost effective
- ✓ Decentralization

Command Line / Terminal

Web browser

Nodejs console **Web3js**

HTML/CSS/ Javascript **Web3.js**

RPC

RPC

EVM – Ethereum Virtual Machine

Block 1

Block 2

Block 3

Block 4

Deployed smart contract

Blockchain (testrpc)

Voting DApp

All the data in the public ledger or the blockchain is secured by cryptographic hashing and validated by a consensus algorithm.
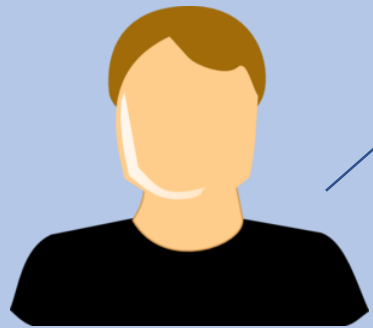
Nodes on the network participate to ensure that all copies of the data distributed across the network are the same.

That's one very important reason why we're building our voting application on the blockchain, because we want to ensure that our vote was counted, and that it did not change.

Processes in the system
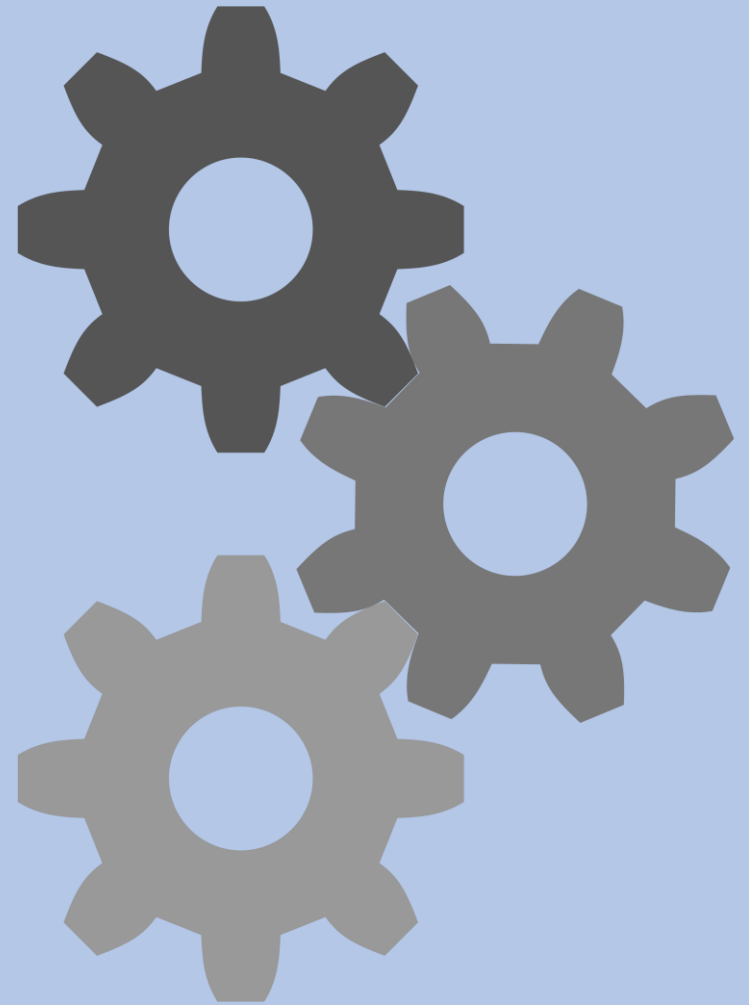
Registering the Voter

The Voter

✓ Public wallet address.
✓ Full Name
✓ Address
✓ Contact details etc...

✓ Every voter needs to be registered on the blockchain for the first time. The voter also needs to provide some other necessary information like his/her full name, the residence address, some valid government ID along with his/her public wallet address.

✓ The voter needs to create a password for his/her wallet during the registration process.

✓ Once the voter has registered, the system will check if voter is valid or not (from his given proofs/information)

✓ Finally when the voter is verified, a new transaction is recorded on the blockchain for successful registration.

The voting

- ✓ To cast a vote, the voter must login to the portal using his/her Public Wallet Address along with the password that he/she had created during registration.

- ✓ Once logged in the voter will be provided with a list in which all the candidates who are participating in the Election will be listed.

- ✓ Apart from the name of the candidate, the amount of votes that the candidate currently has will be displayed.

- ✓ Also the voter's Public Wallet Address will be displayed below the list to show that the voter is legit.

- ✓ Once the voter has casted the vote, the results are updated in real time thus saving the time that is wasted on counting.
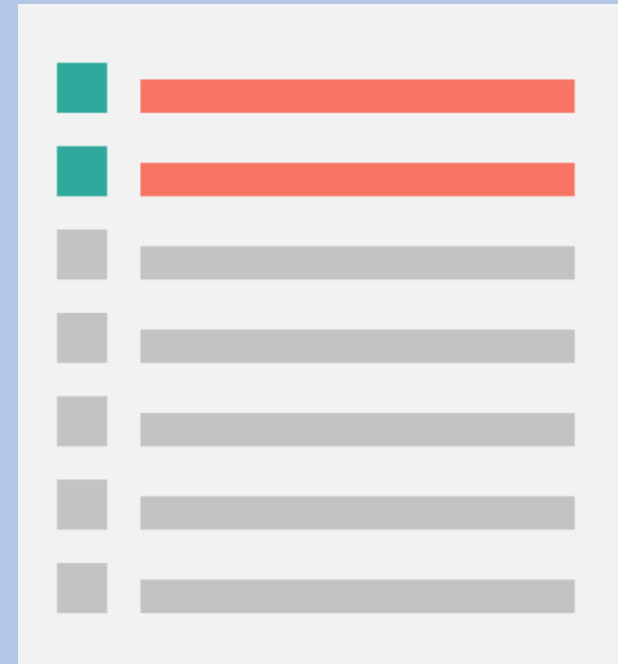
Your wallet address:
0x0206fC3499F305B41160b0cbC3b18B57301BBe79
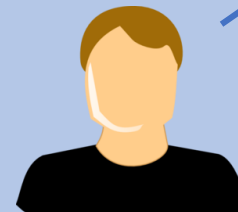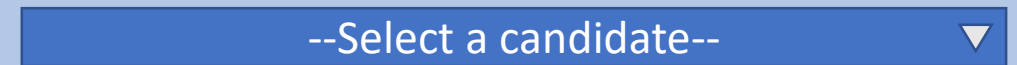
--Select a candidate-- ▼

The voter will select a candidate from the drop down list

Conclusion

✓ The current voting system is shown to have large number of issues which can lead to widespread political unrest in a country.

✓ It is vital for a democracy to have a transparent voting system that must have the least number of obstacles for a voter to vote.

✓ The proposed system not only handles voter privacy and auditability but also provides a transparent system for verification of the election.

✓ The proposed system is shown to be highly cost efficient and can be implemented with existing infrastructure owned by a nation.

✓ Keeping all these factors in mind the proposed system is a comprehensive solution that satisfies all the requirements requested by the client.