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Contract/Tendering System Using Blockchain

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Abstract: ***Tendering is commonly used by governments and businesses to buy goods or services from manufacturers or service providers. Although e-tendering is the most popular procurement method, there are a number of security concerns. Due to its emphasis on information decentralization, encryption, and block- based architecture for transaction management, blockchain technology can be utilized to address these security concerns. In this work, it is investigated how a distributed e-tendering system might be designed using smart contracts (based on the Ethereum block-chain). The project is broken into four components,***

1) ***The process of creating and publicizing a tender,***
2) ***The procedure of accepting bids,***
3) ***The evaluation and negotiation of the bid, and***
4) ***The selection of the winningbid.***

Each procedure is implemented using a different algorithm. The security and audibility problems are assessed and compared to the present tendering process. The primary goal of this document is to put in place a fair, transparent, and open tendering procedure. All 21st-century businesses striving to improve customer service and gain an advantage over the competition rely on information technology as their backbone. Several industries, including financial services, healthcare, agriculture, and even government, are now utilizing block-chain technology.

Keywords: Block-chain, Fair and Open TenderingScheme, smart contract, Ethereum, e-tender.

I. INTRODUCTION

Block-chain is a decentralized public ledger built on peer-to- peer networks that has gained significant traction in distributed application systems in recent years. In this technology, a trustworthy consensus method is established tosynchronize data changes, and the blockchain structure is applied to create a tamper-resistant digital platform for data storage and sharing. At the same time, the decentralization, traceability and immutability of on-chain information storage makes block-chain a trusted machine with high reliability andsecurity. Based on these characteristics, researchers began toanalyze the application of block-chain in various fields, such as the Internet of Things, supply chain management, voting system and bidding system. Block-chain in application can improve the availability of data and reduce costs, whilemaintaining the openness and transparency of the application.Transparency is considered to be a prerequisite for ensuringthe accountability of public officials and in regards, there isbroad agreement that the effectiveness of transparency can befurther strengthened by involving block-chain technology.Such technology could be effective in raising success,risks in complex contracts, strengthening procurement and contracting practices, holding officials accountable and in general, strengthening supply chain.

A blockchain based solution is well-suited for use cases suchas tendering, in which multiple parties with low levels of trusttransact with one another. The technology is applicable in areas where the same transaction is stored across disparate systems or databases. In recent years, electronic bidding hasbecome an efficient and convenient service, which aims toprovide an open and safe bidding environment for supplierstо protect the public interest.

Tendering and bidding is a kindof commodity trading behavior which enables an organizedselection of excellent transactions by the tenderingorganization. It clearly differs from conventional offlinebidding in terms of effectiveness, information gathering, and other factors, and performs better in terms of identity authentication of the bidding object, confidentiality of the bidding content, fairness of the bidding process, and other factors. Emerging block-chain technology combined with smart contracts could revolutionize traditional E-biddingsystems in a decentralized and autonomous manner. Itprovides the way for a safe, irrevocable, and auditable E-bidding procedure while upholding high accuracy andthoroughness. Interested parties can download the tendercontract that contains the code for bid evaluation criteria.Interested parties just have to run the evaluation code that will read the bids from the block and evaluate them. Theevaluation results will demonstrate whether the biddingprocess was fair (auditing tender allocation to the stated bestbidder).

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II. LITERATURE REVIEW

A tendering organization will create a tender as a smart contract and place it on the block-chain. The smart contract will include the certified public key of the tendering organization along with bid evaluation code. A prospective bidder can download the tender from the block-chain. The respective bidder reviews the tender and consider the tendering specification and make a bid proposal, then the bidder generates a bid in response to the tender (smart contract). The actual bid is encrypted by the bidder's generated symmetric key (bid key: Hash). The symmetric key is then encrypted by the public key of tendering organization: (Hash). Half of the (Hash) is included as part of the submission and the second half would be communicated to the tendering organization at the tender submission deadline. The bidder will push the bid as a smart contract to the block-chain. The bid is signed by the bidder's certified signature key. This key is certified by the tendering organization when the bidder register as an authorized bidding company, a process out of the actual tender opening and allocation process. When the deadline for bid submission expires, the smart contract on the block-chain stops accepting new bids. The tendering organization can download the submitted bids, and they can decrypt the bids if they have full (Hash). At the tender closing date, tendering organization will run the evaluation code and select the best bid. The result of the evaluation is pushed to the block-chain. At this stage, the tendering organization can make (Hash) of all bidders public on the block-chain. The illustration of the working concept of the block-chain model for procurement is illustrated in figure 1 below. The tender organization will push the results of the bid evaluations along with bidder's keys to the block-chain. This information is crucial for independent auditing of the tendering process. Interested parties can access the tender details from the block-chain (where this data will reside in perpetuity) along with the bid evaluation code. Interested parties can download the tender contract that contains the code for bid evaluation criteria. Interested parties just have to run the evaluation code that will read the bids from the block and evaluation them. The results of the evaluation will show whether the bidding process was fair (auditing tender allocation to the stated best bidder).

III. METHODOLOGY

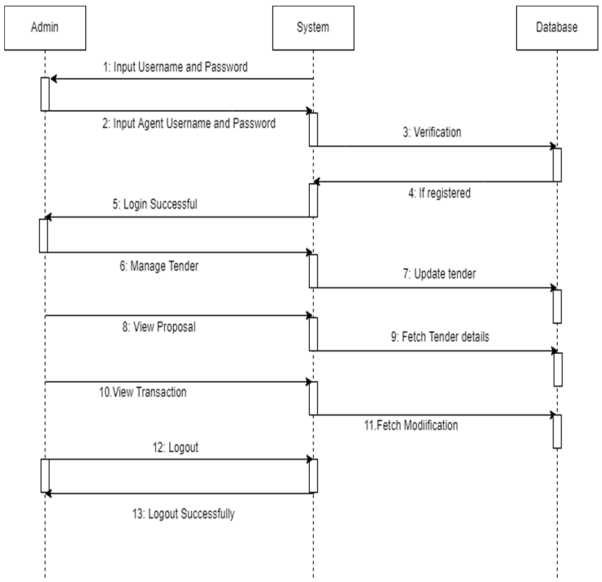


Figure 1: Sequence Diagram

A tender will be created by a tendering organization as a smart contract and uploaded to the blockchain. The smart contract will include the certified public key of the tendering organization along with bid evaluation code. A potential bidder can download the tender from the blockchain. The respective bidder analyzes the tender, considers the tendering specifications, and submits a bid proposal, after which the bidder creates a bid in response to the tender (smart contract). The actual bid is encrypted by the bidder's generated symmetric key (bid key: Hash). The symmetric key is then encrypted by the public key of the tendering organization: (Hash). The first half of the (Hash) is part of the submission, and the second half will be provided to the tendering organization by the deadline for tender submission. The bidder will submit the bid to the block-chain as a smart contract. By using their certified signature key, the bidder signs the offer.

This key is confirmed by the tendering organization when the bidder registers as an authorized bidding corporation, a process separate from the actual tenderopening and allocation process. The smart contract on the blockchain stops taking new bids when the deadline for bid submission passes.

The tendering organization can download the submitted bids, and they can decrypt the bids if they have full (Hash). At thetender closing date, the tendering organization will run the evaluation code and select the best bid. The evaluation resultis published to the blockchain. At this stage, the tendering organization can make (Hash) of all bidders public on the block-chain. The illustration of the working concept of the block-chain model for procurement is illustrated in figure 1 above. The tender organization will upload the findings of thebid evaluations, as well as the bidders' keys, to the blockchain. This information is critical for independent auditsof the tendering process. Interested parties can obtain the tender details as well as the bid assessment code from the block-chain (where this data will be kept in perpetuity). The code for the bid evaluation criteria can be downloaded by interested parties from the bidding contract. Interested partiesjust have to run the evaluation code that will read the bids from the block and evaluate them. The evaluation's findings will demonstrate if the bidding procedure was fair by examining the distribution of the tender to the highest bidder.

IV. RESULTS



Figure 2: Login page consisting of admin and company login option

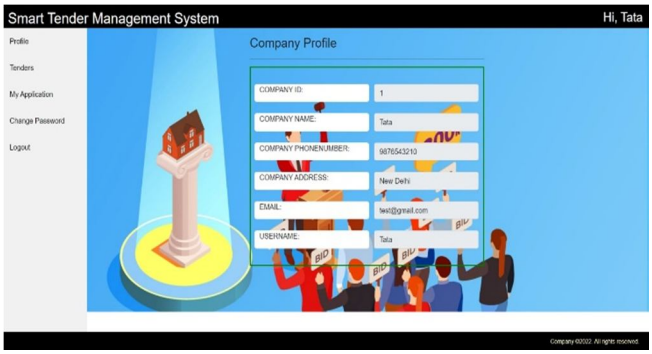


Figure 3: Page showing company details



Figure 4: Page showing tender management for admin

V. CONCLUSION

Traditional technologies and design patterns cannot be employed in applications such as tender portals, where transparency and security are paramount, because they jeopardise these objectives. As previously stated, there are numerous security needs for a tendering framework that can not be met simply by creating and bidding on contracts through a centralised tender platform. Only fair, open, decentralised technologies, such as Blockchain and Smart Contracts, can meet the security and openness criteria of this type of application. In this paper, we'll have look at how sucha system may be created, including the many procedures required and how they're implemented. The security and openness requirements of this type of application can only bemet by using Block chain and Smart Contracts are examples of fair, open, and decentralised technologies. In this paper, we'll look at how such a system may be created, including themany procedures required and how they're implemented.Only fair, open, decentralised technologies, such as Block chain and Smart Contracts, can meet the security and openness criteria of this type of application. In this paper, we'll have look at how such a system may be created, including the many procedures required and how they're implemented.

VI. FUTURE SCOPE

The Government should move towards creating a legal framework for Ethereum and other digital currencies. Although many governments as shown in the literature are now considering launching their own Bitcoin-like cryptocurrency, the process should include sensitizing citizens and financial organizations. This will in addition encourage adoption of the block-chain based smart contractsmodel for tendering process among organizations.

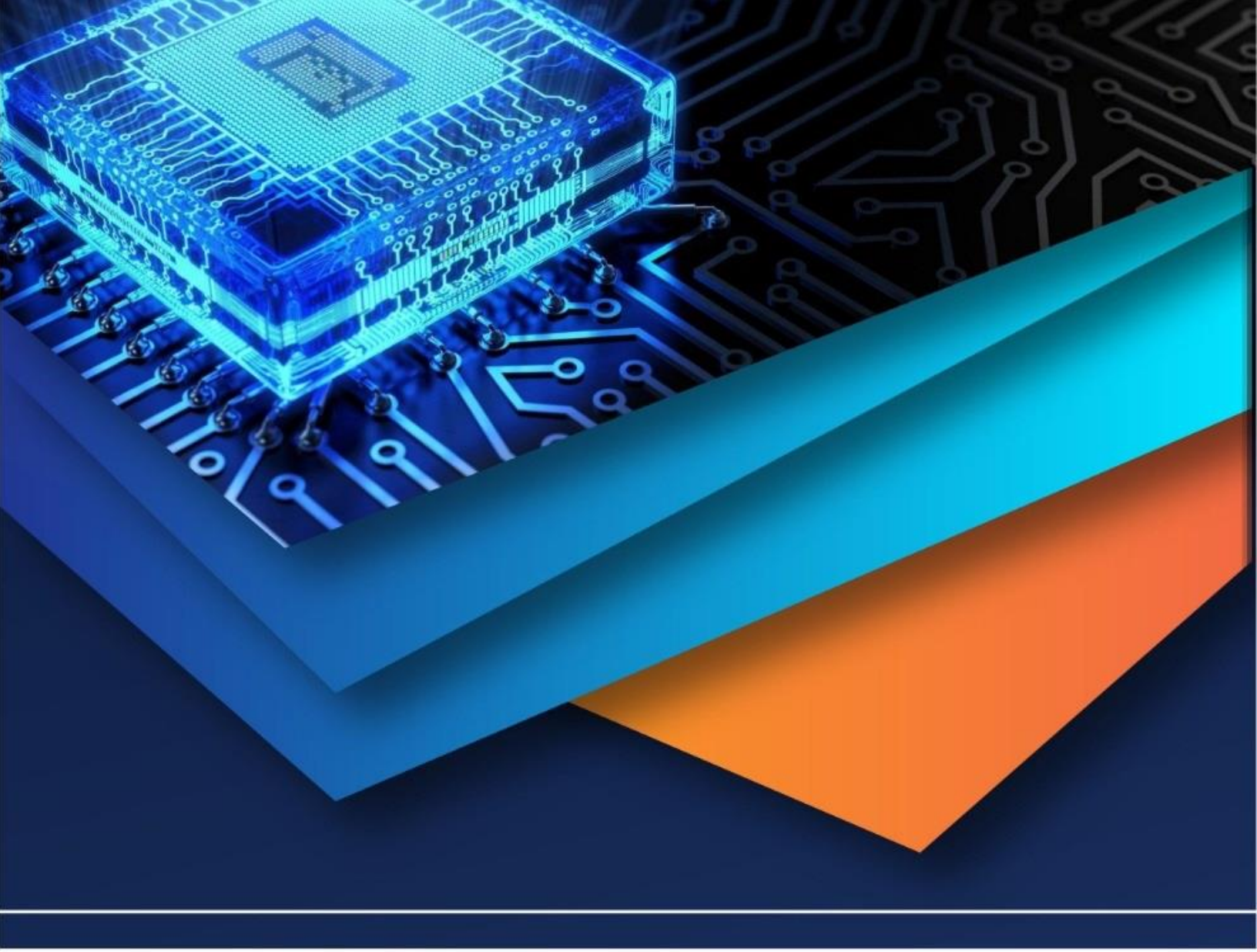
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