Campus Election D-App for Blockchain Project

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Challenges in current electoral processes

Online voting in elections might seem like a logical step forward considering the many other daily activities, like banking and shopping, that we complete online. However, voting online does present unique challenges that usually don't apply to other internet-based processes. These challenges are related to a variety of factors, including the security required for online voting, legal requirements and frameworks, public opinion, and investment.

Security

Elections always require a high level of security in order to protect voter privacy and the integrity of final results. Meeting the security needs of elections means that online voting technology must overcome barriers that don't apply to other online-based processes. Various challenges can be overcome with sophisticated cybersecurity measures like encryption and digital signatures.

Election Verifiability

An online voting system must also be able to provide verification that it has successfully maintained election integrity and that no manipulation had occurred during the voting or tallying processes. Achieving this level of verifiability is complicated by the need to verify the correctness and accuracy of the decrypting process without revealing sensitive information related to the private decryption key or voter identities.

Legal Frameworks

Even with all of the proper legal frameworks in place, using an online voting system would be pointless if the government or general public were not confident in its security, integrity, and accuracy. For this reason, a number of transparency measures have been developed to help ensure the transparency of online voting technology, building trust in the final results.

Investment

Finally, the implementation of an online voting system does require a certain level of investment, and some governments may not be willing or able to front the cost when their electoral budget is already allocated for paper-based voting materials. While there are solutions on the market to meet a variety of budgets, it is important to remember that an increased price tag is often the result of elevated security and experience, vital aspects for any electoral solution.

Decentralized voting system using Blockchain

Current voting systems like ballot box voting or electronic voting suffer from various security threats such as DDoS attacks, polling booth capturing, vote alteration and manipulation, malware attacks, etc, and also require huge amounts of paperwork, human resources, and time. This creates a sense of distrust among existing systems.
Some of the disadvantages are:

- Long Queues during elections.
- Security Breaches like data leaks, vote tampering.
- Lot of paperwork involved, hence less eco-friendly and time-consuming.
- Difficult for differently-abled voters to reach polling booth.
- Cost of expenditure on elections is high.

Solution

Using Blockchain, voting process can be made more secure, transparent, immutable, and reliable. How? Let's take an example.
Suppose we are an eligible voter who goes to polling booth and cast vote using EVM (Electronic Voting Machine). But since it's a circuitry after all and if someone tampers with microchip, we may never know that did our vote reach to person for whom we voted or was diverted into another candidate's account?
Since there's no tracing back of our vote. But, if we use blockchain- it stores everything as a transaction that will be explained soon below; and hence gives we a receipt of our vote (in a form of a transaction ID) and we can use it to ensure that our vote has been counted securely.

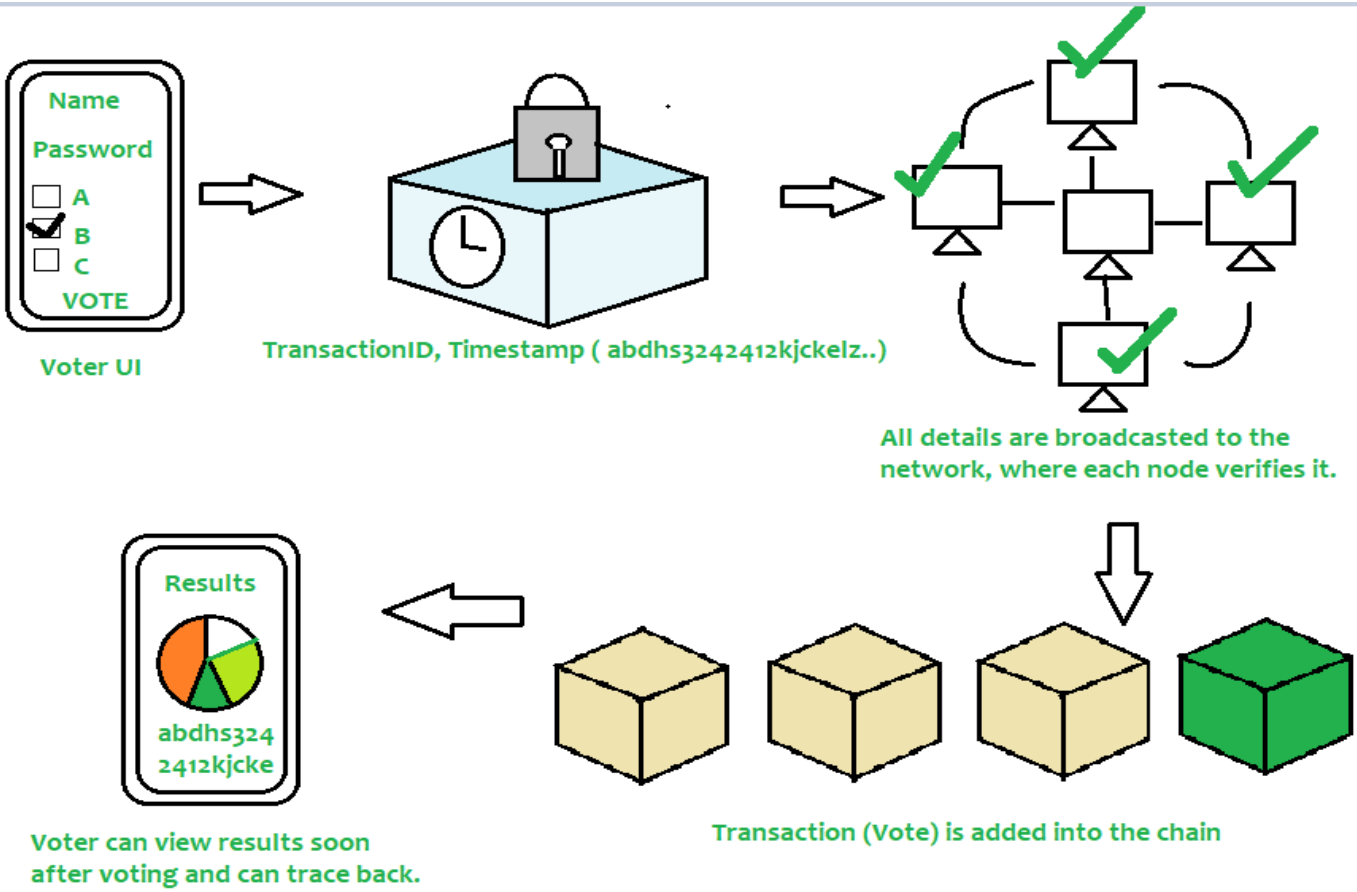
Now suppose a digital voting system (website/app) has been launched to digitize process and all confidential data is stored on a single admin server/machine, if someone tries to hack it or snoop over it, he/she can change candidate's vote count- from 2 to 22! We may never know that hacker installs malware or performs clickjacking attacks to steal or negate our vote or simply attacks central server.

To avoid this, if system is integrated with blockchain- a special property called immutability protects system. Consider SQL, PHP, or any other traditional database systems. We can insert, update, or delete votes. But in a blockchain we can just **insert data** but cannot update or delete. Hence

when we insert something, it stays there forever and no one can manipulate it- Thus name immutable ledger.
But Building a blockchain system is not enough. It should be decentralized i.e if one server goes down or something happens on a particular node, other nodes can function normally and do not have to wait for victim node's recovery.

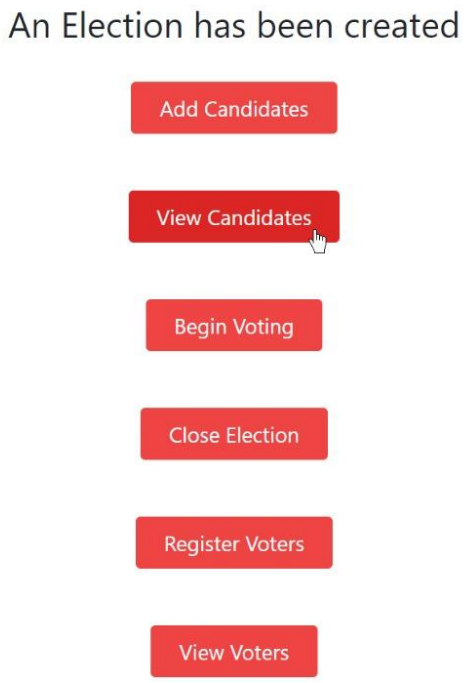
A summary of advantages are listed below:

- We can vote anytime/anywhere (During Pandemics like COVID-19 where it's impossible to hold elections physically
- Secure
- Immutable
- Faster
- Transparent



Campus Election D-App

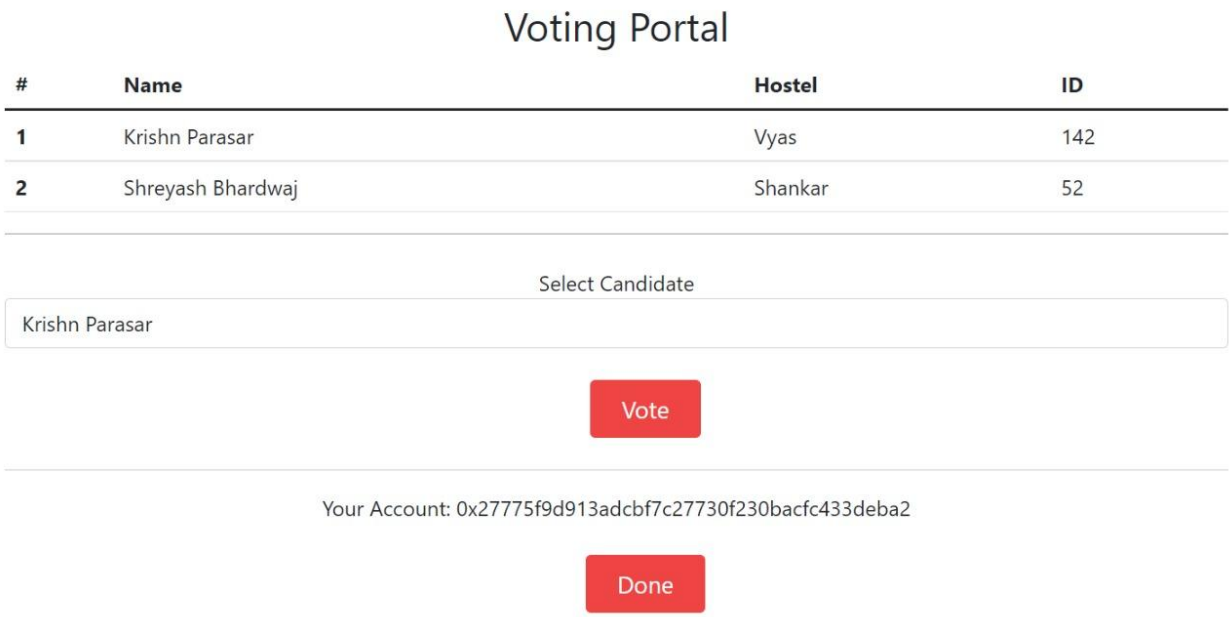
In this decentralized application we create a mechanism for e-voting based on Blockchain. The website works as follows. At first an election is created by the admin. Then the admin adds candidates by taking their inputs. This list can then be viewed by clicking on the view candidates button.



After that the user registers the voters by taking their inputs. This list can also be viewed.

Adding both these bunch of data on the Blockchain will cost some gas and the same will be paid by the admin account from Ganache.

After taking data about both the candidate and the voter, the admin can then begin the voting process.



Each voter is linked with one account from Ganache and provisions have been made to make sure that only one vote can be casted from one account.

After all accounts have casted their votes, the admin then closes the election and declares the result, which is displayed in order of their votes.

In the solidity code, there are two structs, one for candidates and one for voters.

Then there is mapping for candidates and voters.

The backend links the solidity code with the front end in HTML/CSS .

Election Commission

Candidates for the Election

#	Name	Hostel	ID
1	Krishn Parasar	Vyas	142
2	Shreyash Bhardwaj	Shankar	52

Done