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ADEVA: A Decentralized Electronic Voting Application Using Blockchain Technology

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ABSTRACT: Every country's fundamental right is the freedom to vote. An Electronic Voting (E-Voting) is a voting procedure that is recorded, saved, processed, and stored digitally. This is superior to the conventional paper-based approach for managing votes. New chances to create new kinds of digital services are being provided by blockchain. Although study on the subject is still in its early stages, it has mostly concentrated on the technological and legal difficulties rather than making use of this innovative idea and developing improved digital services. Voting on the blockchain might lower voter fraud and broaden voter participation.

KEYWORDS: Immutable ledger blockchain, distributed security, smart contracts, and electronic voting.

I. INTRODUCTION

The foundation of democracy is the idea of free and fair elections, where voters may use their right to cast a ballot without worrying about fraud or manipulation. However, because they depend on centralized authority to oversee the election process, conventional voting methods are frequently exposed to these dangers. With the development of blockchain-based voting systems, blockchain technology has recently emerged as a creative response to these issues.

A decentralized platform called a "blockchain-based voting" makes use of blockchain technology to guarantee the voting process's integrity, security, and transparency. Through an intuitive user interface, it allows voters to cast their ballots anonymously and securely. Each vote is then recorded on an immutable record that is available to all stakeholders. In order to promote democratic ideals and guarantee the correctness of the results, an interconnected system of nodes and a consensus mechanism are used to replace the requirement for a central authority to monitor the election process.

II. LITERATURE REVIEW

The rising interest in blockchain-based voting systems as a remedy for the problems with traditional voting systems is evident from an examination of the literature on the topic. Some of the main conclusions from current research investigations are as follows:

Security and Transparency: By using blockchain technology, voting is made more secure and transparent, making it more impossible for anybody to rig the results. According to a research by Kshetri et al. (2020) on the application of distributed ledgers in elections, it might greatly lower the risks of theft, security breaches, and hacking attempts, improving the voting process' integrity.

Decentralization and Distributed Consensus: Blockchain-based voting is decentralized, which indicates that it does not rely on a single entity to oversee the election process. Instead, they check and confirm the legitimacy of each vote using a distributed consensus technique. This supports the values of democracy and ensures the validity of the findings. Based on research by Kontogiannis et al. (2021), blockchain-based voting systems may help lower the likelihood of election fraud and offer a transparent and safe way of conducting elections.

Technical and Legal Challenges: Before blockchain-based voting is widely used, there are still technical and legal problems that must be resolved. The system's ability to scale, the possibility of network congestion, and the combination of several technologies are among the technical difficulties. The necessity for transparent rules and regulations, data protection regulations, and adherence to international election norms are among the legal issues. These issues were identified and proposed fixes in a research by Vora et al. (2020).

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Adoption and application Cases: Although applications and use cases for blockchain-based voting are many, adoption is still in the early stages. For instance, shareholder voting, community decision-making, and internal elections inside political parties have all employed blockchain-based voting. In accordance with a research by Troncoso-Pastoriza et al. (2021), adopting blockchain-based voting might boost participation and transparency in the making of local decisions.

The literature analysis concludes by addressing the decentralized operation, increased security, and possible advantages of blockchain-based voting. However, before there can be a broad approval, there are a number of technological advances and legal problems that need to be resolved. The adoption of blockchain-based voting in many settings implies that it has several uses beyond regular elections, opening up new opportunities for advancement of democratic decision-making.

III. METHODOLOGY

The voting platform provided by BlockVote's approach is safe, transparent, and adaptive to varied use cases. BlockVote has the capability to completely change how we conduct online voting by utilizing the power of blockchain-based technology.

IV. BACKGROUND

A. Problem Statement : A decentralized voting platform based on blockchain technology is called BlockVote. Its main objective is to create a safe and open voting system that guarantees the fairness of the voting process and removes any chance of fraud or manipulation. Voters can use BlockVote to cast their ballots securely and privately, and everyone with an interest can simply audit and verify the results. By making it simpler and easier for voters to take part in voting, irrespective of their location, BlockVote also hopes to enhance voter turnout. BlockVote is a decentralized solution that uses blockchain technology to lower the possibility of fraud and improve the voting process' security and transparency.

B. Proposed System: The development of a decentralized application made up of peer-to-peer nodes creating a network of blockchain servers to share the burden of preserving information about the network and code integrity is an alternate solution to the problem mentioned earlier. Each node in the distributed ledger network holds both the source code and the data in a completely decentralized application paradigm.

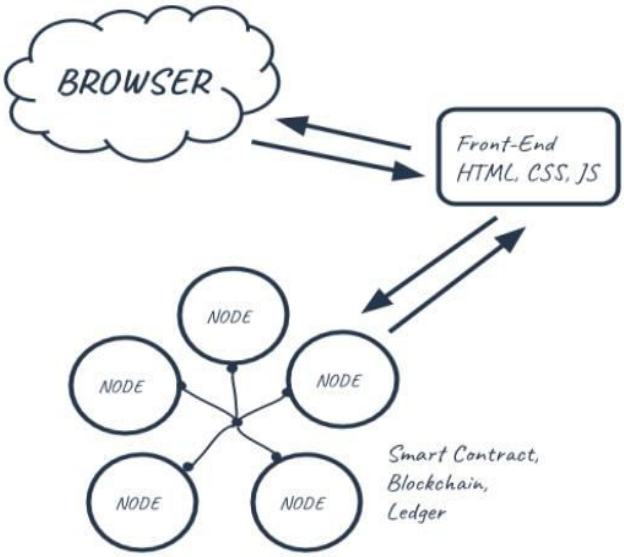

Fig1. Basic System Architecture

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V. SYSTEM DESIGN

The Ethereum blockchain technological advances is the basis for the ADEVA framework. The Ethereum Virtual Machine (EVM), a blockchain design that relies on a peer-to-peer network of nodes, hosts the user interface, the contract itself, and the ledger record. Nodes communicate with one another via broadcast or multicast encryption. The votes are kept in blocks, which are collections of data that are linked together using an algorithm called hashing to create a ledger.

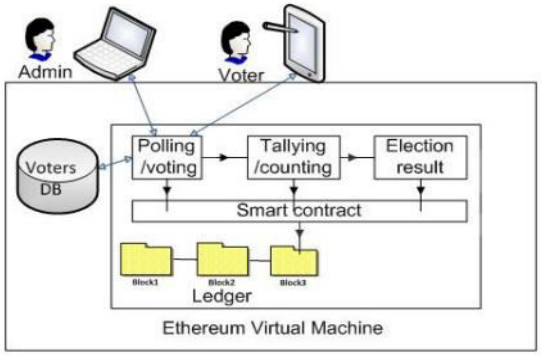

Fig. 2: ADEVA Architecture

The immutable characteristics of the blockchain ensure the security of all the data on the ledger. An administrator user interface and the voter user interface make up the frontend user interface. Nodejs is used in the administrative user interface to facilitate the deployment of the smart contract on the nodes. The smart contracts that provide voters access to the election functionality are programmed with the voter interface. The user interface, the contract itself, and the ledger wherein the votes are kept are all contained on each node in the network where the ADEVA application resides as a result. Users can access application functions through the use of smart contracts, which can also edit and manage ledger records (votes).

VI . APPLICATIONS

There are many possible applications for BlockVote, a few of which include:

- **Political Elections:** BlockVote may be used to organize safe and open political elections, guaranteeing that the outcomes are reliable and unchangeable.
- BlockVote may be used for shareholder voting and other corporate governance procedures, guaranteeing that the decision-making process is transparent and accountable.
- **Public Opinion surveys:** BlockVote is a secure and dependable platform that can be used to conduct public opinion surveys, allowing for the collection of responses from citizens.
- **University Elections:** The student government as well as other university elections can utilize BlockVote to make the method of voting transparent.
- **Non-Profit Elections:** Elections for charitable organizations may use BlockVote to ensure a fair and transparent voting process.
- **Union Elections:** BlockVote can be utilized for union elections, ensuring a secure and accurate voting process.

Overall, BlockVote has the promise of transforming how we conduct voting online and offering a dependable and secure platform for a variety of applications. BlockVote provides an open tamper-proof, and distributed voting system that can improve the fairness and integrity of the voting procedure by utilizing the potential of blockchain technology.

VII. RESULTS

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Elections and other voting processes may use the safe and dependable platform offered by BlockVote, a permissioned blockchain-based voting application. The application is suited for usage in a variety of scenarios since it is scalable, adaptable, and simple to use. A number of features are provided by BlockVote, such as safe identity verification, secret ballots, and real-time vote tally. All transactions are logged on the blockchain and are auditable at any time as part of the application's transparent design.

VIII. FUTURE SCOPE

Despite these difficulties, BlockVote's future is bright. More individuals will become familiar with and trust blockchain technology as it gets more widely used. Additionally, advancements in the technology of blockchain will increase its scalability and open it up to a larger audience.

BlockVote has the potential to completely transform elections in the future, making them safer, more open, and more democratic. In addition, it could open the door to further blockchain-based apps that improve our daily lives in different ways.

IX . CONCLUSION

Elections may be performed in a safe, transparent, and successful manner using blockchain technology. The advantages of blockchain-based voting are significant even though multiple problems still need to be solved. We may anticipate a wider use of this technology in the future as more countries and organizations begin to test voting techniques based on blockchain technology.
We can build a more democratic and open society where everyone has a voice and each vote counts by leveraging the potential of blockchain technology.

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