GOVERNMENT FUND ALLOCATION AND TRACKING SYSTEM USING BLOCKCHAIN

Submitted in partial fulfillment of the requirements for the award of Bachelor of Technology degree in Information Technology

by

NAVEENKUMAR P (41120128)

BALACHANDRAKUMAR S (41120036)

DEPARTMENT OF INFORMATION TECHNOLOGY

SCHOOL OF COMPUTING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A++" by NAAC

12B Status by UGC Approved by AICTE

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

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SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMEDTOBEUNIVERSITY)
Accredited with "A++" grade by NAAC
I 12B Status by UGC I Approved by AICTE
Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai – 600 119
www.sathyabama.ac.in

DEPARTMENT OF INFORMATION TECHNOLOGY

BONAFIDE CERTIFICATE

This is to certify that this Project Report Phase-I is the bonafide work of **BALACHANDRA KUMAR S (41120036), NAVEENKUMAR P (41120128)** who carried out the project entitled " **GOVERNMENT FUND ALLOCATION AND TRACKING SYSTEM USING BLOCKCHAIN** " under my supervision from June 2024 to August 2024.

27/8/24

Internal Guide
Ms. J. MERLIN MARY JENITHA, M. Tech,

Head of the Department
Dr. S. REVATHY, M.E., Ph.D.,

Submitted for Viva voce Examination held on 28/8/24

28/8/24
Internal Examiner

28/8/24
External Examiner

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DECLARATION

I **BALACHANDRA KUMAR S (41120036)** hereby declare that the Project Report Phase- I entitled **"GOVERNMENT FUND ALLOCATION AND TRACKING SYSTEM USING BLOCKCHAIN"** done by me under the guidance of **Ms. J.Merlin Mary Jenitha, M.Tech,** is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology degree in **Information Technology.**

DATE: 28-08-24

PLACE: CHENNAI

S. Balachandra Kumar.

SIGNATURE OF THE CANDIDATE

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ABSTRACT

The Government Fund Allocation and Tracking System using Blockchain aims to enhance transparency, accountability, and efficiency in the management of public funds. Traditional systems often face challenges such as opaque processes, delayed transactions, and susceptibility to corruption. This project proposes a blockchain-based solution that leverages decentralized ledger technology to ensure real-time tracking and verification of fund distribution and utilization. By integrating smart contracts and blockchain's immutable ledger, the system provides a transparent, tamper-proof record of fund allocations and expenditures. Users can trace the flow of funds from the initial allocation to the final expenditure, ensuring compliance with budgetary constraints and reducing the risk of mismanagement or fraud. The implementation of this blockchain-based system is expected to improve public trust, streamline administrative processes, and foster a more efficient and secure environment for government financial operations. This project will involve designing the blockchain architecture, developing smart contracts, and creating a user-friendly interface to interact withthe system. State Governments need to caters to a huge number of responsibilities of a state. The working of state governments involves huge number of transactions towards various operations that need to be carried out throughout the state. This includes new projects, repair and maintenance works, awarding contracts, paying of government employees, farmer schemes and so on. A major hurdle that the top government face is the low level corruption that issometimes impossible to track which deprives the state progress. Tracking it is avery difficult task due to the current system. Here we propose a smart system totrack funds allocated to the state government as they travel through the government process at each stage.

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CHAPTER 1

INTRODUCTION

Blockchain is one of the technologies that have created a disruptive change in several industries. Currently, Blockchain is getting used 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 information stored within the chain, and its openness. Due to these characteristics, another area in which Blockchain can be used is to release funds for government projects. Governments have to cater to an enormous number of responsibilities of a state.

The working of state governments involves numerous transactions towards various operations that require 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 serious hurdle that the highest government faces is the low-level corruption that's sometimes impossibleto trace, which deprives the state of progress. Tracking it's a really difficult task because of the present system. Blockchain is touted for its capability to reinforce the trust and ease of information-based exchanges among people and associations.

The innovation offers a guarantee when deliberately applied within the proper settings. Customarily, associations working their own, singular IT frameworks trying to group must pander to difficulties including compromise of data, 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 that no single substance controls the complete framework. Government incorporates a characteristic need to assemble, support, and ensure open trust in data and frameworks. In such kinds of situations, blockchain may help to boost this trust.

CHAPTER 2
LITERATURE SURVEY

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy and company strength. Once these things are satisfied, then the next step is to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from book or from websites. Before building the system the above consideration are taken into account for developing the proposed system. The major part of the project development sector considers and fully survey all the required needs for developing the project. For every project Literature survey is the most important sector in software development process. Before developing the tools and theassociated designing it is necessary to determine and survey the time factor, resource requirement, man power, economy, and company strength. Once these things are satisfied and fully surveyed, then the next step is to determine about the software specifications in the respective system such as what type of operating system the project would require, and what are all the necessary software are needed to proceed with the next step such as developing the tools, and theassociated operations.

2.1. DETAILED LITERATURE SURVEY

[1]. Vani K A a , Aditya P Kulkarni b , Arjun Sb , K Tarunb , Mohammed Saqheeb , State Government Fund Allocation and Tracking System Over Blockchain, International Journal of Research Publication and Reviews, Vol 4, no 5, pp 5345-5348 May 2023.

Description

The state government has many departments which have various schemes that are used to provide funds to the citizens that qualify for them depending upon the requirements laid down by the government for each scheme. This means that there needs to be a centralized system which will be able to keep track of all the various applications, document approval status, sanctioned amounts and all the different schemes that the government is offering. Improvement in overall efficiency and quality of user experience for government can lead to tackling of other administrative problems using emerging technologies like Blockchain.

Merits

1. **Security**: Blockchain's encryption and immutability ensure data cannot be altered or accessed by unauthorized users.
2. **Transparency**: All transactions are recorded on a public ledger, making the process transparent and trustworthy.

Demerits

1. **Complexity**: Implementing blockchain technology requires specialized knowledge and skills.
2. **Cost**: Initial setup and maintenance can be expensive.

[2]. Heru Susanto and Nurul Kemaluddin, April 2023, Innovative Blockchain-Based Tracking Systems, A Technology Acceptance for Cross-Border Runners during and Post-Pandemic, Sustainability 2023, 15(8), 6519; Submission received: 30 July 2022 / Revised: 2 January 2023 / Accepted: 7 February 2023 / Published:12 April 2023

Description

This study aims to design and implement an online blockchain-based and real-time parcel monitoring and tracking system for cross-border runners and the customer via an online platform, during and post the COVID-19 pandemic. A blockchain is a distributed ledger system that serves as a transparent, understandable, and trustworthy store of data and analysis on the platform for participants to engage with each other.

Merits

1. **Transparency**: Blockchain provides a transparent and immutable record of parcel movements, allowing all participants to view the status and history of parcels.
2. **Real-Time Tracking**: Enables real-time monitoring of parcels, improving the efficiency and accuracy of tracking and reducing the chances of loss or theft.

Demerits

1. **Implementation Complexity**: Setting up a blockchain-based tracking system can be complex and require specialized knowledge and technology.
2. **Cost**: Initial development and deployment of a blockchain system can be expensive, and ongoing maintenance might add to the costs.

[3]. Reyan M. Zein and Hossana Twinomurinzi, April 2024, Information Sharing in Land Registration Using Hyperledger Fabric Blockchain, *Blockchains* 2024, *2*(2), 107-133,Submission received: 5 March 2024 / Revised: 7 April 2024 / Accepted: 8 April 2024 / Published: 16 April 2024

Description

Blockchain technology is increasingly being recognized for its pivotal role in enhancing security, immutability, and transparency across government sectors, notably in land registration (LR) processes. This research emphasizes the need for contextually adapted blockchain technology solutions, particularly in resource-constrained and culturally diverse settings. Utilizing the elaborated action design research method, this study presents a Hyperledger-based blockchain technology system tailored for Sudan's LR, addressing technical challenges, evaluation frameworks, privacy measures, and deployment strategies.

Merits

1. **Enhanced Security**: Blockchain ensures secure land transactions byusing cryptographic techniques, making it difficult for unauthorized users to alter data.
2. **Immutability**: Once recorded, land transaction data cannot be changed, ensuring a permanent and tamper-proof record.

Demerits

1. **Implementation Complexity**: Developing and deploying a blockchain based land registration system can be technically challenging and require specialized skills.
2. **High Initial Costs**: Setting up blockchain infrastructure and training personnel can be expensive.

[4]. Sherimon , Sherimon P.C. , Jeff Thomas, A Blockchain Framework for Investment Authorities to Manage Assets and Funds , Vinu November 2023,

Description:

Investment authorities are broad financial institutions that carefully manage investments on behalf of the national government using a long-term value development approach. To provide a stronger structure or framework for Investment Authorities to govern the distribution of funds to public and private markets, we have started research to create a blockchain-based prototype for managing and tracking numerous finances of such authorities. We have taken the case study of Oman Investment Authority (OIA) of Sultanate of Oman. Oman's wealth is held in OIA. It is the organization that oversees and utilizes the additional capital generated by oil and gas profits in public and private markets. Unlike other Omani funds, this one focuses primarily on assets outside the Sultanate.

Merits

1. **Enhanced Transparency**: Blockchain provides a transparent and immutable record of all transactions, allowing all stakeholders to view and verify fund movements.
2. **Increased Security**: The cryptographic features of blockchain ensure that transactions are secure and resistant to tampering or fraud.

Demerits

1. **Implementation Complexity**: Developing and implementing a blockchain-based system requires significant technical expertise and resources.
2. **High Initial Costs**: The initial setup costs for blockchain infrastructure can be substantial.

[5]. Mohammad Mustafa Ibrahimy , Alex Norta, June 2024, A Blockchain based Fund Management System for Construction Projects, A Comprehensive Case Study in Xiong'an New

Description:

As large-scale construction projects become increasingly complex, the use and integration of advanced technologies are being emphasized more and more. However, the construction industry often lags behind most industries in the application of digital technologies. In recent years, a decentralized, peer-to-peer blockchain technology has attracted widespread attention from academia and industry. This paper provides a solution that combines blockchain technology with construction project fund management. The system involves participants such as the owner's unit, construction companies, government departments, banks, etc., adopting the technical architecture of the "Xiong'an Blockchain Underlying System"

Merits

1. **Transparency**: Blockchain ensures that all transactions are visible to authorized parties, enhancing trust and accountability among stakeholders.
2. **Traceability**: Every transaction is recorded on the blockchain, making it easy to trace the flow of funds and identify any discrepancies.

Demerits

1. **Implementation Complexity**: Integrating blockchain technology into existing construction fund management systems can be complex and require specialized expertise.
2. **High Initial Costs**: The cost of developing and deploying a blockchain-based system can be significant, particularly for large-scale projects.

[6]. Amit Bhusari1 , Rinu Vishwakarma2 , Dipali Bhusari3 , Snehal Shinde. GOVERNMENT FUND ALLOCATION TRACKING SYSTEM OVER BLOCKCHAIN JUNE 2024,

Description:

The prevalence of low-level corruption often hinders progress and obstructs the delivery of services to those in need. The existing system lacks a robust tracking mechanism, making it difficult to monitor and validate transactions, thus depriving deserving individuals of their entitlements. In response, this paper proposes a blockchain-based framework that leverages cryptography and transaction security to ensure transparency and provide an auditable trail of every transaction.

Merits:

1. **Enhanced Transparency**: Blockchain provides a transparent and immutable record of all transactions, making it easier to track and validate them, reducing opportunities for corruption.
2. **Improved Accountability**: With every transaction recorded on the blockchain, it is easier to hold parties accountable for their actions and ensure they fulfill their responsibilities.

Demerits

1. **Implementation Complexity**: Developing and integrating a blockchain-based system into existing government infrastructure can be technically complex and require significant expertise.
2. **High Initial Costs**: Setting up a blockchain system involves substantial initial costs for development, deployment, and training.

[7]. Amit Bhusari1 , Rinu Vishwakarma2 , Dipali Bhusari3 , Snehal Shinde. ,GOVERNMENT FUND ALLOCATION TRACKING SYSTEM OVER BLOCKCHAIN , MAY 2024,

Description:

The prevalence of low-level corruption often hinders progress and obstructs the delivery of services to those in need. The existing system lacks a robust tracking mechanism, making it difficult to monitor and validate transactions, thus depriving deserving individuals of their entitlements. In response, this paper proposes a blockchain-based framework that leverages cryptography and transaction security to ensure transparency and provide an auditable trail of every transaction.

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1. **Enhanced Transparency**: Blockchain provides a transparent and immutable record of all transactions, making it easier to track and validate them, reducing opportunities for corruption.
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Demerits

1. **Implementation Complexity**: Developing and integrating a blockchain-based system into existing government infrastructure can be technically complex and require significant expertise.
2. **High Initial Costs**: Setting up a blockchain system involves substantial initial costs for development, deployment, and training.

[8]. Mohammad Mustafa Ibrahimy , Alex Norta, June 2024. Blockchain-based governance models supporting corruption-transparency: A systematic literature review Journal: Blockchain: Research and Applications, 2024.

Description:

blockchain-based governance models in enhancing transparency and combating corruption. As corruption undermines governance and public trust, there is a growing interest in leveraging blockchain technology to address these issues. This review synthesizes existing research on blockchain implementations in governance, focusing on how these systems can improve transparency and reduce corrupt practices. The paper highlights various blockchain-based models and their effectiveness in different governance contexts, including public administration, financial management, and supply chain transparency.

Merits

1. **Enhanced Transparency**: Blockchain technology provides a transparent and immutable record of transactions, which helps in improving accountability and reducing corruption.
2. **Reliable Audit Trail**: The immutable nature of blockchain ensures a reliable and verifiable audit trail, making it easier to track and verify governance processes.

Demerits

1. **Scalability Issues**: Blockchain systems may face challenges in scaling to handle large volumes of transactions efficiently, which could impact their effectiveness in broad governance applications.
2. **Privacy Concerns**: Ensuring the balance between transparency and privacy can be challenging, particularly when sensitive data is involved.

[9]. Arijeet Singh, Mohd. Ahad, Donation Tracking System using Blockchain, 2023, IRJET | Impact Factor value: 7.529 | ISO 9001:2008 Certified Journal

Description:

A decentralized blockchain based donation tracking system that is designed to incorporate transparency, authenticity and verifiability in an online donation process. The system provides transparent accounting of operations for donors for direct access to the intended beneficiaries in the form of charitable foundations or individual recipients. Smart contracts are written and stored using the Solidity programming language on the Ethereum public blockchain which is programmed to run automatically when described conditions are met.

Merits

1. **Transparency**: Blockchain provides a transparent record of all transactions, allowing donors and beneficiaries to see how donations are allocated and used.
2. **Authenticity**: The use of smart contracts ensures that donations are onlyused as intended, reducing the risk of misallocation or fraud.

Demerits

1. **Technical Complexity**: Developing and maintaining a blockchain-based system requires specialized technical knowledge and skills.
2. **High Initial Costs**: Setting up a blockchain system and deploying smart contracts can be expensive, particularly for smaller organizations.

[10]. Dr. Rengarajan A1 , Adithya Parashar K C2, Hyperledger Fabric Based Blockchain Cross Border Fund Transfer Application, ISO 3297:2007 Certified Impact Factor 7.918 Vol. 12, Issue 3, March 2023 DOI: 10.17148/IJARCCE.2023.12304.

Description:

A Hyperledger Fabric based Blockchain application namely “CBFT Application” having the ability to query from the banks network’s data that is available as part of the blockchain (Reading bulk data from the Blockchain), query any one of the banks network’s data that is available as part of the blockchain (reading individual record or data from the blockchain.

Merits

1. **Enhanced Security**: Hyperledger Fabric provides a secure environment for managing and storing data, ensuring that only authorized parties can access or modify the blockchain records.
2. **Transparency**: All transactions and data modifications are recorded on the blockchain, providing a transparent and immutable audit trail for verification.

Demerits

1. **Technical Complexity**: Developing and deploying a Hyperledger Fabric- based application requires specialized technical skills and expertise, which may be a barrier for some organizations.
2. **High Initial Costs**: Setting up and maintaining a Hyperledger Fabric infrastructure can be expensive, particularly for smaller institutions or startups.

[11]. Deshmukh Abhishek1 , Bhosale Parth2 , Asst. Prof. Aparna Mote, Blockchain Based Farmer's Fund Distribution System.

Description:

The agricultural sector grapples with a host of real-time problems stemming from outdated fund distribution methodologies. The existing systems exhibit a lamentable lack of efficiency, transparency, and accountability, exacerbating the hardships endured by farmers, students, and entrepreneurs seeking essential financial support. This predicament, with its associated bottlenecks and corruption vulnerabilities, obstructs the timely allocation of funds, hindering not only the progress of individual beneficiaries but also the overall socioeconomic development of the region.

Merits

1. **Increased Efficiency**: The blockchain-based system streamlines the fund distribution process, reducing delays and ensuring timely allocation of financial support to farmers, students, and entrepreneurs.
2. **Enhanced Transparency**: The use of an immutable blockchain ledger provides clear and transparent records of every transaction, reducing opportunities for corruption and mismanagement.

Demerits

1. **Technical Complexity**: Developing and implementing a blockchain-based system involves complex technology and requires specialized expertise, which may be challenging for some organizations.
2. **High Initial Costs**: The setup and deployment of blockchain technology and mobile applications can be costly, particularly for regions with limited resources.

[12]. SAHIL SIDDHARTH JAMBHULKA, VISHAKHA PRASHANT RATNAPARKHI, GOVERNMENT FUND DISTRIBUTION AND TRACKING SYSTEM USING BLOCKCHAIN TECHNOLOGY NOVEMBER 2023

Description:

Governments need to cater to a huge number of responsibilities of a state. The working of state governments involves huge number of transactions towards various operations that need to be carried out throughout the state. This includes new projects, repair and maintenance works, awarding contracts, paying of government employees, farmer schemes and so on. A major hurdle that the top government face is the low level corruption that is sometimes impossible to track which deprives the state progress. Tracking it is a very difficult task due to the current system

Merits

1. **Enhanced Transparency**: Blockchain technology ensures that every transaction is recorded in an immutable ledger, providing clear and transparent records of fund allocations and movements.
2. **Increased Security**: The use of cryptographic hash functions and encryption algorithms like AES ensures that transaction data is secure and resistant to tampering.

Demerits

1. **Technical Complexity**: Implementing a blockchain-based system involves complex technology and requires specialized knowledge and expertise, which can be a barrier to adoption.
2. **High Initial Costs**: The setup and deployment of blockchain infrastructure, along with encryption and verification systems, can be costly, particularly for resource- constrained governments.

[13]. Vidya Dhoke , Manas Samant , Atharva Sasture , Shraddhey Satpute , Sumeet Satpute , Darpan Supekar , Tracking Government Funds using Blockchain Technology , DOI:10.15680/IJIRSET.2023.1205331 . SEPTEMBER 2023

Description:

The efficient and transparent management of government funds is crucial for ensuring public trust and accountability. Traditional systems often lack transparency, making it difficult to track fund allocation and utilization, leading to potential misuse and corruption. To address these challenges, this paper proposes a blockchain-based government fund allocation tracking system.

Merits:

1. **Auditable Records**: The immutable nature of blockchain ensures that all transactions are recorded in a way that can be audited at any time, facilitating better oversight and compliance.
2. **Efficient Tracking**: The system improves the efficiency of tracking funds throughout their lifecycle, from allocation to expenditure, reducing administrative overhead and processing delays.

Demerits

1. **Regulatory Compliance**: Navigating and complying with legal and regulatory requirements related to blockchain technology and data protection can be complicated.
2. **Privacy Concerns**: Although transparency is a benefit, ensuring the privacy of sensitive data while maintaining transparency can be a delicate balance.

[14]. Megha Rani R, Keerthesh, September 2022, Agriculture Fund Granting Schemes Using Blockchain, **Volume/Issue :** Volume 7 - 2022, Issue 9 – September.

Description:

Current agricultural development and reform are calling for new techniques and innovations to create a more transparent and accountable environment in the agriculture sector to provide full proof, secure authentic fund allocation. The proposed system keeps track of funds allocated, as this has to be processed at each stage of state government. Thus by building a decentralized database infrastructure that would resolve the problem by providing secure transfer of funds in efficient way.

Merits:

1. **Enhanced Transparency**: The system provides clear visibility into the fund allocation process, allowing stakeholders to track funds at each stage and reducing opportunities for corruption.
2. **Improved Security**: Using blockchain technology, the system ensures secure and tamper-proof transactions, protecting the integrity of fund transfers.

Demerits:

1. **Technical Complexity**: Implementing and maintaining a blockchain-based system requires specialized technical skills, which may pose a challenge for some government agencies.
2. **High Initial Costs**: Setting up the blockchain infrastructure and ensuring it is secure and efficient involves significant upfront investment.

[15]. Abhishek Katore Sanskar Choubey , May 2021, Government Scheme and Funds Tracker using Blockchain, International Journal of Engineering Research & Technology (IJERT) ,ISSN: 2278-0181 IJERTV10IS050403, Published by : www.ijert.org Vol. 10 Issue 05, May-2021

Description:

India, a fastest growing economy in the world has a great potential in attracting the global customers and adapting to new technologies and changes. Digitalization has a great capabilities which in turn improve and enhance the connectivity in nearly every sector of its economy. But at times the distribution of these approaches is uneven among few sectors of government. Adapting to the latest growing technologywill in turn help in bringing the great value and a drastic change in the mode of operations/work for the large group of people out there.

Merits:

1. **Decentralization**: The decentralized approach removes the need for a central authority, reducing the risk of single points of failure and making the system more resilient.
2. **Immutable Records**: Blockchain's immutability guarantees that once data is recorded, it cannot be changed or deleted, ensuring a permanent and accurate record.

Demerits:

1. **Technical Complexity**: Implementing and maintaining a blockchain-based system requires specialized technical skills and expertise, which can be a barrier for some government sectors.
2. **High Initial Costs**: Setting up the blockchain infrastructure involves significant upfront investment in technology, training, and integration.

2.2. INFERENCES FROM LITERATURE SURVEY

The modern state government faces an array of challenges in managing public funds, where issues such as inefficiency, opacity, and vulnerability to fraud have long undermined public trust and the effective allocation of resources. State governments traditionally grapple with inefficiencies, opacity, and susceptibility to fraud in managing public funds, undermining public trust and effective resource allocation. Moreover, collaboration between governments, private sector entities, and academia is essential for driving innovation, addressing scalability challenges, and ensuring compliance with regulatory frameworks.

The problems in the existing systems are:

- Provision of access to the assets to all users without any priority.
- Only using one security mechanism like hashing at a time.
- Not granting the applicants the ability to track the status of their funds.
- Only allowing a singular application from a participant per scheme.
- Giving the admin rights over the entire system that is a third-party userand might not be trusted completely.
- Added costs of cloud services that are required to store records.
- Extensive usage of the database for all transactions makes the storage less secure.
- The rejection level for an application is not being made clear to the applicant.

2.3. REVIEW ON EXISTING SYSTEM

In existing system during a project report is that section that suggests the numerous analyses and studies made in the discipline of your interest and consequently the outcomes already published, thinking of the varied parameters of the project and additionally the extent of the project.

A literature survey is the maximum substantial step in any reasonable study. Before beginning development, we need to test the preceding papers of our area in which we're operating and the idea of the look at what we're capable of expecting or generate the downside and start operating with the reference of preceding papers.

During this phase, we briefly evaluate the associated work on the Government Fund Allocation & Tracking System and the usage of Block-chain Technology.

CHAPTER 3

REQUIREMENT ANALYSIS

3.1. NECESSITY & FEASIBILITY ANALYSIS OF PROPOSED SYSTEM

Develop a transparent and secure fund allocation and tracking system using blockchain technology. Enable real-time visibility of fund flow to enhance accountability and transparency. Implement smart contracts to automate fund allocation processes and ensure compliance with predefined conditions. ▪ Utilize cryptographic techniques and consensus mechanisms to prevent unauthorized access and fraudulent activities. The state government working involves a large number of transactions activities towards various operations throughout the state. This includes new actions, initiatives, projects, granting contracts, farmer schemes, and so on. One of the most challenging factors that top governments face is low-level corruption which at times is hard to follow and denies the state progress. In this case, we use blockchain which enables cryptography and transaction securityat every stage while maintaining transparency so that every transaction is backedup with proof of its authenticity

3.2. SYSTEM REQUIREMENTS:

3.2.1 HARDWARE REQUIREMENTS

1. Processor

• **Intel Core i5-12600K:** This 12th-generation Intel processor features 6 performance cores and 4 efficiency cores, offering a total of 16 threads. It provides a high level of performance for both single-threaded and multi-threaded tasks, making it suitable for development, data processing, and general use.

• **AMD Ryzen 5 5600X:** This 6-core, 12-thread processor from AMD's Ryzen 5000 series offers strong performance for a wide range of applications. It provides excellent multi-core performance, which is beneficial for tasks like code compilation, running simulations, and handling complex computations.

2. Memory (RAM)

• **Capacity:** 16 GB of DDR4 RAM is sufficient for most development and data processing tasks. It allows for smooth multitasking and efficient handling of large datasets, applications, and development environments.

• **Speed:** Look for RAM with speeds of at least 3200 MHz to ensure optimal performance. Faster RAM can improve data access speeds and overall system responsiveness.

3. Storage

• **512 GB SSD:** An SSD (Solid State Drive) such as the Samsung 970 EVO provides fast read and write speeds, which translates to quicker boot times, faster application launches, and overall improved system performance. It is ideal for the operating system and frequently used applications.

• **1 TB HDD:** A Hard Disk Drive (HDD) like the Seagate Barracuda offers ample storage space for large files, backups, and less frequently accessed data. While slower than SSDs, HDDs provide a cost-effective solution for additional storage needs.

4. Graphics Processing Unit (GPU)

• **NVIDIA GeForce GTX 1660:** This GPU is well-suited for tasks that require decent graphical performance without being top-of-the-line. It is capable of handling most graphical and visualization tasks efficiently and supports various development tools and applications.

• **AMD Radeon RX 5600 XT:** This GPU offers strong performance for gaming and graphical applications, making it a good choice for tasks that involve rendering, machine learning, or any application requiring substantial GPU resources.

5. Network

• A 100 Mbps Ethernet connection provides reliable and sufficiently fast network access for most development and data processing tasks. It supports smooth file transfers, web browsing, and online collaboration.• This speed is adequate for tasks such as downloading and uploading code, accessing online resources, and collaborating on cloud-based platforms. For more intensive network activities or larger teams, faster connections (like 1 Gbps) might be considered, but 100 Mbps is generally sufficient for smaller-scale needs.

3.2.2 SOFTWARE REQUIREMENTS

This document outlines the software requirements for the development of a Government Fund Allocation and Tracking System using blockchain technology. The system aims to ensure transparency, accountability, and efficiency in the allocation and utilization of government funds.

Development Environment

The development environment for the application includes Visual Studio Code or Android Studio as the primary IDEs, with the Flutter SDK and Dart SDK installed for Flutter app development. MongoDB Compass is used for managing and interacting with the MongoDB database. Postman or Insomnia is employed for testing and documenting APIs. Git is used for version control, with repositories hosted on platforms like GitHub or GitLab for collaboration.

Backend Development

For backend development, Node.js with Express.js or Python with Flask or Django can be used to build APIs and handle server-side logic. MongoDB serves as the database for storing fund details, with Mongoose facilitating integration if using Node.js. Post manor Insomnia are utilized for testing API endpoints.

Data Security

Data security involves using encryption libraries like encrypt or flutter_secure_storage to protect sensitive user information stored within the app. Firebase Authentication or OAuth provides secure user authentication and access control. Regular security audits and updates are conducted to address potential vulnerabilities and ensure robust protection. Data is transmitted securely using HTTPS to prevent interception during communication. Access to sensitive information is restricted through stringent access control measures and authentication protocols.

Hosting and Deployment

For hosting and deployment, Firebase Hosting can be used to deploy Flutter web applications efficiently. AWS, Google Cloud Platform, or Azure are suitable for hosting backend services and managing server resources. Mobile applications are distributed through the Google Play Store for Android devices and the Apple App Store for iOS devices. Continuous Integration/Continuous Deployment (CI/CD) tools like GitHub Actions or Jenkins streamline the deployment process and ensure regular updates. Monitoring tools like Firebase Crashlytics help track and resolve issues post-deployment.

CHAPTER 4

DESCRIPTION OF PROPOSED SYSTEM

The proposed system tracks the funds granted to the state government as they go through the government process. It uses blockchain technology to safeguard transactions at each level while retaining transparency in every transaction and sealing every transaction with proof as the money goes forward. The systemsecures data using hashes to keep a block of transactions in a chain. It enables a complete proof, secure, and authentic financial distribution and tracking mechanism, which contributes to the formation of an incorruptible government.Our system has 2 modules, i.e., Admin (Government) and User. Admin(Government) Module: The government provides the requested funds to the user.

ADVANTAGES OF PROPOSED SYSTEM:

- Easy to track the funds granted to the state government as they go through the government process.
- It uses blockchain technology to safeguard transactions at each level while retaining transparency in every transaction and sealing every transaction with proof as the money goes forward.

4.1. SELECTED METHODOLOGIES

Encryption and Decryption:

- For encrypting metadata file we are using AES encryption algorithm.
- In Method follows a process which is before reconstructing the File joiner needs the sequence of chunks in which they are being joined. This sequence information is stored in a metadata file which is being encrypted before storing it in the cloud. So the decryption module decrypts the metadata file for file joiner.

Agile Methodology:

The project will be developed using the Agile methodology, which emphasizes iterative and incremental development. By breaking down the project into smaller, manageable sprints lasting 2-4 weeks, the development team can continuously deliver functional components of the system while adapting to any changes in requirements. This approach fosters close collaboration between developers, stakeholders, and government entities, ensuring that feedback is quickly incorporated and the final product closely aligns with user needs. Tools like Scrum will be employed to manage the workflow, including daily stand-ups for team communication and sprint retrospectives to reflect on the progress and plan for the next iteration.

Security-First Approach:

Given the sensitive nature of government fund allocation, a security-first approach will be central to the system's development. The project will begin with comprehensive threat modeling to identify potential vulnerabilities and security threats. To protect data integrity and confidentiality, industry-standard encryption protocols such as TLS for data in transit and AES-256 for data at rest will be used. Additionally, secure key management will be handled using Hardware Security Modules (HSMs), ensuring that cryptographic keys are stored and managed with the highest level of security.

Algorithms:

- AES with SHA Key: For encrypting metadata file we are using AES encryption algorithm. The encryption process generates a symmetric key called around a key.
- SHA-1 is applied on this key which creates block of data which is hold by an array of data called the state array

4.2 Architecture/overall design of proposed system

Describing the overall features of the software is concerned with defining the requirements and establishing the high level of the system. During architectural design, the various web pages and their interconnections are identified and designed. The major software components are identified and decomposed into processing modules and conceptual data structures and the interconnections among the modules are identified. The following modules are identified in theproposed system.

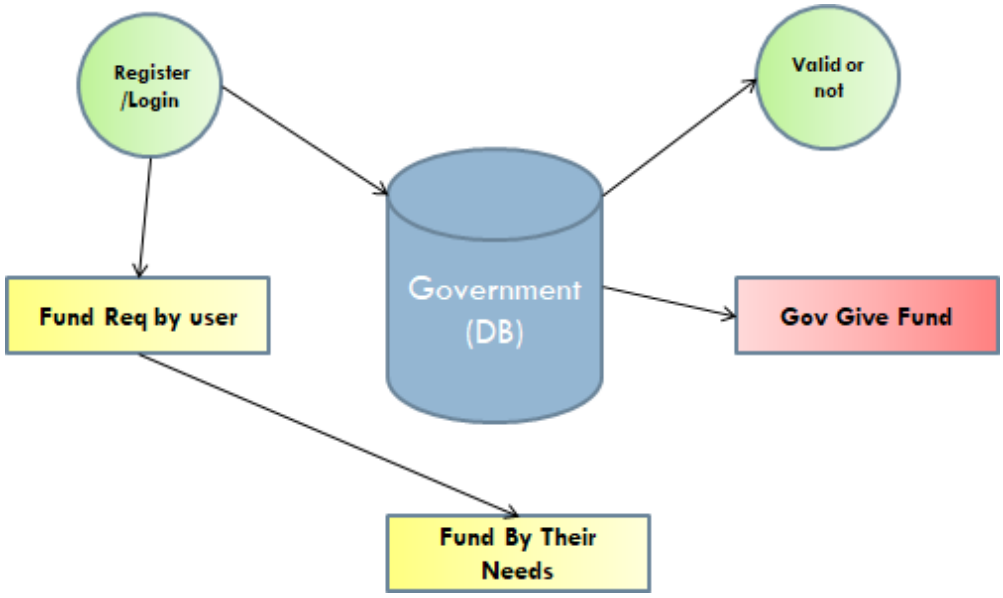

Fig 4.2.1. system architecture

Fig 4.2.1 represents the system architecture diagram of the Government Fund Allocation and Tracking System using Blockchain. The architecture comprises several key layers: the User Interface Layer the Application Layer, the Blockchain Layer, and the Database Layer. Additionally, the architecture includes External Interfaces for integration with government systems, public ledger access, and third-party APIs.

4.2.1. Government(Admin) Module:

Government will give the fund which is requested by the user. we can see that the user requests the funds from the admin (Government) then the request gets sent to the Government for approval. After that, the government views the request and then can approve or reject the request.

- Admin can log in
- Admin can View Request
- Admin can Add or Edit Different Categories of Fund/Scheme
- Admin can Reject/Approved the Request
- Admin can View Transaction on Funds

4.2.2Authority Module(TPA)

The Authority Module (TPA) for Fund Finder authorizes and verifies users to ensure they are legitimate and that their requests are valid. This process involves two-pass authentication, where users must first authenticate their identity, followed by a verification of their access rights to fund-related data.The module enforces role-based access, encrypts data transmissions, and logs all interactions to maintain security and integrity. Unauthorized users or invalid requests are promptly denied, protecting sensitive information.

4.2.3.User Module

User will request for the fund according to their needs. In this system, the user will request the funds according to their needs and also, they can check their transaction history and wallet balance as well. The home page will have all the available schemes listed. A normal user can visit the site and check for schemes and available and allocated funds. In this system, the user will request the funds according to their needs and also, and they can check their transaction history and wallet balance as well. The user requests the funds from the admin (Government) then the requests are sent to the Government for approval. After that, the government views the request and then can approve or reject the request. The transaction is validated by the network's nodes (people in real life). Following this confirmation, the block is put on the blockchain along with a timestamp. After that, the transaction could be enforced. All transactions submitted in this manner will be noted and made publicly available to everyone. the proposed work for a state government fund allocation and tracking system using blockchain involves a series of steps and tasks to design, develop, and implement such a system.

- Users can Register
- Users can log in
- Users can Request for Fund/Scheme
- Users can View Transaction on Funds

4.2.4 SYSTEM MODELING:

1. System modeling is a process used to create abstract representations of a system, enabling stakeholders to understand, design, and evaluate system components, their relationships, and interactions. It helps visualize complex systems, facilitating effective decision-making and communication.
2. System modeling allows for the identification of potential issues early in the development process, enabling better risk management and optimization of system design before implementation. This approach improves overall system efficiency and reduces development costs by providing a clear roadmap for system behavior.
3. Model shows how the information moves through the system and how it is modified by a series of transformations. It is a graphical technique that depicts information flow and the transformations that are applied as data moves from input to output.
4. Model is also known as bubble chart. A MODEL may be used to represent a system at any level of abstraction. MODEL may be partitioned into levels that represent increasing information flow and functional detail.

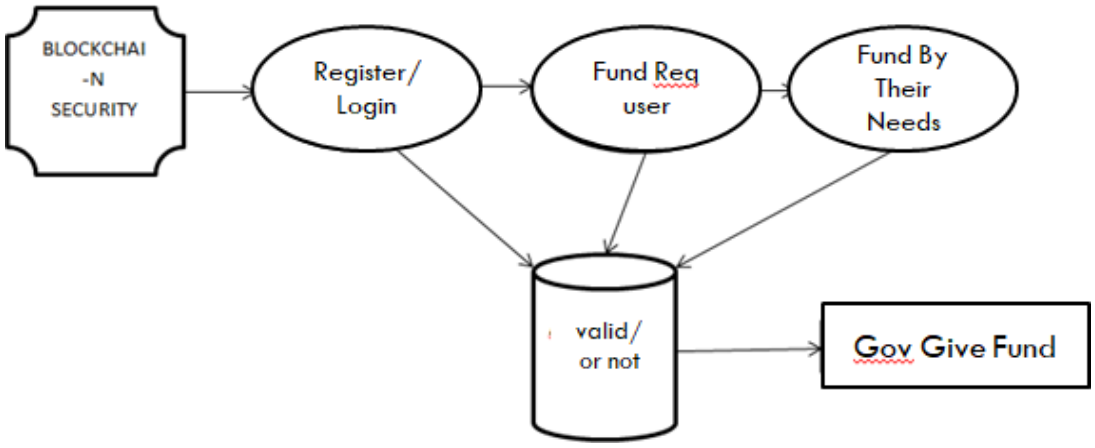

Fig 4.4.6 workflow diagram

4.3 TESTING PLAN OF PROPOSAL SYSTEM:

The testing plan for the Fund Finder system is crucial to ensure that it functions as intended, offering users a smooth, reliable, and secure experience. The plan will include various types of testing, such as unit testing for individual components, integration testing to ensure that all layers work together, and performance testing to validate scalability under different loads. Tools and methodologies like automated testing, API testing, and manual verification will be used to systematically assess the system's functionality. By thoroughly testing all aspects, from the user interface to machine learning algorithms and external API integration.

Unit Testing:

Unit testing will be conducted to validate the functionality of individual components within the Fund Finder System. Each module, such as the user profile system, rating mechanism, and trust model, will be tested in isolation to ensure it operates correctly. Automated testing tools will be utilized to run these tests, providing rapid feedback to developers and allowing for quick identification and correction of bugs. Unit testing helps ensure that each part of the app performs as expected before moving on to more complex integration tests.

Integration Testing:

Integration testing focuses on verifying that the various modules and components of the Fund Finder System work together seamlessly. After successful unit testing, components will be integrated, and their interactions will be tested to detect issues such as data flow errors, interface mismatches, and communication breakdowns. This phase is essential to ensure that the app's features, such as user authentication, real- time updates, and data synchronization, function correctly when combined. Integration testing helps identify and resolve problems that may not be apparent when components are tested in isolation.

System Testing

System testing involves testing the entire Fund Finder System as a complete and integrated system. This phase will verify that the app meets all specified requirements and performs well under various conditions, such as different user loads and network environments. System testing will cover both functional and non- functional aspects, including performance, security, and usability.

User Acceptance Testing (UAT)

User Acceptance Testing (UAT) is the final phase of the testing plan, where real users test the app to ensure it meets their needs and expectations. This phase involves testing the app's usability, functionality, and overall experience from the perspective of the end user. UAT helps verify that the app’s features, such as the rating system and trust model, are intuitive and effective.

Regression Testing

Regression testing will be systematically conducted at each stage of the development process to ensure that new code changes do not negatively impact existing features or introduce new bugs. Every time a new feature is added or modifications are made, regression tests will be executed to confirm that the app’s core functionalities remain intact and perform as expected. To streamline this process and enhance coverage, automated regression testing tools will be utilized, enabling the rapid re-testing of the app's functionality. This approach will help maintain the app’s stability, reliability, and overall user experience as it continues to evolve and grow in complexity.

Performance Testing

Performance testing will assess the Fund Finder System responsiveness, speed, and scalability under various conditions. This testing will simulate different levels of user activity to evaluate how the app handles peak loads and ensure it remains stable and efficient. Key performance metrics such as load times, response times, and resource usage will be monitored and analyzed.

4.4. PROJECT MANAGEMENT PLAN

PHASE	MONTH	TASKS	MILESTONES
Planning and Research	September	I. Validating Ideas II. Feature/Technology Research	Validating ideas along with research is done
Design and Development	October	I. UI/UX Design II. Front end development III. Backend development	UI/UX design made for app along with frontend setup
Integration and Testing	November	I. API Integration II. Database Integration III. Front end and backend integration	Database Integrated with frontend for authentication and verification
Documentation	December	I. Technical Documentation II. Database Optimization	Documentation check is done
Paper Publication	January	I. Submit a research proposal paper	Research paper on the idea proposed is written
Submission And Final Presentation	February	Final Review Submit the Project Present the Project	Submitted the project for final review

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