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A Secure Framework for Government Tender Allocation Based on Blockchain and Edge Computing

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ABSTRACT:

Blockchain is an example of a technology that has recently grabbed the interest of governments all around the world. Because of its higher traceability, improved security and low-cost infrastructure, blockchain can be used in a wide range of applications. Governments typically issue tenders to third-party corporations for a variety of tasks. In order to win the contract, some competitors try to eavesdrop on the tender prices of others during this process. Block chain technique used under various security service with different model. It is used as backend database model, that maintains distributed ledger. No. of users can register and make the tender quotation under various department. Admin will check and give the response from the quotation result. Admin or authority check the experience and process management level skill for general auditing purpose.

1. INTRODUCTION

The usage of blockchain technology has increased rapidly in practically all domains and all countries of the world. Blockchain technology is a highly promising option that may be used in government tender processes to improve security, privacy, openness, and work speed. Blockchain can connect all of the parties involved in a specific tender to the same network and track the workflow step by step [1]. Governments such as Georgia, the United Kingdom, the United Arab Emirates, Australia, China, Japan, and Russia are currently integrating blockchain into their daily operations at a rapid pace. The Dubai administration has high plans to go fully paperless by implementing blockchain technology widely [2].

In recent years, governments in several developing nations, including

India, have promoted a variety of projects and regulations aimed at facilitating the use of blockchain technology [3]. Various initiatives have been made to integrate technology to make government procedures paperless and rapid, such as online ticketing systems, online tendering, filing tax returns, and so on. Although most of these systems appear to be strong and well-implemented, they are all dependent on the concept of a central server with a single point failure, as hackers could easily hack or interrupt its operation through attacks like DOS, Slow-loris, SYN Flooding, and so on. [4].

Complicated bureaucratic procedures in most governments often lead to improper workflow riddled with human errors and corruption. Bribery, Information leaks and corruption are examples of misconduct in some governance procedures, such as government tenders. The majority of today's IT infrastructure and electronic services are restricted by the aforementioned constraints. New technologies like blockchain, on the other hand, have the ability to considerably relieve the existing challenges [5], [6].

A permissioned blockchain network will provide the transparency required to efficiently implement government regulations for the advantage of the country's population while also establishing responsibility in the event of system misuse [7], [8].

2. LITERATURE REVIEW

2.1 H. Cho, "Correction to asic-resistance of multi-hash proof-of-work mechanisms for blockchain consensus protocols," IEEE Access, vol. 7, 2019, Art. no. 25086

Blockchain technology has quickly gained popularity due to its decentralized and open operation. The consensus protocol is the central mechanism of securing the assigned ledger from potential adversary attacks in a blockchain community. Proof-of-work (PoW) is a popular consensus process that necessitates a substantial quantity of computation to identify a new legitimate block. The decentralized feature of blockchain networks is endangered when application-specific integrated circuits (ASICs) designed specifically for PoW computation grow to dominate the blockchain consensus process.

Many PoW strategies are being developed in order to discourage the usage of ASICs in consensus operations.

One of the often-used techniques to achieve such ASIC-resistance is to use more than one hash feature in the PoW computation that is multi-hash PoW. The degree of ASIC resistance of multi-hash PoW processes is empirically investigated in this work. The overall performance difference between ASICs and general-purpose computer systems is used to determine the amount of ASIC resistance. Our findings show that the ASIC-resistance of various PoW mechanisms is no longer powerful enough to prevent ASIC-based mining, contrary to the assumptions of multi-hash PoW techniques. The majority of them contain ASIC-resistance layers that are comparable to PoW techniques that have already been beaten by ASIC-based systems.

2.2 V. Hassija, V. Chamola, S. Garg, N. G. K. Dara, G. Kaddoum, and D. N. K. Jayakody, "A blockchain-based framework for light-weight records sharing and power buying and selling in V2G network," IEEE Trans. Veh. Technol., vol. 60, no. 6, pp. 5799–5812, Jun. 2020

The Vehicle-to-Grid (V2G) community, which uses battery-powered cars to feed electricity into the power grid, is exploding. In a V2G community, a scalable, stable and cost-effective system is necessary to support the growing number of transactions. Existing studies rely on standard blockchain to meet this need. Because the mining incentive is bigger than the transaction cost, blockchain-enabled V2G networks demand a lot of computing power and are no longer suitable for micro-transactions. Furthermore, standard blockchain transaction throughput is insufficient to serve the growing volume of traditional transactions on V2G networks.

To overcome these challenges, this research offers the Directed Acyclic Graph-based V2G community, a lightweight blockchain-based protocol (DV2G). The term "blockchain" is used in this context to refer to any Distributed Ledger Technology (DLT), not simply the bitcoin block chain. To document community transactions in a strictly closed and scalable manner, a tangle information shape is being used.

A recreation idea mannequin is used to do cost-effective function negotiation between the grid and motors. The suggested model reduces the need for the intensive calculation associated with the insertion of transactions to the information structure and eliminates the

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need for any charges to publish the transaction. The mannequin has been proved to be scalable and useful in micro-transactions necessary in V2G networks.

3. PROPOSED SYSTEM

A permissioned block chain network will provide the transparency required to efficiently implement government regulations for the advantage of the country's population while also establishing obligations in the event of system misuse.

3.1 IMPLEMENTATION

3.1.1 PUBLIC COMPLAINT

In this module in our project, Public add complaint something about some issues about his/her area or zone such as water department issue, Electricity related issue with the picture of that.

3.1.2 DEPARTMENT REGISTER

In this module the department has to register with user name and password along with the name of the department. This register data stored in the database.

3.1.3 DEPARTMENT LOGIN

In this module in our project, Department admin has to login with user id and password if they are valid then the admin will redirect to respective department view.

3.1.4 SELECT DEPARTMENT

In this module in our project, here the department is need to select the department like construction or some department for the tender allocation.

3.1.5 DEPARTMENT UPLOAD

In this module, the respective department will upload the public complaint along with all the details in PDF file format to the Government. Here we are encrypting the file with AES. When the government wants to see the file, it will be decrypted.

3.1.6 GOVERNMENT LOGIN

In this module of our project, Government admin has to login with user id and password if they are valid then the admin will redirect to government view.

3.1.7 GOVERNMENT VIEW

In this module the government will also view the contractor. And analysis the details will be responsible for your file stored in database.

3.1.8 GOVERNMENT TENDER ALLOCATION

In this module the government will allocate the tender for the government

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project. Analysis the details will be responsible for your file stored in database.

3.1.9 GOVERNMENT APPROVE

Government Approve module is used to assist the contractor in requesting the tender with the land longitude, and the contractor will update the report with their opinion, which will be saved in the database.

3.1.10 CONTRACTOR REGISTER:

In this module, the contractor has to register in order to see the tender. In the registration page contractor has to fill all the details of the company along with username and password. All the details will go to the government admin. The admin will see all the details of the company if it is a legal and valid company then admin will accept otherwise admin will reject.

3.1.11 CONTRACTOR LOGIN:

In this module the contractor will get the login credentials if the government admin accepts the request. The contractor can then login with his/her credentials.

3.1.12 CONTRACTOR TENDER REQUEST:

In this module the contractor will also view the request. And analysis the details

will be responsible for your file stored in database.

3.1.13 CONTRACTOR APPOINTMENT:

In this module is used to help to the contractor to request the tender with the appointment by the government and the contractor will update the report along with their opinion and they will be stored the database.

3.2 ALGORITHM

The SHA-1 algorithm is most popular and widely used cryptographic hash function. It is used in cryptography and crypt analytics. It takes a small input and create a string of 160 bits, sometimes a hash value of 20-byte long. The result produced is called as a message digest.

3.2.1 CHARACTERISTICS

Cryptographic hash functions are used to retain and save secure data by offering three various types of features such as pre-image resistance, also called as the first level of image resistance, second level of pre-image resistance, and collision resistance.

The foundation is that as the first level of image resistance technique makes it time consuming and difficult for the

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hacker to find the original message by providing the corresponding hash value.

As a result, the nature of a one-way function, which is a major component of the SHA algorithm, provides security. The pre-image resistance is critical for defending against brute force attacks from a cluster of large and powerful machines.
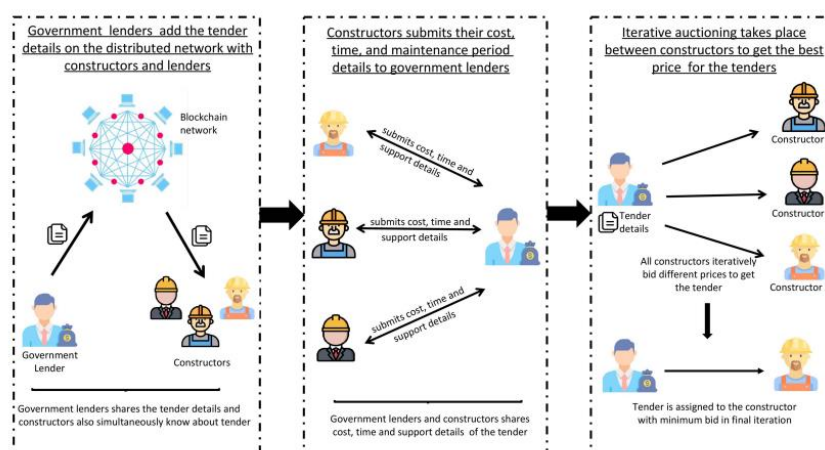
Similarly, second level of pre-image resistance approach is used, in which the hacker has a difficult time deciphering the following error message even after deciphering the first level of the message. The collision resistance is the last and hardest to crack, making it extremely impossible for the hacker to locate two different messages that hash to the same hash code.

To conform with the pigeonhole principle, the ratio of the number of inputs to the number of outputs should be identical. The collision resistance suggests that it is highly difficult to find two independent sets of inputs that hash to the same hash, indicating its safety.

3.2.2 SHA Algorithm Applications

PGP, TLS, IPsec, S/MiME and SSL are just a few of the security protocols and applications that utilize these SHA algorithms. These also have a role in the coding standards and vast majority of cryptanalytic procedures, which are primarily geared at observing the functioning and operation of virtually all governmental and private organizations and institutions. Today, major corporations like as Microsoft, Google and Mozilla have begun to use SHA-3 and have discontinued the use of the SHA-1 algorithm.

Fig1: Proposed framework's step-by-step flow.

4.   RESULTS AND DISCUSSION

Fig2: Public Complaint Form

Fig3: Complaint Status on Government view Page

Fig4: Tender Request on Contractor view page.

CONTRACT COMAPNY	DEPARMENT NAME	DATE	ZONE	ALLOCATE AMOUNT	DURATION	REQUEST AMOUNT	ACCEPT	Rejected
cts	WATER MANAGEMENT	2022-03-04T14:57	GUNTUR	9000000	2 months	9500000	APPROVED	REJECT

HOME
PUBLIC COMPLIANT
COMPLIANT STATUS
ACTIVATE
DEPART STATUS
RESPONSE
TENDORS DETAILS
LOGOUT

Fig5:   Tender Response on Government View page.

Zone	Address	Department	Company Name	Project Details	Duration	Allocate Date	Total Cast
Machilipatnam	12 th street	WATER MANAGEMENT	xyz	19779124_00046399832_1 (1).pdf	6 months	2022-03-02T17:13	90000

Fig6: Allocated Tender Details on Government view Page.

5. CONCLUSION

Our project tender management system has successfully created a user-friendly environment in tender management process. It is so designed that further modifications to the system can be easily done. This application can manage the government's whole tender information and allows companies and the government to manage all tender records in one place digitally without the inconvenience of using pen, paper, and registers. It also provides the whole tender document online and allows for document downloads. All of this is achievable in an easy and cost-effective manner.

6. FUTURE ENHANCEMENTS

Improving protocol efficiency, both in terms of the number of tenders exchanged and in terms of time. Implementing using two are more algorithms.

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