

Blockchain based e-voting

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This document presents a proposal for the Distributed Database Systems Project. We propose to use blockchain as a service to implement e-voting system to ensure that the whole system be robust, tamper-proof and cost effective. This will make sure that we don't need a central managing authority since the above system is decentralized.

Additional Key Words and Phrases: blockchain, ethereum, multichain, voting, consensus

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1 MOTIVATION

Blockchain is a constantly growing ledger that keeps a permanent record of all the transactions that have taken place, in a secure, chronological and immutable way that makes peer to peer value transfer possible. In electoral voting, this value is the vote that is transferred between the voter and the candidate. The system being decentralized, curbs the need to have a central managing authority (like election commission).

E-voting was introduced with the goal of minimizing the cost of conducting an election, while fulfilling and increasing the security conditions. But EVMs (Electronic voting machines) have been viewed as flawed, by the security community, primarily based on physical security concerns. Using blockchain as a service to implement e-voting, would ensure the whole system to be robust, tamper-proof and cost effective. Various advantages of blockchain based e-voting are:

- More voter participation
 - Can vote from anywhere (remote access)
 - Improved identity verification (any national Id works)
 - System is scalable
- Blockchains generate cryptographically secure voting records, thus addressing the concern of tampering of votes
- Increase the speed with which votes are calculated
- Ensures one vote per voter
- Blocks any fraud voters and bad-actors in the network
- Blockchain promotes greater clarity and transparency of votes- Public ledger ensure individual votes publicly available but hides the identity of voters using cryptographic keys.

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2 CHALLENGES

There are many challenges that prevents the use of Blockchain for e-voting:

- Public confidence and trust- Broadband access and digital user skills are also concerns.
- Need much energy to perform authentication and validation, slower than traditional e-voting system.
- Might face resistance from political leaders and other electoral authorities and government agencies as it being decentralised, shifts power away from them.
- Blockchain technology still in nascent stage.

3 RELATED WORK

There are many blockchain based frameworks that offer blockchain as a service like Ethereum, Multi-chain that can be used to implement e-voting. With Ethereum, we can use Smart contract to validate and store voting count states in the Blockchain[2]. However, it comes at the cost of transacting in public network. And for security purposes, e-voting should take place in a private network. Multi-chain is also used by some approaches to implement blockchain based e-voting[1].

4 PROPOSED APPROACH

We plan to design a basic network for e-voting system based on decentralized network architecture. We plan to use Proof-of-Work consensus algorithm as it gives the advantage to being scalable in future. To hash the data in the blocks of the blockchain, SHA256 hash algorithm can be used and difficulty level for POW in the system will be decided.

For transaction authentication mechanism of our system, we plan to use Account Based transaction model (used in Ethereum), which is like a global state and stores the list of all the accounts. Each account in this type of model has balance, storage, and code-space separately. A transaction is valid if an account has a sufficient balance. If the account has code, the code will run and change in the internal repository to create additional messages that may affect the debits and the credits of other accounts. Therefore, all newly created blocks may potentially affect the status of all other accounts. Surveys and votes in the Voting System is similar with accounts and balances of Account Based Transaction Models.

5 PROPOSED TIMELINE

We propose the following timeline for the project :

10/30/2019

Design the architecture for the voting system

- Block structure
- Blockchain structure
- Node structure
- Network architecture and Consensus algorithm

11/15/2019

- Implementation of the architecture finalized above
- Implementation of the consensus mechanism i.e. proof of work algorithm for the system
- Implementation of the types of transaction using smart contracts

12/01/2019

- Implementation of the transaction authentication system
- Testing the complete system.

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