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Smart Tender Allocation System using Blockchain with Auction System

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ABSTRACT: Governments and public sector entities worldwide are actively exploring innovative approaches to align with technological progress, aiming for smart governance, heightened work efficiency, and optimized costs. Particularly in the context of government tenders, where tenders are typically outsourced to third-party corporations, the competitive landscape often involves monitoring rival tender values. Unfortunately, unethical practices may involve government officials accepting bribes to favor specific third parties during the tender allocation process. Our project seeks to address these issues by designing a secure and transparent system for government tender allocation utilizing blockchain. The blockchain serves as a stable and immutable data structure to safeguard government records from interference. The overarching goal of our project is to establish a transparent and secure edge computing framework for the workflow in government tenders, minimizing human supervision and facilitating the development of government plans and strategies.

KEYWORDS: Virtual Reality (VR) technology, 3D model rendering, Immersive campus tour, Web application., Intuitive navigation, Realistic representation, Innovative solution, Higher education transformation.

I. INTRODUCTION

Blockchain, a revolutionary technology, manifests as a dynamic and secure ledger composed of interconnected blocks, each safeguarded by cryptographic mechanisms. These blocks encapsulate a cryptographic hash of the antecedent block, a timestamp, and transactional data arranged in a Merkle tree structure. The timestamp functions as a testament to the temporal existence of transaction data at the block's publication, intricately interweaving a secure chronology. The cumulative linkage of blocks forms an immutable chain, where the alteration of any block necessitates the modification of all subsequent blocks. This intrinsic property imparts resistance to data tampering, rendering blockchains highly robust and tamper-evident.

In the realm of governmental processes, particularly the tendering system, blockchain technology emerges as a beacon of promise. Its potential application stands poised to elevate security, privacy, transparency, and operational efficiency. By integrating all stakeholders into a unified network, blockchain enables real-time monitoring of the tendering workflow. This technology addresses the pitfalls of centralized systems, where a singular point of failure leaves them vulnerable to cyber threats like Denial of Service (DOS) attacks and SYN Flooding. Governments, including those in developing nations such as India, are actively endorsing blockchain initiatives to streamline processes and mitigate issues like corruption and mismanagement.

Despite strides in digitization, prevailing centralized systems harbor vulnerabilities that blockchain seeks to rectify. Traditional electronic services, reliant on central servers, are susceptible to a myriad of adversarial attacks. The bureaucratic inefficiencies inherent in government processes, especially in tendering, further exacerbate these vulnerabilities. Blockchain's transformative potential lies in its permissioned network, offering unparalleled transparency to enforce government policies and hold accountable those who exploit the system. In the digital landscape, data manipulation emerges as a pervasive threat. The integrity of existing systems hinges on the accuracy of data; however, blockchain's inherent resistance to data manipulation positions it as a potent antidote to corruption, misinformation, and malicious activities.

In the contemporary era dominated by digital interactions, the critical role of data integrity cannot be overstated. Adversaries and malevolent entities exploit data manipulation to inflict harm on public entities and government bodies. Traditional systems, dependent on the veracity of data, become compromised when subjected to correlated or misrepresented information. The advent of blockchain, with its incorruptible ledger and decentralized architecture, signifies a paradigm shift in addressing these challenges. As governments grapple with complex issues in their

processes, embracing blockchain technology emerges as a strategic imperative to usher in a new era of security, transparency, and accountability.

II. RELATED WORK

The existing tender allocation systems, despite their attempts to digitize and streamline processes, face several technical challenges and vulnerabilities. One primary concern lies in the reliance on centralized servers, creating a single point of failure susceptible to various cyber-attacks. Traditional distributed denial-of-service (DDoS) attacks, such as DOS, Slow-loris, and SYN Flooding, can compromise the functionality of these central servers, leading to service disruptions, data breaches, and potential manipulation of tender-related information. As a result, the current systems lack robustness and are exposed to threats that can undermine the integrity of the tendering process.

Moreover, the intricate bureaucratic structures within most governments contribute to inefficiencies, corruption, and mismanagement in the workflow of tender allocation. The complexity of these systems often hinders transparency and accountability, creating opportunities for malpractices like information leaks, corruption, and bribery. The lack of a secure and tamper-proof infrastructure exacerbates these issues, as the existing electronic services and IT infrastructure are susceptible to data manipulation. In the digital space, where data integrity is paramount, any compromise in the accuracy or reliability of the data can lead to systemic corruption, raising serious concerns about the fairness and legality of the tendering process.

To address these challenges, recent technological advancements, particularly in the realm of blockchain, offer a promising avenue for enhancing the security, transparency, and efficiency of government tender processes. Blockchain's decentralized and distributed nature mitigates the risks associated with a single point of failure, making it resistant to attacks that target centralized servers. Additionally, the use of cryptographic techniques in blockchain ensures the immutability of recorded data, preventing retroactive alterations to information in any given block. Implementing a permissioned blockchain network can provide the required transparency to track and verify tender-related activities while establishing accountability in case of system abuse.

In summary, the existing tender allocation systems face significant technical challenges related to centralized servers, cyber-attacks, and bureaucratic inefficiencies. These issues compromise the integrity and fairness of the tendering process, exposing vulnerabilities to corruption and data manipulation. The adoption of blockchain technology, particularly in the form of a permissioned blockchain network, presents a promising solution to address these shortcomings and create a more secure and transparent environment for government tender processes.

III. PROPOSED METHODOLOGY

Proposed Methodology for Blockchain-Based Tender Allocation System:

Blockchain Infrastructure Implementation:

The first phase of our proposed methodology involves the establishment of a robust blockchain infrastructure. We will leverage a permissioned blockchain network to ensure secure and transparent recording of all tender-related transactions. Hyperledger Fabric, a permissioned blockchain framework, will be employed for its scalability, privacy features, and suitability for enterprise-level applications. Smart contracts will be coded to encapsulate the business logic governing different stages of the tendering process, ensuring that only authorized participants can engage in the network. This infrastructure will serve as the foundation for a decentralized and tamper-resistant ledger, preventing unauthorized alterations and ensuring the integrity of tender-related data.

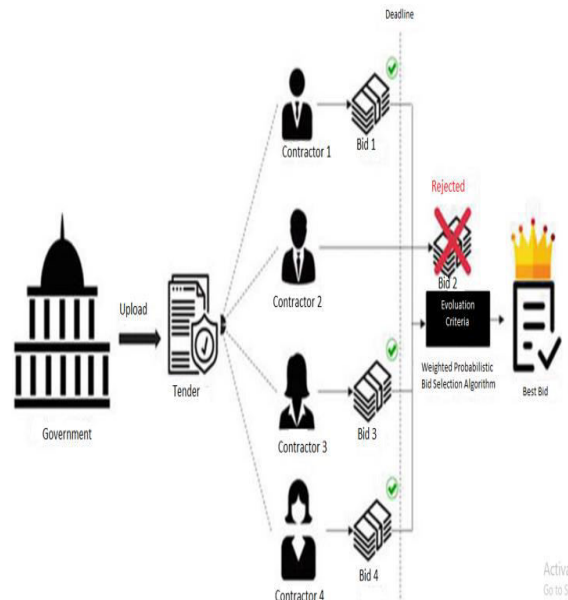


Fig 1. Proposed System Architecture

User-Friendly Interface Development:

To facilitate seamless interaction with the blockchain-based tender allocation system, a user-friendly interface will be developed. This interface will allow government officials, bidders, and other stakeholders to easily navigate through the system, submit and review tenders, and track the progress of each tender. The interface will be designed with a focus on accessibility and simplicity, ensuring that even non-technical users can effectively engage with the blockchain-based platform. Integration with existing government systems will be implemented to enable smooth data flow and interoperability, promoting user adoption and integration into established workflows.

Decentralized Network Establishment:

The final phase of our proposed methodology involves the establishment of a decentralized network to ensure secure and accountable tender allocation. Nodes within the network will be distributed across relevant government entities, ensuring a decentralized consensus mechanism. This distributed architecture enhances system resilience, minimizes the risk of a single point of failure, and provides a high level of security against malicious activities. Periodic audits and monitoring mechanisms will be implemented to uphold the transparency of the network. This decentralized approach ensures that no single entity has control over the entire network, fostering trust among participants and contributing to the overall success of the blockchain-based tender allocation system.

IV. WORKING MODULE

The proposed blockchain-based tender allocation system is designed to operate seamlessly within an AngularJS and Node.js-based web application, providing a secure, efficient, and transparent platform for government users and contractors. The technical foundation of the system lies in a decentralized consortium architecture, leveraging the capabilities of a permissioned blockchain to ensure the highest standards of security and privacy.

The AngularJS framework will be employed to create an intuitive and responsive user interface, allowing government users to initiate tenders and share comprehensive information with authorized contractors. The system's frontend, developed using AngularJS, will facilitate a user-friendly experience, enabling efficient interaction with the blockchain network.

On the backend, Node.js will be utilized to handle server-side operations and manage the interaction between the web application and the permissioned blockchain. The identity-authenticated network nodes, responsible for data access control, will be seamlessly integrated into the Node.js backend. This integration ensures that only authenticated users have access to relevant information, maintaining the confidentiality and integrity of the tendering process.

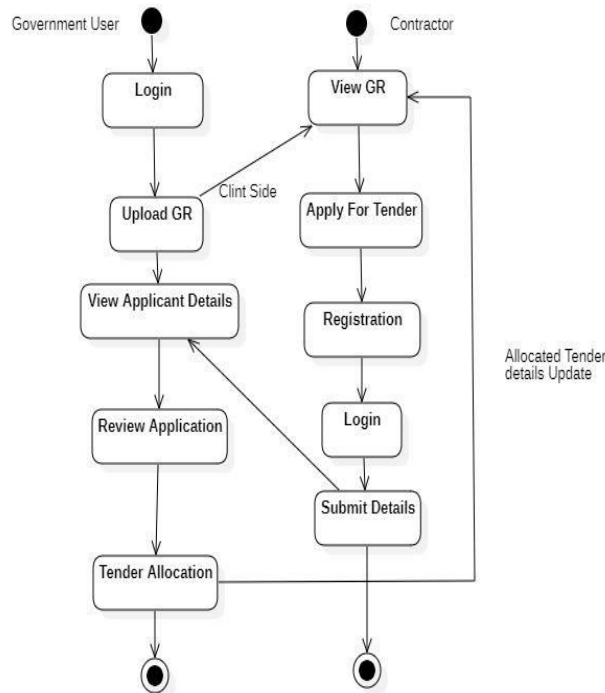


Fig 1. Proposed System Flow Diagram

Smart contracts, a key component of the proposed system, will be implemented using the chosen blockchain platform. These smart contracts will automate the tendering process, recording transactions and bids on an immutable ledger. The AngularJS and Node.js components will facilitate the seamless integration and execution of these smart contracts, ensuring a tamper-proof record of all activities within the system.

The auction system, governed by smart contracts and cryptographic techniques, will enhance efficiency and fairness in bid submissions. The roles of Admin and Contractors will be clearly defined within the AngularJS and Node.js application. The Admin, through the AngularJS interface, will oversee the entire process, set auction parameters, and validate smart contracts. Contractors, participating in secure and anonymous bidding, will interact with the system through the AngularJS frontend, facilitated by the Node.js backend.

In conclusion, the proposed system's technical architecture, powered by AngularJS and Node.js, ensures a seamless integration of frontend and backend components for a user-friendly, secure, and efficient tender allocation platform. The utilization of permissioned blockchain technology, combined with smart contracts and cryptographic techniques, marks a significant advancement in revolutionizing traditional tendering processes, promoting transparency, security, and efficiency in public procurement.

V. CONCLUSION

In conclusion, the AngularJS and Node.js-based web application developed for the Blockchain Tender Allocation System with Auction System marks a significant milestone in advancing the technical landscape of procurement processes. The strategic amalgamation of AngularJS for robust front-end development and Node.js for scalable and event-driven server-side architecture underscores a commitment to delivering a high-performance and user-friendly solution. The utilization of blockchain technology ensures an immutable and decentralized ledger, fostering trust and transparency in tender allocation. Overcoming challenges encountered during the project's lifecycle, the technical foundation laid out showcases great potential. To unleash the full capabilities of this system, it is imperative for the development team to diligently address identified gaps, fine-tune the architecture for optimal efficiency, and seamlessly integrate blockchain and auction protocols. Through sustained dedication, collaborative efforts, and ongoing innovation, this AngularJS and Node.js-powered web application stands poised to revolutionize traditional tender allocation processes, establishing new benchmarks for technical excellence, transparency, and efficiency within the realm of public procurement.

REFERENCES

1. Vikas Hassija, Vinay Chamola, Dara Nanda Gopala Krishna, Neeraj Kumar, and Mohsen Guizani “A Blockchain and Edge Computing-based Secure Framework for Government Tender Allocation” IEEE 2020
2. Dhawal Mali, Divya Mogaveera, Parth Kitawat, Mohd.Jawwad “Blockchain-based e-Tendering System ” IEEE 2020
3. V. Hassija, V. Chamola, V. Saxena, D. Jain, P. Goyal, and B. Sikdar, “A survey on iot security: Application areas, security threats, and solution architectures,” IEEE Access, vol. 7, pp. 82 721–82 743, July 2019.
4. A. Alketbi, Q. Nasir, and M. A. Talib, “Blockchain for government services—use cases, security benefits and challenges,” in 2018 15th Learning and Technology Conference (L&T). IEEE, 2018, pp. 112–119.
5. coindesk, “The Indian government is preparing a national framework to support the wider deployment of blockchain use cases.” <https://www.coindesk.com/india-plans-to-issue-a-national-blockchain-framework>, online; Nov. 27, 2019.
6. H. Cho, “Correction to asic-resistance of multi-hash proof-of-work mechanisms for blockchain consensus protocols,” IEEE Access, vol. 7, pp. 25 086–25 086, 2019.
7. V. Hassija, V. Chamola, S. Garg, N. G. K. Dara, G. Kaddoum, and D. N. K. Jayakody, “A blockchain-based framework for lightweight data sharing and energy trading in v2g network,” IEEE Transactions on Vehicular Technology, 2020.
8. V. Hassija, V. Chamola, D. N. G. Krishna, and M. Guizani, “A distributed framework for energy trading between uavs and charging stations for critical applications,” IEEE Transactions on Vehicular Technology, vol. 69, no. 5, pp. 5391–5402, 2020.
9. E. Androulaki, A. Barger, V. Bortnikov, C. Cachin, K. Christidis, A. De Caro, D. Enyeart, C. Ferris, G. Laventman, Y. Manevich et al., “Hyperledger fabric: a distributed operating system for permissioned blockchains,” in Proceedings of the Thirteenth EuroSys Conference. ACM, 2018, p. 30.
10. V. Hassija, V. Chamola, G. Han, J. J. Rodrigues, and M. Guizani, “Dagiov: A framework for vehicle to vehicle communication using directed acyclic graph and game theory,” IEEE Transactions on Vehicular Technology, vol. 69, no. 4, pp. 4182–4191, 2020.
11. C. D. Clack, V. A. Bakshi, and L. Braine, “Smart contract templates: essential requirements and design options,” arXiv preprint arXiv:1612.04496, 2016. [10] C. Cachin, “Architecture of the hyperledger blockchain fabric,” in Workshop on distributed cryptocurrencies and consensus ledgers, vol. 310, 2016.
12. H. Cho, “Asic-resistance of multi-hash proof-of-work mechanisms for blockchain consensus protocols,” IEEE Access, vol. 6, pp. 66 210– 66 222, 2018.



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