

Public Work Department Fund Allocation and Tender Tracking System using Blockchain

Devakrishnan A

Department of Information Science & Engineering
AJ Institute of Engineering and Technology
Mangalore, Karnataka, India
devak8762@gmail.com

Joshwa Fernandes

Department of Information Science & Engineering
AJ Institute of Engineering and Technology
Mangalore, Karnataka, India
joshwafernandes74@gmail.com

Erica Fernandes

Department of Information Science & Engineering
AJ Institute of Engineering and Technology
Mangalore, Karnataka, India
ericafernandes2422420@gmail.com

Shamitha

Department of Information Science & Engineering
AJ Institute of Engineering and Technology
Mangalore, Karnataka, India
shamithapoojari73@gmail.com

Prof. Divya

(Project Guide)

Assistant Professor

Department of Information Science and Engineering
A. J Institute of Engineering and Technology
Mangalore, Karnataka, India
divyap@ajiet.edu.in

Abstract—The world's fastest-growing economy, India, offers a lot of opportunity for luring in foreign clients and adjusting to new developments. The vast powers of digitalization increase and strengthen connectivity in almost every area of its economy. However, there are times when these strategies are distributed unevenly among a few government departments. Governmental activities necessitate a vast array of financial transactions. This involves starting new projects, performing repairs and maintenance, granting contracts, paying government employees, and so forth. Low-level corruption, which hinders progress and is frequently tough to trace, is a significant challenge for the government. Because of the existing situation, tracking it is a very challenging task.

INDEX TERMS: Blockchain, Ganache, IPFS, InterPlanetary File System, Smart contracts.

I. INTRODUCTION

The world's most fastest growing economy, offers a lot of opportunity for luring in foreign clients and adjusting to new developments. The vast powers of digitalization increase and strengthen connectivity in almost every area of its economy. However, there are times when these strategies are distributed unevenly among a few government departments. Governmental activities necessitate a vast array of financial transactions. This involves starting new projects, performing repairs and maintenance, gran

ting contracts, paying government employees, and so forth. Thereby offering a really well -developed suste with low corruption, which hinders progress and is frequently tough to trace, is a significant challenge for the government. Because of the existing situation, tracking it is a very challenging task.

The world is becoming more digital in every way right now in this era of technology and digitalization. Each block contains specific information, such as the number of transactions, and the peer network of participants updates the record whenever a transaction occurs. And this decentralised data storage method is known as "Distributed Ledger Technology" (DLT). Without relying on a centralised source of trust, blockchain technology uses distributed software to create a shared ledger with a single source of truth for the transactions that are recorded. Consequently, technology promotes trust in the digital world. Any asset, physical or digital, can be represented and tracked on a blockchain network, bringing transparency, speeding up computation, and cutting costs. Smart contracts can automate blockchain as well. Transparency, security, and efficiency are thus advantages of blockchain technology, making it a layer of trust over the internet for a variety of applications. To support a variety of governmental and public sector applications, such as roads, highways, bridges, and government buildings, the Public Works Department (PWD) needs this kind of leverage. Blockchain thus makes handling the transactions for these tenders very simple. Public works development (PWD) is the term used to

describe infrastructure projects and services provided to the general public by governments or other public sector organisations. These may include things like building public facilities, sewage and water systems, and roads.

The InterPlanetary File System (IPFS), a peer-to-peer network and protocol, is used to store and share data across dispersed file systems. It is similar to HTTP but is constructed more like BitTorrent. By retrieving a file based on its content rather than its name or location, IPFS enables end-to-end sharing and content addressing over the network. Juan Benet is responsible for the project's original design. IPFS is free software and has a large user base.

The creation of IPFS was significantly influenced by Bitcoin. The Blockchain protocol for Bitcoin has given rise to design elements including network architecture for data storage, elimination of redundant records, and addressing of nodes connected to the network.

Bitcoin had a big impact on the development of IPFS. Thereby, deploying design features including network architecture for data storage, the removal of redundant records, and addressing of nodes connected to the network have all been made possible by the Blockchain protocol for Bitcoin.

PWD projects may receive funding in one form or another from the government or another funding source. Blockchain technology, a distributed database that records transactions and data in a safe and transparent manner, can be used to track this allocation of cash. There are various possible advantages to using blockchain for tracking and allocating PWD funds. For instance, it can ensure that money is utilised for what it is intended for and can serve as a record of how money was used. Bitcoin had a big impact on the development of IPFS.

A local blockchain network can be built using Ganache, a well-liked blockchain development tool, for testing and development. Without the requirement for an actual blockchain network, it offers developers a user-friendly interface that enables them to mimic transactions and interactions with a blockchain network. Developers can build a local blockchain network with a predefined set of accounts and balances using Ganache. You can simulate transactions and other interactions on the blockchain network using these accounts. Before releasing them to the live network, developers can test their smart contracts, dApps, and other blockchain applications in a virtual setting. Design features including network As all transactions and data are recorded on the blockchain and accessible to anyone with the right permissions, it can also aid in enhancing transparency and accountability. Due to the fact that all transactions are tracked and can be audited, using blockchain for PWD fund allocation and tracking can also help to lower the

risk of fraud or corruption. This may serve to boost public confidence in PWD projects and public trust in the public sector. Overall, the use of blockchain for the distribution and tracking of PWD funds can help to increase the effectiveness and efficiency of PWD projects while also enhancing accountability and transparency.

II. PROBLEM STATEMENT

The ongoing scenario of the entire system intuitively that whenever a project is being stated by the Public Work Development (PWD), the contractors need to submit certain quotations for the tenders. While these processes, there is a tendency to take bribes by the sub-authorities or intermediaries from the vendors to get their quotation selected which will not be recorded thereby causing low-level corruption. And once all the tender work is done, while passing the bill entities to the engineers or local organizations there is another chance of corruption again. So, in order to avoid this measure, the proposed system for the public work development (PWD) fund allocation and tracking using blockchain provides a confined way of handling such kinds of bribe and low-level corruption. The system states that whenever a tender is introduced on the website by the higher authority, the various vendors have to submit quotations and out of all the quotations, the lowest and the best quotations will be selected. Since the system is implemented using Blockchain technology, there is no chance of forcing bribes on the engineers or the intermediate authorities thereby, implementing transparency and accountability.

III. OBJECTIVE

The Objectives comprises of the following:

- **Secure and transparent platform:** The system will be built on blockchain technology, which provides a secure and transparent platform for recording transactions and maintaining a tamper-proof ledger. This will help to prevent corruption and ensure greater accountability in the management of public funds.
- **Efficient allocation of funds:** The system will allow for the efficient allocation of funds to different projects and activities based on predefined criteria such as the priority of the project, the estimated cost, and the available funds.
- **Real-time tracking of project progress and expenses:** The system will enable real-time tracking of project progress and expenses, which will help to ensure that funds are being used for their intended purpose and that projects are completed within budget and on time.
- **Integration with existing systems:** The system will be designed to integrate with

existing PWD systems such as accounting and project management software, to ensure seamless data exchange and to reduce the administrative burden on PWD staff.

- **Improved decision-making:** The system will generate automated reports and analytics based on the data collected, which will help PWD staff to make more informed decisions about the allocation and management of public funds.

V. LITERATURE REVIEW

Abhishek Katore, Sanskar Choubey et al. [1] in “Government Scheme and funds tracker using blockchain”, proposes a transparent execution of transactions done within the city/small scale industries/ large scale industries which involves the tracking of funds. The system uses encryption for secure transactions and uses hashes for maintaining a block of transactions. The system initiates with the payer and all the transactional details will be stored in a database. These transactional details contained in block will be added to the network. Followed by validation, the transaction block will be added to the blockchain network. Then the details will be added to the distributed ledger which can be accessed by the public to track the transactions.

Apoorva Mohite, Ajay Achary et al. [2] in “Blockchain for Government fund tracking using Hyperledger”, presents a system which uses Hyperledger as a tool for writing a smart contract. The system processes basically start with a transaction which is represented by a block. The block contains the details of the transactions like the amount, payer, the payee and the purpose of a transaction along with a transaction ID. Now the block containing the information mentioned is broadcasted into the network. The nodes i.e., real people in the network validate the transaction. Next, the block with timestamp is added to the blockchain. Therefore, all the transactions will be recorded in the decentralized ledger which is visible to public. The Hyperledger Composer tool allows us to rapidly prototype blockchain applications by defining a business model and deploying it on the Hyperledger.

Rishita Gawade, Aditi Kale, Snehal Mane, Ashutosh Koli et al. [3] in “Government Fund Allocation and Tracking System using Blockchain”, the system makes use of a decentralized application that tracks the funds granted by the state government. The two modules include: Admin and User. The multistep verified transactions are addressed in this system which prevents the low-level corruption. Blockchain technology here decreases the theft and makes the entire high-level transaction to department and public fund transactions convenient. It ensures security because the data is stored in the blocks with the timestamps.

All transactions submitted in this manner will be noted and made publicly available to everyone. In this full-proof, secure government fund allocation and tracking system, the allotted funds are tracked at each level until it reaches the beneficiaries. This proposed framework is added to assist the authorities to lessen corruption and offer transparency in all transactions because of the functions of blockchain-like immutability, proof of work, and security.

Sahil Siddharth Jambhulkar, Vishakha Prashant Ratnaparkhi [4] in “Government Fund Distribution and Tracking System using Blockchain Technology” This paper provides transparent in every transaction sealing every transaction with the proof as the fund flows. It offers on-demand right to transactional data. The system uses encryption for security with the hashes in a chain manner to maintain block of transactions. Each node verification takes place for authentication purpose and the transaction data is saved. The system consists of three modules i.e., Government (which gives the user requested fund), Authority (to authorize & verify the user for identification), User (the one requesting funds as per the need). Thereby, providing a full proof, secure & authentic fund allocation and tracking.

Umair Ansari, Siddhant Patodia, Zainab Mirza et al. [5] in “Government Fund’s Allocation and Tracking System Using Blockchain Technology”, provides tracking of funds by the government. This system proposes a login framework for users for them to apply for their required funds. Tracking of actions is done with graph and a table is used to track the allocation performance. The authorized person creates an entity, in which the funds will be transferred which makes it transparent. Usage of hashes for encryption resulting in verification of each node. Therefore, this system offers a crystal-clear and authentic transactions. Blockchain technology is revolutionary. It will make life simpler and safer by changing the way personal information is stored and how transactions for goods and services are made.

HNour Diallo, Weidong Shi, Lei Xu, Zhimin Gao, Lin Chen, Yang Lu, Nolan Shah, Larry Carranco, TonChanh Le, Abraham Bez Surez, Glenn Turner et al. [6] in “eGov-DAO: a Better Government using Blockchain based Decentralized Autonomous Organization”, introduces e-governance with the decentralized autonomous organization (DAO). This system uses blockchain & smart contract (includes creation, acceptance, execution & transaction result confirmation) and DAO (smart contract with rules of governing an organization having set of goals). The system uses a high-level architecture containing a DAO maintainer & users for the transparency and trustworthy work. The remaining include bidding & selection, monitoring contract execution, auditing,

user registration, contract preparation and submission. Entirely, this system is full-proof, secure transactions system.

Kalpesh Bhole, Kunal Bathija, Tamanna Saini, Anuraj Bhosale et al. [7] in “Allocation and Tracking of Public Funds using Blockchain”, the authors attempted to create a blockchain network to maintain all of the data regarding fund allocations by the government with security and transparency of the fund flow. The system consists of two modules i.e., Allocation & tracking of public funds and e-tendering process. The results of the transactions are showcased through graphical representation using Neo4J. This paper proposes a solution towards a secure and transparent fund allocation & tracking system using blockchain technology that also includes e-tendering process. Thereby, working to be a digital ledger. The earlier methods that have been used for allocation and tracking of public funds were not up to the mark.

Vikas Hassija, Vinay Chamola, Neeraj Kumar, Mohsen Guizani et al. [8] in “A Blockchain and Edge Computing Based Secure Framework for Government Tender Allocation”, shows the process involving in the allocation of tenders from government lenders to constructors. This includes the construction of a secure edge computing infrastructure. The system provides a double-auctioning between the constructors and government lenders. The system mainly consists of three types of entities: government officials, external parties like construction companies or individual constructors, and banks/ The system makes use of smart contract design and a decentralized document storage, Consensus algorithm and optimal price formulation. The process involves 3 layers of Cryptographic encryption. The first layer uses the Elliptical Curve Digital Signature Algorithm (ECDSA). The complete work-flow is transparent and visible to the members of the particular channel. The flow will also help to showcase the malicious nodes. No one can tamper the status of the transactions thereby contributing to immutability.

Ardiansyah, Fathurrahmad, Fauzan Putraga Albahri, Bahruietal. [9] in “Village Fund Allocation Information System Design”, proposes to have a strategic role in the village development. This contributes to have a government that faces the condition of the community’s education level being still weak. The system mainly describes and analyzes the management of village fund allocation in empowering rural communities. The driving and inhibiting factors for the management of village fund allocation in empowering rural communities. This creates an online budget data processing information system design, and improve all aspects of data forms or expand the relationship or relationship of each data.

Muhammad Nasir Mumtaz Bhutta, Amir a. Khwaja1, Adnan Nadeem, Hafiz Farooq Ahmad, Muhammad Khurram khan, Moatiz a. Hanif et al. [10] in “A Survey on Blockchain Technology: Evolution, Architecture and Security” Blockchain is a revolutionary technology that is making a great impact on modern society due to its transparency, decentralization, and security properties. Blockchain gained considerable attention due to its very first application of Cryptocurrencies e.g., Bitcoin. In the near future, Blockchain technology is determined to transform the way we live, interact, and perform businesses. Recently, academics, industrialists, and researchers are aggressively investigating different aspects of Blockchain as an emerging technology. Unlike other Blockchain surveys focusing on either its applications, challenges, characteristics, or security, we present a comprehensive survey of Blockchain technology’s evolution, architecture, development frameworks, and security issues.

Noe Elisa, Longzhi, Yang, Fei Chao, Yi Cao et al. [11] in “A framework of blockchain based secure and privacy preserving E-government system” proposes an e-government framework that enforces security and privacy in the public sectors by employing the blockchain technology. The theoretical and qualitative analysis on security and privacy of the framework shows that, cryptography, immutability and the decentralized management and control offered by the blockchain technology can provide the required security and privacy in e-government systems. The proposed system also has the potential of solving the interoperability issues between governance departments which is one of the limitations of existing e-government systems. As this work is limited at the framework and theoretical discussion level, the active future work is to implement such framework and then further explore its full potential in a real-world environment.

VII. METHODOLOGY

The project employs a systems design is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development. The purpose of the system design process is to provide sufficient detailed data and information about the system and its system elements to enable the implementation consistent with architectural entities as defined in models and views of the system architecture. The design of the system is perhaps the most critical factor affecting the quality of the software, and has a major impact on the later phases, particularly testing and maintenance.

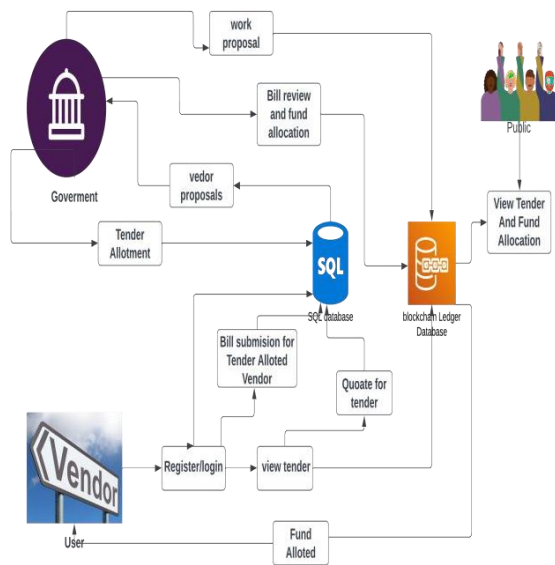


Figure 1. System Architecture

Blockchain technology has the potential to revolutionize the way funds are allocated and tracked for public work development projects. Here in Figure 1, it is a possible system architecture for a blockchain-based approach to fund allocation and tracking in the PWD: A decentralized platform, such as Ethereum, is used to host the blockchain. The platform is powered by nodes that run the blockchain software and validate transactions. A smart contract is deployed on the blockchain to manage the fund allocation and tracking process. The smart contract is programmed to accept funds from donors and allocate them to specific projects. It starts with a user registration, after which there will be access to the user profile and also it is allowed to view the tender and accordingly show the sent quotations. After all the quotations are forwarded, the forwarded quotations can be viewed along with its bill. And all these view accessories will be analysed based on the tenders, quotations, and bill evaluations. After which based on the user and its tender aspects, if it is accepted or rejected, the details can be seen. This shows the amount allocated to the user. All these options are offered to the user to have a keen track of the fund allocations. A public database, accessible via the blockchain, is used to store information about each project, including the amount of funds allocated, the status of the project, and any relevant documents or reports. A user interface, such as a web application, is provided to allow stakeholders, including donors, PWD officials, and the general public, to access and interact with the information stored on the blockchain. Stakeholders can use the user interface to view the status of projects, track the use of funds, and view relevant documents and reports. The smart contract is programmed to ensure that funds are used for their intended

purpose and that all transactions are transparent and auditable. Following are the steps:

- Initially Government official will add vendor to portal after verifying them. View Web Application Controller Registration Digital Verification Tender Allotment & Submission Bill review & fund allocation Transfer Fund Model Storage Vendor Data Project Data Vendor Billing Information Fund Allocation Information.
- Government will do the verification and either reject or approve.
- Approved requirements will be shown on Vendor login and they can add their tender accordingly (price, work file of contractor).
- Bid will be raised and the most efficient and optimal bid will be approved by Government and will be shown on Portal.
- Now after the completion of work the vendor submits the work on the portal and the bill can be viewed by all and the bill will be reviewed in two days and then the status is updated.
- Fund will be received by the vendor.

Overall, this system architecture allows for a transparent and efficient process for allocating and tracking funds for public work development projects, while also providing a high level of security and accountability.

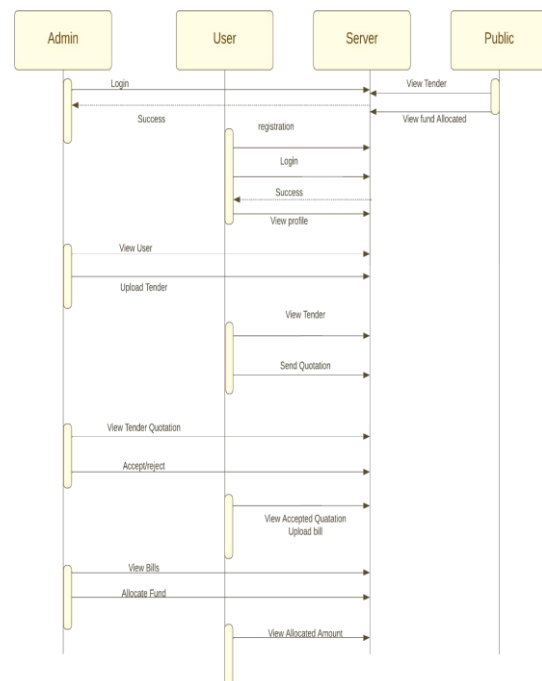


Figure 2. Sequence diagram

Several different phases of the sequence diagram are being focused here which mainly comprises of the admin, user and the public work sequence which can be clearly depicted from Figure2. Sequence diagram for admin:

The Sequence of operation done by admin is:

- Initially the admin logs in to the application.
- There will be an option to add Tender . Admin adds the Tender.
- The UI proceeds the request to Ipfs for the transaction to be recorded in the blockchain.
- Admin confirms the transaction.
- Transaction gets registered in the block, which is immutable.
- Admin have the option to accept the Quotation.
- Admin verifies the bill and allocate the fund.
- When transactions are completed a certain amount of gas fees is deducted in the form of ethers.

Sequence diagram of user:

The sequence of operations:

- Initially the User logs into the application with his credentials. If he is not an existing user, he will have to sign up first and then login.
- The voter will receive a confirmation after the admin accepts the request for login.
- Once registration process is complete, he will need to wait for the admin to upload the tender.
- In the tendering phase the user can see the tender and send quotation.
- If the User wins the Quotation the user can send the bill after completion of work.
- Once completed User will receive the fund

from the admin/government.

Sequence diagram of Public:

- The Public can view the tender.
- And the public can view the allocated fund.

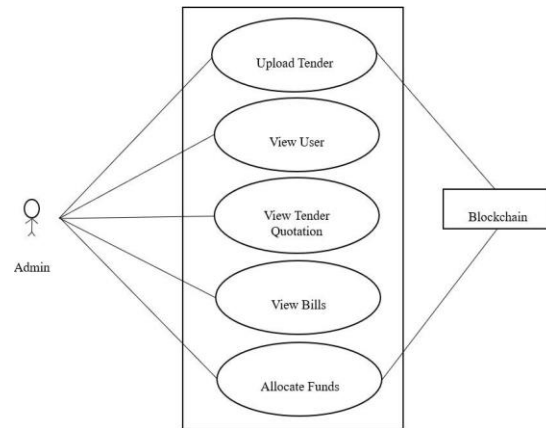


Figure 3. Admin Use-case diagram

As an admin, their role is critical to the success of the website. You have a range of important tasks to perform, all of which contribute to the smooth running of the site and the satisfaction of users. In this article, we'll take a closer look at some of the key responsibilities of an admin and how they help to ensure the success of the site as shown in Figure 3.

One of the primary tasks of the admin is to upload tenders to the website. This is an essential aspect of the site, as it enables businesses and individuals to compete for a contract to supply goods or services to the government. Only the admin has the authority to upload tenders to the website. When the admin uploads the tender file, it is converted into a unique hash by the IPFS server. This ensures that the file is secure and cannot be tampered with. The hash is then stored in the blockchain, making it immutable and transparent. This ensures that the tender is secure and can be accessed by authorized users. Another important task of the admin is to view users who have registered on the website. The admin has the authority to accept or reject users based on their qualifications and experience. The details of the users can be seen by the admin, and they can also view the tenders for which the users have applied. This helps the admin to select the most suitable candidate for the tender. By carefully vetting the users who register on the site, the admin helps to

ensure that the tenders are awarded to qualified and reputable individuals.

The admin can also view the tender quotations that are sent by the users to various tenders. The admin can then analyze the quotations and decide which one to choose. This is an important task, as it helps the admin to select the best offer for the tender. The admin can read through the quotations and make an informed decision based on the quality of the quotation and the reputation of the user. By carefully selecting the winning bid, the admin helps to ensure that the tender is completed successfully and on budget.

Another important task of the admin is to view bills. The bills contain details such as the amount, budget, and expenses of the tender that the users have sent to the tender. Based on this information, the admin can pick the most profitable offer for the tender. The admin can also allocate funds to the selected user based on the budget of the tender. By carefully managing the funds allocated to the tender, the admin helps to ensure that the tender is completed within budget and that the selected user is paid fairly for their work.

In addition to these tasks, the admin is also responsible for ensuring that the site is secure and that the privacy of users is protected. This includes implementing strong security measures, such as two-factor authentication and encryption, to prevent unauthorized access to the site. The admin must also ensure that user data is stored securely and is not shared with third parties without the user's consent.

Furthermore, the admin must ensure that the site is user-friendly and easy to navigate. This includes optimizing the site for different devices and screen sizes, as well as ensuring that the site is accessible to users with disabilities. By providing a user-friendly and accessible site, the admin helps to ensure that users can easily find the information they need and can participate in tenders without any difficulty.

Finally, the admin must be responsive to user feedback and complaints. This includes addressing any issues that users may have with the site, as well as responding to questions and concerns in a timely and professional manner. By providing excellent customer service, the admin helps to ensure that users have a positive experience on the site and are more likely to return in the future.

In conclusion, the role of the admin is critical to the success of the website. The admin has several

important tasks, including uploading tenders to the website, viewing and selecting users, analyzing.

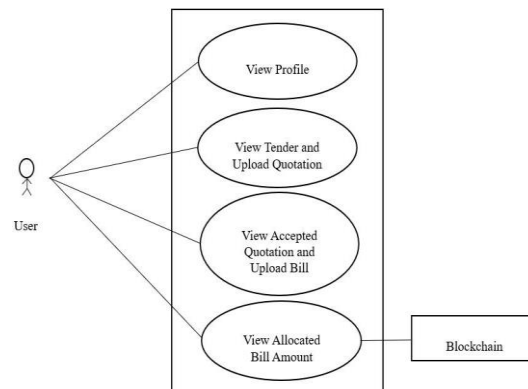


Figure 4. User Use-case diagram

The User makes a great impact and it's vital that every information of the user is valid. Once the user is logged in, it is allowed to access all the functionalities which include viewing the profile, tender details and uploading the quotations which is being depicted in Figure 4. This provides the information on whether the quotations are accepted or not and on the evaluation, uploads the bill. After the bill is produced for the allocated amount, it is also displayed and the user can view it which will be stored in the blockchain which cannot be altered.

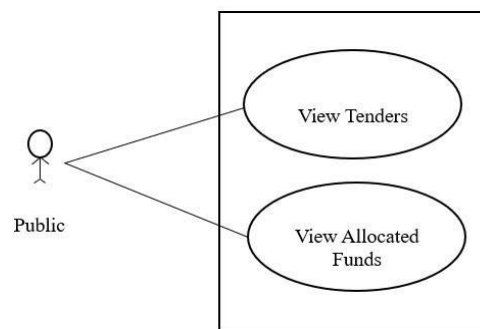


Figure 5. Public Use-case diagram

The above Figure 5 shows that the public has the access to viewing the tenders and the allocated fund after all the login and registration processes which makes it very definite and public approached. This also depends on the acceptance or disapproval of the quotations, which impacts on showing the tenders of the people mentioning if the tenders are selected or not.

The authenticity in the project is mainly because of the IPFS because it is offering a good transparency due it's connectivity aspects which is very important for the project. This makes the system alteration proof and a secure contract execution.

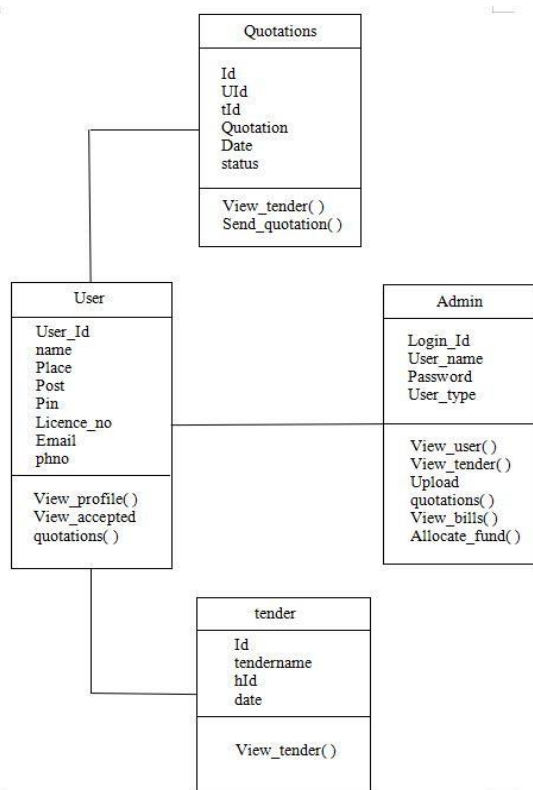


Figure 6. Class diagram of the system

A class diagram in the Unified Modelling Language (UML) shows the connections and dependencies between classes in the source code. A class, which in this instance refers to a particular item in a program or the chunk of code that corresponds to that thing, defines the methods and variables in an object. In all types of object-oriented programming (OOP), class diagrams are helpful. Although the idea has been around for a while, it has been improved as OOP modelling paradigms have advanced. Classes are placed in groups according to features in class diagrams. A class diagram looks like a flowchart where classes are represented by boxes with three rectangles inside each box. The class name is located in the top rectangle, its attributes are located in the middle rectangle, and its methods, which are also known as operations, are located in the lower rectangle. Users, administrators, and tender are the four types of quotes illustrated in the picture below, along with a relationship chart.

The class diagram from Figure 6, includes four main entities: Tender, Quotations, Admin, and User. Tenders are created by Admins and contain information about a project that needs to be completed. Users can view Tenders and submit Quotations to be considered for the project. Quotations include information about the services and pricing offered by the User. The system ensures that each User can only submit one Quotation per Tender, and Admins can only select

one Quotation per Tender. Additionally, all Users must be registered and logged in to submit a Quotation.

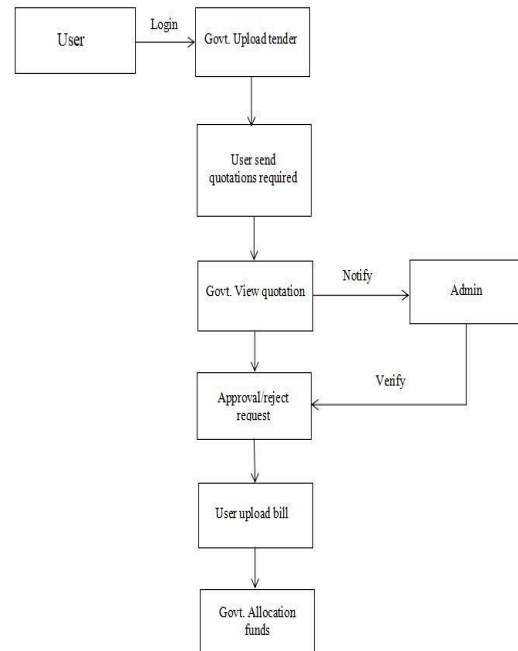


Figure 7. Modular design diagram

Modular design or “modularity in design”, is a design approach that subdivides a system into smaller parts called modules or skids that can be independently created and then used in different systems as shown in Figure 7. A modular design can be characterized by functional partitioning into discrete scalable and reusable modules, rigorous use of well-defined modular interfaces, and making use of industry standards for interfaces. A modular system can be characterized by functional partitioning into discrete scalable, reusable modules; rigorous use of well-defined modular interfaces; and making use of industry standards for interfaces. Entire project is divided into three modules:

- User : he is responsible for registerin and sending quotations to the tender.
- blockchain fund allocation system : This is the main module which keeps track of all transaction information, functioning process of the funding and also view how much fund is allocatedto the user. This module is responsible for bringing up different phases in the system as mentioned in the use case diagram above.
- Admin : Admin is responsible for uploading the tender, approve the user, accept or reject the quotations by verifying them and finally alloacte the fund.

VIII. RESULT EVALUATION

Result evaluation refers to the process of assessing the outcome of a project or activity against the expected goals and objectives. It involves measuring the effectiveness and efficiency of the process. It helps to determine the success of the project and provides valuable insights for future planning and decision-making. Effective result evaluation is crucial for ensuring accountability, transparency, and continuous improvement with respect to the PWD fund allocation and tracking using blockchain.

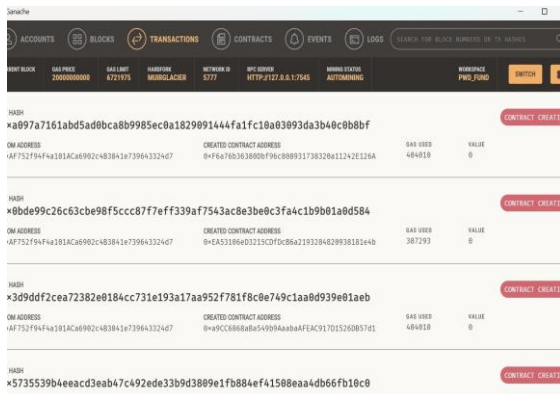


Figure 8. Contract creation

The implementation after the IPFS contradiction and through the ganache working of the smart contracts, it shows transaction details of deploying the smart contracts to the blockchain. There are four transactions made for two contracts which is intuited in the above Figure 8.



Figure 9. Homepage

This is the home page of the web application. User has to click on login for the tender process and public has to click on tenders for viewing tender details that can be seen in Figure 9. Also, the admin can login and for the its functionalities like viewing the tenders, selection of quotations, amount sanctioning, acceptance or rejection of the quotations and viewing the status. This is the main page from the entire project process can be accessed.

VIII. CONCLUSION

The suggested system will track the transactions in this way and inform the vendors and higher authorities when the funded funds have successfully reached the beneficiary. The blockchain technology claims to be appropriate for transactions that are both transparent and secure. A host that can authenticate transactions is required when the state government delivers payments. As a result, this offers a method for securely storing transactional records. Blockchain technology stops low-level corruption, which can be difficult to trace and hinders state progress. The tracking system is available at all times and assists in keeping an eye on all the data. As a result, the system enables a complete, authentic, secure, and reliable resource allocation and fund monitoring system to aid in the formation of an incorruptible government process. This application will increase transparency throughout the entire process. Because individuals are aware of what they are purchasing and how the system will assist in resolving the issue, this system aids in resolving trust difficulties..

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