Blockchain and Edge Computing Based Secure Framework for Government Tender Allocation

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. Blockchain 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 blockchain to penetrate various domains.

Generally, governments release tenders to some third-party organizations for different projects. During this process, different competitors try to eavesdrop the tender values of others to win the tender. The corrupt government officials also charge high bribe to pass the tender in favour of some particular third party. In this article, we presented a secure and transparent framework for government tenders using blockchain. Blockchain 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 workflow in government tenders to implement government schemes and policies by limiting human supervision to the minimal.

Existing System:

Unfortunately, the research pertaining to the government domain of blockchain applications is very less with only a few studies pertaining to the topic itself. This implies an adaption gap of Blockchain technology among government-related applications and those pertaining to the rest of the major domains of study. Therefore, the use of blockchain in government tenders is an upcoming area of interest.

In an article, they have elaborated on the opportunities and benefits of using blockchain technology to reduce the time and effort required to administer and maintain government works. Smart contracts are introduced as a promising solution to avoid corruption and bribes in government office work-flow.

Proposed System:

Initially, government lenders and constructors enter into the blockchain 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. Finally, the tender is assigned to the constructor with the minimum bid.

The proposed model consists of a decentralized consortium architecture that combines both the security and privacy of Permissioned Blockchain and the openness and transparency of a Permission-less Blockchain. 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. Using Ethereum, we can control data access by the network nodes based on identity
authentication. Only the nodes that are allowed to view or verify the particular data get access to the files.

Software Tools:

1. Ganache
2. VS Code
3. Metamask
4. NodeJS
5. NPM
6. Web3.js
7. Truffle Suite

Hardware Tools:

1. Laptop
2. Operating System: Windows 11
3. RAM: 16GB
4. ROM: 4GB
5. Fast Internet Connectivity