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RESEARCH ARTICLE OPENACCESS

Distribution of Public Funds Using Blockchain

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Abstract:

Public sector funds sometimes have problem with transparency and liquidity of cash flow. To improve the traceability and tracking of fund expenditure, we propose the Blockchain system for tracking. This will not only help in controlling the cash flow but will also bring in transparency within the public domain. Thus, attempting to remove corruption also.

This project is an interface for governmental bodies to regulate the funds received by public sector and allocate them to projects. Where central government has the highest authority and will allocate funds to state governments and further on which will be allocated to projects. All these transactions happen on blockchain technology and thus makes tracing of fund transfer easier with the help of public address of the ledger. The graphical format and representation are achieved by graph database called Neo4J. this will make public who donates money easier to visualize the flow of funds.

Keywords **—Blockchain, Public Funds, ledger, Proof of Work, Cryptographic Hash**

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I. Introduction

Blockchain is one amongst the technologies that have created a disruptive change in several industries. Currently, Blockchain is getting utilized in numerous places and there are more applications of Blockchain yet to be discovered and implemented. Blockchain is characterized by its decentralized nature, the integrity of the data stored within the chain, and its openness. thanks to these characteristics, another area during which Blockchain are often used is to release funds for state projects. Governments need to cater to an infinite number of responsibilities of a state. The working of state governments involves numerous transactions towards various operations that need to be applied throughout the state. This includes new projects, repair, and maintenance work, awarding contracts, paying off government employees,

farmer schemes, and so on. a significant hurdle that the best government faces is that the low-level corruption that's sometimes impossible to trace, which deprives the state of progress. Tracking it is a really difficult task due to the current system. Blockchain is touted for its capability to strengthen the trust and easy information-based exchanges among people and associations. The innovation offers a guarantee when deliberately applied within the correct settings. Customarily, associations working their own, singular IT frameworks trying to group must pander to difficulties including compromise of knowledge, recognizing a solitary wellspring of truth, and provoking establishment. Blockchain innovation tends to those difficulties by giving a specialized establishment that underpins the execution of shared business forms, such no single substance controls the entire framework. Government incorporates a characteristic must assemble, support, and ensure open trust in data and frameworks. In such styles of situations, blockchain may help to spice up this trust.

II. Problem Statement

What can be achieved on this issue is to improve the transparency of public or state funds. Blockchain gives us the freedom of transparency in transactions and their traceability. We propose blockchain system for tracking. This not only helps to control cash flow, but also brings transparency to the public. This project is an interface for government agencies to regulate the funds received from government agencies and allocate them to projects. Where central government has supreme authority and allocates funds to state governments and these are later allocated to projects. All of these transactions are performed on blockchain technology, making it easy to track the money transfer using the public ledger address. The formatting and rendering of the chart is accomplished through a chart database called Neo4J. This makes it easier for the donor public to visualize the flow of funds. The best possible solution for a publicly operated network will be blockchain. It will satisfy all of our needs with the fund transactions that we will discuss later. Many people have already heard of Bitcoin, it is a fully digital currency, with no government to issue it and no banks to manage accounts and verify transactions. It is a fully decentralized system and transactions are publicly distributed throughout the network. Therefore, it offers better traceability. But why blockchain? Why do we need blockchain? First of all, centralized systems have the problem that if the main server goes down, the entire service goes down until the main server is up and running again. For example, during a transaction we often find that the bank's server is down at times and we have no choice but to wait for the servers to resume service. But here blockchain is a decentralized way of storing data, which means that all other data is sent to all nodes. Connected in a network that makes every node a server. Once the data has been sent to the blockchain network, it is extremely difficult to change the data again, making it more secure, reliable and transparent. Distributing funds via blockchain benefits from the following points

III. Existing System

There are three basic components of a blockchain: blocks, miners, and nodes. Block – Each blockchain is made up of multiple blocks, and each block contains data that is a record of transactions. The key point is that the chain is not owned by a single person or organization. When a block is efficiently mined, the miner receives a monetary reward. Nodes: A node connects each block to another block, forming the chain. Basically, a node keeps the copies of the ledger and keeps the network operational. How does blockchain provide security?? Most blockchains organize data into blocks, with each block containing a transaction or series of transactions. Each new block in a crypto chain is so connected to all previous blocks that it is very difficult to manipulate them. Consensus procedures ensure that every transaction within the block is truthful and accurate in validating and accepting all transactions within the block. Blockchain technology provides decentralization by allowing members of a distributed network to participate. There appears to be no single point of failure, and the individual user cannot tamper with the transaction log. How does blockchain achieve immutability? A hash value is a unique value that identifies a single block. Because hashes are determined by the content of each block, each block is uniquely identifiable by its own hash value. As a result, each block can reference or reference the previous one, so the fourth block references the third, which references the second, and so on. The hash value thus serves as a reference. For example, in our system, Admin (government) sends the funds requested by the user. After that, the government determines whether the transaction taking place is legal. As the iterations continue, a chain is built that demonstrates the transparency of the transaction. Finally, the background transferred from the administrator to the user and the transaction completed. The immutable feature of the blockchain can be seen in the example above, making it immaculate. It is immutable due to the combination of validations provided by the blockchain hashing process and cryptography. How does a transaction get into the blockchain?

A transaction must be approved and validated before it can be added to the blockchain. Before a transaction can be added to the blockchain, it must go through several important stages. Take a look at crypto key authentication and proof of work Authorization Protocols in Rechain Blockchain Accessing a person's "account" or "wallet" of value requires identification of cryptographic keys. A string of data (similar to a password) serves as a Cryptographic key. Once users have consented to the transaction, it must be authorized before it can be added to a blockchain. The decision to conduct an on-chain transaction on a public blockchain is decided by consensus. The majority of the "nodes" (or computers) must accept the transaction for it to be valid. People who own machines on the network are rewarded for confirming transactions. This method is called "Proof of Work". Understand Libra Learn how Facebook used certain pieces of blockchain technology to establish Libra, a new cryptocurrency that has the potential to impact the banking and finance industry. Proof of Work To add a block to the chain, Proof of Work challenges the people who own the machines on the network to solve a difficult math problem. Mining is the process of solving a problem, and "miners" are usually rewarded with bitcoins. However, mining is a difficult task. The math problem can only be solved by trial and error, with a ratio of 1 to 5.9 billion chances of success. The process requires significant amounts of computing power, and this consumes significant amounts of energy. This means that the benefits of mining must exceed the cost of computers and the electricity used to power them, since it would take a single computer year to solve a math problem.

IV. Proposed System

The main goal of the project is to develop a platform that will track the allocation of government funds using blockchain technology. The platform aims to achieve the following goals: • Make the allocation of government funds more convenient with reporting documentation. Because donation data is collected in one place, we can generate reports automatically.• By developing a blockchain-based system, charitable foundations can become more transparent.• To ensure transparency and security at every stage.• Creation of an incorruptible governmental process. • Provide an immutable fund tracking environment. • Use of funds. The proposed system will be used to track funds granted to the state government as they go through the government process. It uses blockchain technology to protect transactions at every level, keeping every transaction transparent and sealing every transaction with evidence as the money moves. The system protects data by using hashes to maintain a block of transactions in a chain. It enables a fully tested, secure, and authentic financial tracking and distribution mechanism that helps form an incorruptible government. The government provides the requested funds to the user.

V.Advantages

i. Process Integrity: Due to the security reasons, this program was made in such a way that any block or even a transaction that adds
to the chain cannot be edited which ultimately provides a very high range of security.

ii. Traceability: The format of Blockchain designs in such a way that it can easily locate any problem and correct if there is any. It also creates an irreversible audit trail.

iii. Security: Blockchain technology is highly secure because of the reason each and every individual who enters into the
Blockchain network is provided with a unique identity which is linked to his account. This ensures that the
owner of the account himself is operating the transactions. The block encryption in the chain makes it tougher
for any hacker to disturb the traditional setup of the chain

VI. Software Tools Specification: -

➔ Visual Studio Code - Visual Studio Code is a source-code editor made by Microsoft for Windows, Linux, and macOS. Features contain aid for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git.

➔ GIT - Git is software for tracking changes in any set of files, usually used for coordinating work among programmers collaboratively developing source code during software development.

➔ Node JS - Node.js is an open-source, cross-platform, backend JavaScript runtime environment that runs on the V8 engine and executes JavaScript code outside a web browser.

➔ Neo4J – Neo4j is the only enterprise-strength graph database that combines native graph storage, advanced security, scalable speed-optimized architecture, and ACID compliance to ensure predictability and integrity of relationship-based queries

VII. Hardware & Software Requirements: -

➔ ***System Specifications-***

Processor: Intel Core i5 / AMD Ryzen 5 or higher

RAM: 8GB or higher

Storage: 10GB+

Internet: Stable 10 Mbps+

➔ ***Software Required-***

Browser: Google Chrome / Mozilla Firefox / Microsoft Edge

VIII. Algorithm

Proof of Work

Proof of Work is the authentic consensus set of rules in a blockchain community. The set of rules is used to verify the transaction and create a brand new block withinside the chain. In this set of rules, minors (a collection of people) compete with every different to finish the transaction at the community. The technique of competing with every different is referred to as mining. Once the technique of verifying the transactions withinside the block to be added, organizing the ones transactions in chronological order withinside the block, and saying the newly mined block all through the

community does now no longer require an awful lot electricity or time. The performance-eating element is fixing the "difficult math problem" to hyperlink the brand new block to the ultimate block withinside the legitimate blockchain. If miners effectively create a legitimate block, they may be rewarded. The maximum famous Proof-of-Work utility is Bitcoin.

The technique of verifying the transactions withinside the block being added, organizing the ones transactions in chronological order withinside the block, and saying the newly mined block all through the community does now no longer require an awful lot electricity or time. The performance-eating element is fixing the "difficult math problem" to hyperlink the brand new block to the ultimate block withinside the legitimate blockchain. Finally, whilst a miner reveals the proper solution, the node pronounces it to the whole community on the identical time and gets a cryptocurrency prize (the reward) furnished via way of means of the Proof of Work protocol.

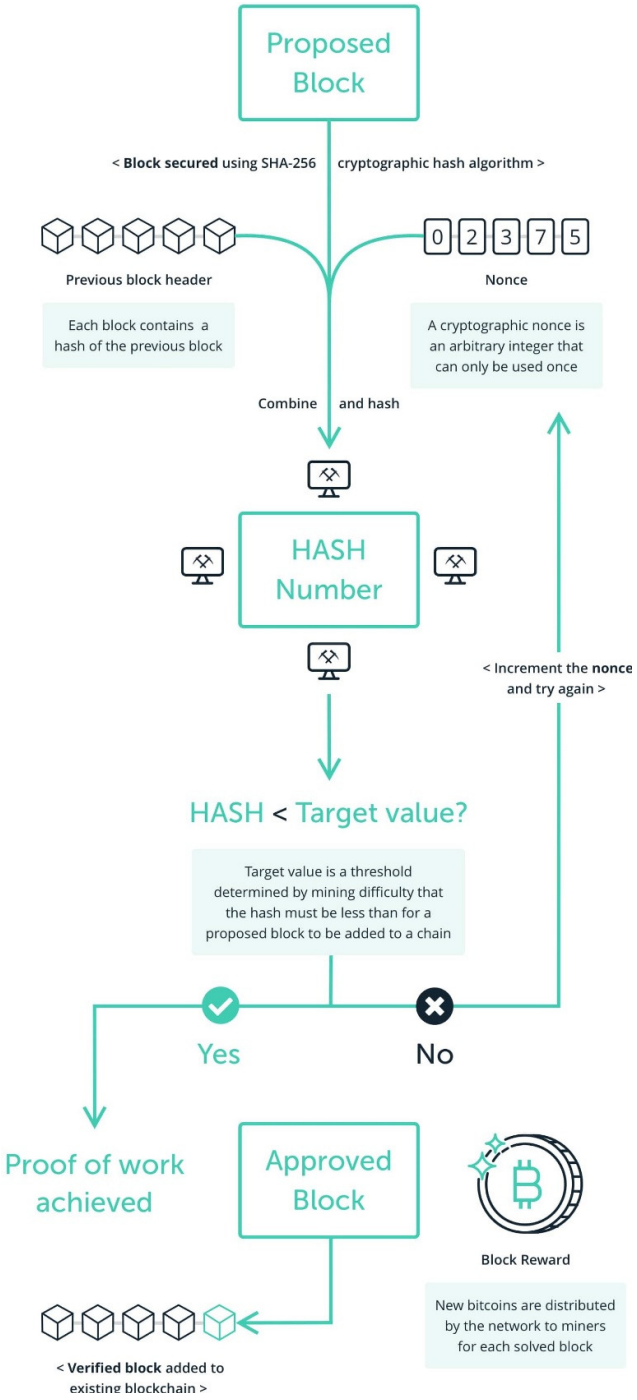


Figure 1 Proof of Work Algorithm

IX. Database Architecture

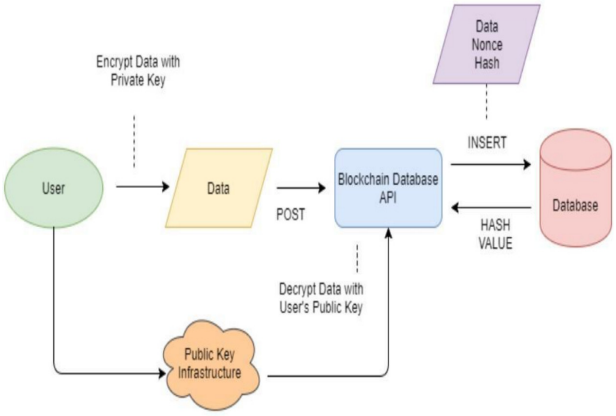


Figure 2Database Architecture

The essential benefit of blockchain databases is that they may be specifically secure. Since the database is decentralized, the information on the chain can't be hacked and modified because the opportunity nodes worried with the databasewill withstand any unauthorized change.Another key thing withinside the blockchain vs. shared database assessment is that a blockchain database is not controlled with the resource of the usage of one single centralized body. This has huge implications which consist of considering increased access to contract-based definitely services to reduced fees for mission financial transactions etc.

The use of blockchain-based definitely smart contracts, as championed with the resource of the usage of such businesses due to the fact the Ethereum Project, stands to deliver sizeable benefits to humans for the duration of the world. The decentralized nature of blockchain also removes any politicization of the database which allows for freer transactions.The removal of every governmental or organization control would possibly allow contracts to be set up for certainly anything, without the need for them to examine the rigid guidelines set out with the resource of the usage of accountable institutions or adhere to a specific political ideology, etc.Finally, fault tolerance is highly increased as each of the nodes

worried with the database has a complete record of the blockchain, thereby preventing information loss should one of the nodes fail.

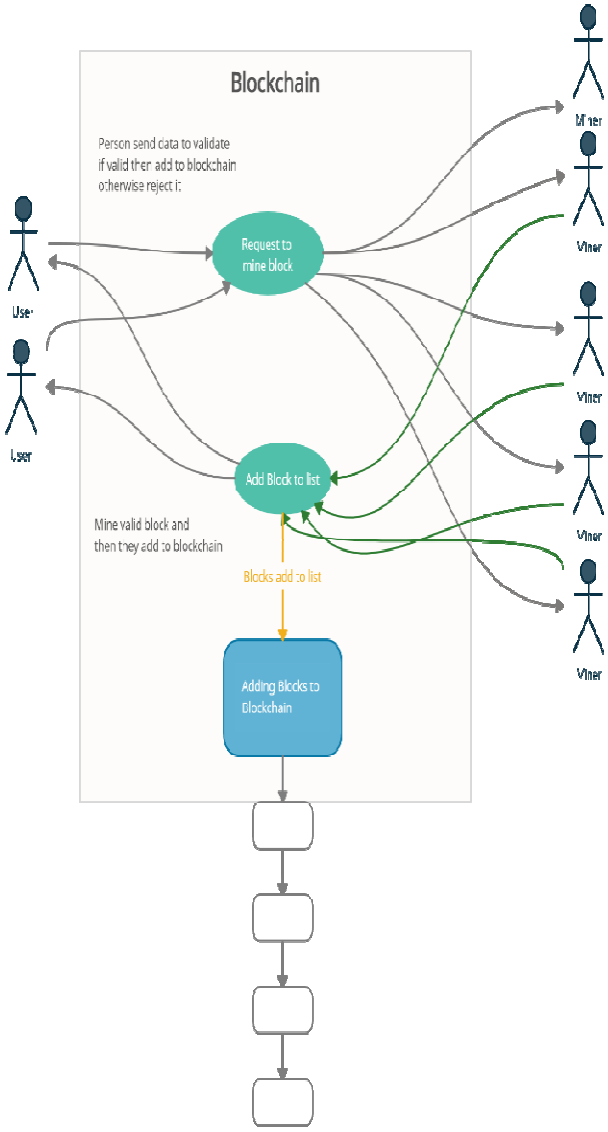
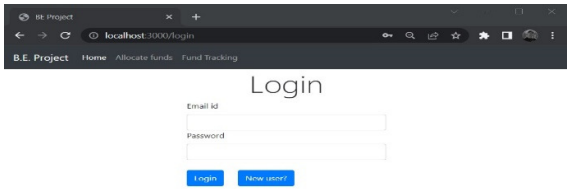
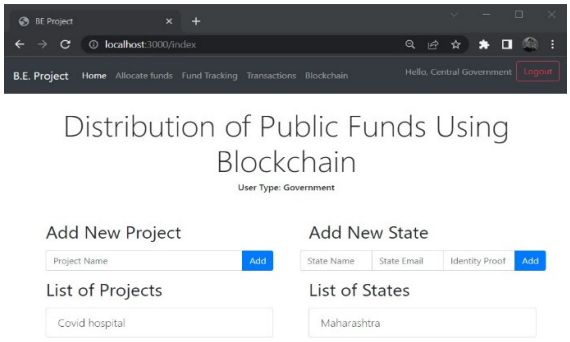


Figure 3 Use Case Diagram

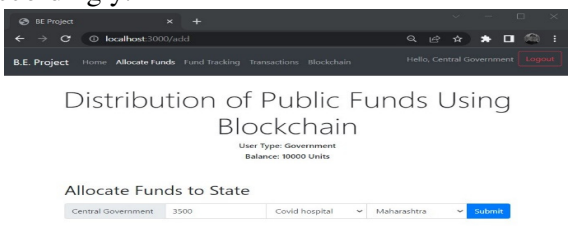
X. Results



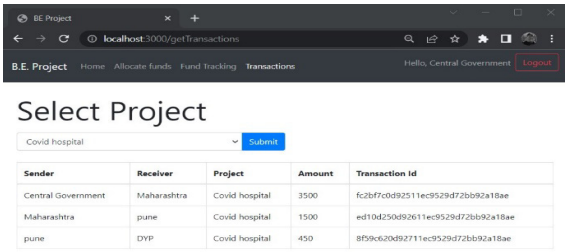
Login into the system using the credentials. Central Government to allocate funds to all bodies in the below hierarchy.



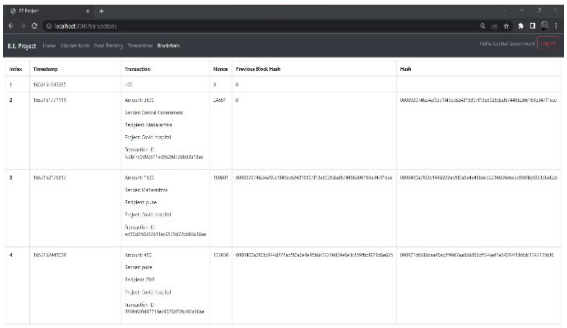
Add Projects and allocate projects to states accordingly.



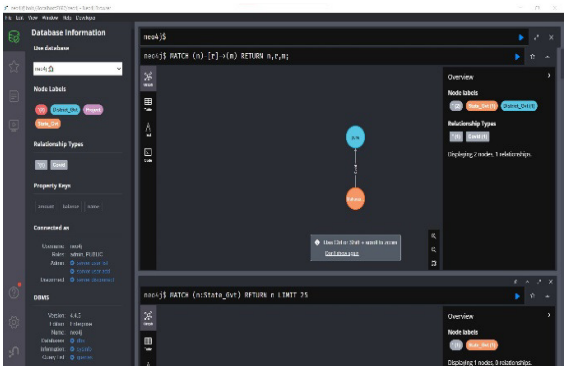
Allocate funds obtained from Central government to Projects.



Transaction ID can be used to track down the cashflow.



With ongoing transactions, a block chain is generated of which previous block hash and current block has is obtained.



Finally, Neo4j Desktop database is used to graphically represent fund transfer. And track down the flow of the currency hence achieving the motive of the project of bringing in transparency in flow of Public funds.

XI. Conclusion

In this secure and fail-safe government funds allocation and tracking system, allocated funds are tracked at all levels until they reach the recipients. This proposed framework is added to help authorities reduce corruption and provide transparency in all transactions due to blockchain capabilities. Immutability, proof-of-work, and security. It provides the right governance and transparency. It keeps track of all transactions made. Because blockchain technology is used, once transactions are made, they cannot be altered, and if attempted tempered, we can roughly identify that easily. There may be no requirement for the stranger, and the exchange can be regulated in a more robust and transparent manner. Besides avoiding human errors and delays, it helps eliminate human errors. That will make the operation of the general government framework significantly more stable and productive. However, we can upload common programs from around the world to raise funds to take it to the next level for a wide range of prizes needed by people in need.

XII. Future Scope

However, there is still scope for a lot of improvements that can be done in the application like implement a custom currency conversion interface and support for multiple vendors in order to receive funds from public directly.

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