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# A Block chain and Edge Computing-based Secure Framework for Government Tender Allocation

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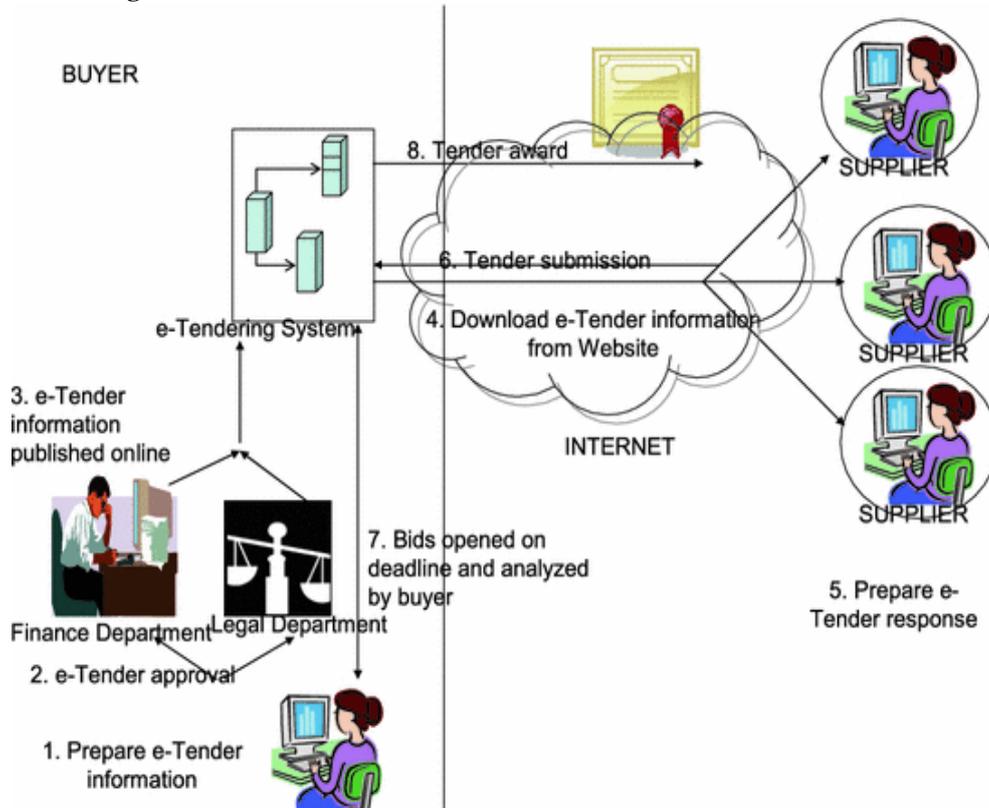
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**ABSTRACT:** Governments and public sector entities around the world are actively exploring new ways to keep up with technological advancements to achieve smart governance, work efficiency, and cost optimization. Block chain technology is an example of such technology that has been attracting the attention of Governments across the globe in recent years. Enhanced security, improved traceability and lowest cost infrastructure empower the block chain to penetrate various domains. Generally, governments release tenders to some third-party organizations for different projects. During this process, different competitor try to eavesdrop the tender values of others to win the tender. The corrupt government officials also charge high bribe to pass the in favour r of some particular third party. In this paper, we presented a secure and transparent framework for government tenders using block chain. Block chain is used as a secure and immutable data structure to store the government records that are highly susceptible to tampering. This work aims to create a transparent and secure edge computing infrastructure for the work-flow in government tenders to implement government schemes and policies by limiting human supervision to the minimal.

## I. INTRODUCTION

There has been a rapid growth in the use of blockchain technology in almost all domains and all parts of the world. Blockchain technology is a highly promising solution that can be employed in the government tender process to enhance the level of security, privacy, transparency, and speed of work. Blockchain can allow all the parties involved in a particular tender to be a part of the same network and to monitor the work-flow step by step [1]. Governments like Georgia, UK, UAE, Australia, China, Japan, and Russia are currently progressing at a rapid pace in adapting blockchain in their day to day functioning. The government of Dubai has an ambitious plan of becoming completely paperless through the widespread implementation of blockchain [2]. Governments of several developing countries like India have also been promoting various projects and policies for adaptation of blockchain technology in recent years [3]. There have been various attempts to implement technology to make government processes paperless and instantaneous, such as online ticketing systems, online issuing of tenders, filing tax returns, etc. Although most of these systems seem and well-implemented, all of them are based on the idea of a central server which has a single point of failure, as hackers can easily hack or disrupt its functioning by attacks, such as DOS, Slow-loris, SYN Flooding, etc [4]. In most governments, complicated bureaucratic systems often result in highly inefficient work-flow fraught with corruption, mismanagement, and human errors. Some of the governance processes, such as government tenders include malpractices like information leaks, corruption, bribery, etc. Most of the existing electronic services and IT infrastructure have the above-mentioned limitations, however, new technologies such as blockchain have the potential to greatly ameliorate the existing problems [5], [6]. A permissioned blockchain network can provide the necessary transparency to effectively implem government policies for the benefit of the citizens of the country and fix responsibilities in case of abuse of the system

**IA. Architecture Diagram**



**II. LITERATURE SURVEY**

**A.) Bidding System using Blockchain**

Block chain is the latest technology in the IT industry for securing blocks of data. Secure online bidding system is designed with blockchain technology using hyper ledger saw tooth framework. Currently, there is a lot of data integrity problems with respect financial services in the market. Block chain overcomes this flaw by decentralizing the information. In the proposed work, the client can connect to the validator network to put an item or commodity of their choice for auction. Other users can view the items and connect to the validator network to bid their items using user interface. All the information regarding the items are stored on the Blockchain. Information is safe and integrity is achieved. Detailed records cannot be altered and the highest bidder has to make the purchase. Once the purchase is done, nobody can alter the data. Information is safe and integrity is achieved as both seller and bidder are enabled with security.

**B.) Blockchain-Based Decentralized Reverse Bidding in Fog Computing**

Fog computing systems are designed to provide localized computation, storage, and communication services in close proximity to the endpoint mobile and IoT devices. Fog service providers typically monetize their service usage via centralized payment mechanisms in unverifiable and non-transparent manner. Therefore, there exists a need for a trust-enabling payment mechanism whereby fog service providers should be incentivized or penalized based upon the continuous feedback from endpoint devices. We propose a decentralized reverse-bidding scheme developed using the key features of blockchain and smart contracts. We develop a solution that allows the users or devices to initiate the bidding process by making a request for services to be provided by nearby public fog nodes, and these fog nodes to make bid offers in return. The proposed scheme ensures that all fog nodes on the network can equally and fairly make offers to win the bid. The bidding process incorporates the automated payments at the end of the service. Our solution is implemented using Ethereum smart contracts. It also integrates a reputation system for fog nodes and imposes a penalty for misbehaving nodes. Our solution is fully decentralized and provides a high level of trust, transparency, and security. In the paper, we present the system architecture, implementation details, and show the correct functionality of the overall proposed solution. In addition, we provide performance, cost, and security analyses of the smart contract code to demonstrate its effectiveness and robustness against major security concerns.

### C.)Peer-to-Peer Energy Trading in Virtual Power Plant Based on Blockchain Smart Contracts

A novel Peer-to-peer (P2P) energy trading scheme for a Virtual Power Plant (VPP) is proposed by using Smart Contracts on Ethereum Blockchain Platform. The P2P energy trading is the recent trend the power society is keen to adopt carrying out several trial projects as it eases to generate and share the renewable energy sources in a distributed manner inside local community. Blockchain and smart contracts are the up-and-coming phenomena in the scene of the information technology used to be considered as the cutting-edge research topics in power systems. Earlier works on P2P energy trading including and excluding blockchain technology were focused mainly on the optimization algorithm, Information and Communication Technology, and Internet of Things. Therefore, the financial aspects of P2P trading in a VPP framework is focused and in that regard a P2P energy trading mechanism and bidding platform are developed. The proposed scheme is based on public blockchain network and auction is operated by smart contract addressing both cost and security concerns. The smart contract implementation and execution in a VPP framework including bidding, withdrawal, and control modules developments are the salient feature of this work. The proposed architecture is validated using realistic data with the Ethereum Virtual Machine (EVM) environment of Ropsten Test Network.

### D.)A Tender Algorithm of Improved Distributed System Resource Management

The tender algorithm is one of the most commonly used algorithms in the distributed system resources management. The calculation of marked price has neglected the key consumption of sites and the reliability is low. Through the improved algorithm, the introduction of resources coordinator and the adoption of Dijkstra algorithm, the marked price can be calculated precisely. Then the improved tender algorithm greatly enhanced the performance and reliability of the distributed system.

## III. EXISTING SYSTEM

The allocation of tenders from government lenders to constructors. Initially, government lenders and constructors enter into the block chain network to construct a secure edge computing infrastructure. The government lender shares the tender details with all the relevant constructors. Further, double auctioning takes place between the constructors and government lenders. The target of the model is to efficiently handle the government tender process securely. The system mainly consists of three types of entities: government officials, external parties like construction companies or individual constructors, and banks.

## IV. PROPOSED SYSTEM

Government announces new projects, invites vendors to give quotations/tenders and approves the best candidate. The vendor is given the project and a Government officer is appointed to keep track of the status of project. A timeline is defined for project and officer to keep a check on progress and to get it complete before deadline. Government officer often visit the site, to take an overview of the progress and report it to the officer. We are developing a very comprehensive system for this business process which will manage each and every aspect starting from vendor registration and tender submission and up to the completion of the project.

## V. MODULES

### A. Vendor Login And Register

Initially Vendor need to create a account in the Government tender Process, so that he/she can able to access the project .

### B.Government Verification of Vendors:

Government announces new projects, invites vendors to give quotations/tenders and approves the best candidate. The vendor is given the project and a Government officer is appointed to keep track of the status of project. A timeline is defined for project and officer to keep a check on progress and to get it complete before deadline. Government officer often visit the site, to take an overview of the progress and report it to the officer.

### C. Government Tender Allocation in Vendor:

Developing a very comprehensive system for this business process which will manage each and every aspect starting from vendor registration and tender submission and up to the completion of the project. Our system will automate this process and make it really smooth and will also provide a lot of intelligent features which are not possible in manual system. The system will provide an interface to the Government Administrator to define new projects and allocate to officers. The vendors will fill in tenders from the system itself and the tender approval process will also be

facilitated by our system.

D. Tender Details stored in block chain using Smart Contracts:

Most importantly, we will also have an android based tracking module which will be used by officer to keep a live track on the progress by updating. This will assure the management that the photo presented is that of the actual site and not a dummy photo. The overall aim of system is to increase human efficiency and keep the vendors and officers on their toes which should help in on-time completion of Government Projects which is very rare in today's scenarios.

## VI. CONCLUSION

We have elaborated on the need and benefits of using blockchain technology in the government tender assignment process. We have used Ethereum to implement the end-to-end edge computing framework for government tender workflow. Iterative auction algorithm is proposed to associate the best-suited constructors to the tender projects, thereby enhancing the profit of both the government lenders and the construction companies. We have also studied the performance evaluation of the proposed model. The proposed model proves to give better results in terms of different tender parameters as compared to its counterparts.

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