Secure Electronic Voting via Blockchain

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Introduction

- Current voting systems are slow and outdated.
- The accessibility and mobility electronic voting provides is very promising.
- The integrity of an electronic vote can be hard to verify.

Research Question

How do we ensure and verify the security and anonymity of votes in an electronic voting system?

Blockchain Voting System

- **Index** - Block Number.
- **Transaction/vote** - Senders ID, Recipient ID, token
- **Signature** - Hash of vote encrypted with voters private key
- **Timestamp** - Report of the time of submission.
- **Hash of Previous Blocks** - SHA-256 Algorithm to Compute hash of the previous block.

Voting Block

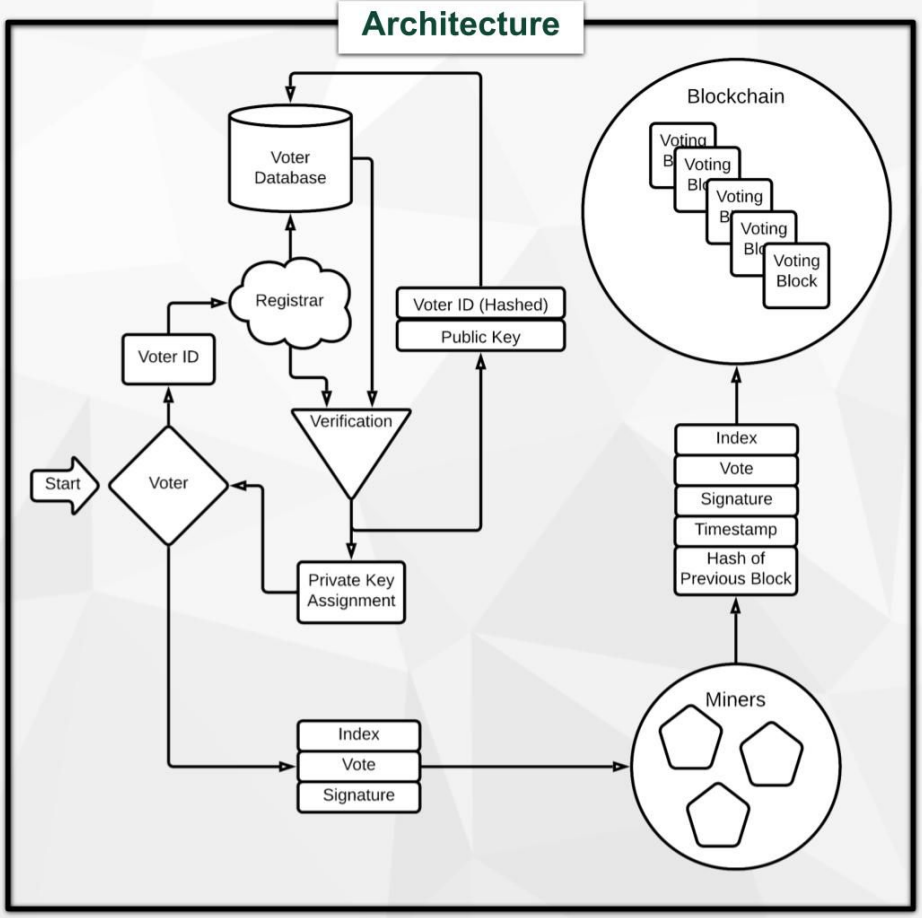
Index
Transaction/Vote
Signature
Timestamp
Hash of Previous Block

Blockchain

Blockchain is a distributed ledger technology, secured by cryptographic hashing, that can be validated by anyone on a blockchain network.

While originally created for e-currency, the system can also be used to validate transactions of any sort, including votes.

Architecture



Conclusions

Strengths

- **Decentralization** - no one weak point and no one central controlling authority.
- **Verification** - Since voter registration and votes are public, anyone can check to see if any tampering has taken place.
- **Anonymity** -Personal information is kept secret.
- **Transparency** - Votes are stored on an immutable public ledger visible to everyone, leading to trustworthiness and legitimacy.
- **Security** - Votes added to the blockchain are secured with asymmetric cryptographic hashing, which makes tampering with votes close to impossible.
- **Mobility** - Voters can vote from anywhere.
- **Speed/Efficiency** - Processing time is faster. No human error in counting/verifying.

Weaknesses

- **Private Key Loss** - If private key is lost, it is gone for good.
- **Receipt** - Private key and voter ID, which could be used to prove to others who you voted for.
- **Trust** - You must trust the software you're voting on.
- **Mimicry** - Voter database could be potentially manipulated by impersonating the registrar and sending a fake voter ID hash and public key.