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TranKrypto: A Blockchain-Based Platform for Secure and Transparent Transactions

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Abstract - The concept of blockchain has recently gained a lot of popularity because it can be applied to practically every industry and commercial transaction while maintaining sufficient security measures. A comprehensive solution for safe and transparent transactions is offered by the blockchain-based platform TranKrypto. The platform uses Ethereum as its blockchain network and leverages several technologies, such as React, Solidity, Vite, Tailwind, Node.js, and MongoDB, to create a decentralized network of nodes that work together to maintain the ledger. User identification, smart contracts, an admin panel, and a decentralized ledger are just a few of the platform's features that offer a safe and open method to do business transaction. The objective of this research activity is to provide a detailed overview of TranKrypto, which makes use of the technologies node, react, solidity, vite, tailwind, and MetaMask. Our proposed approach includes an admin panel built with React, MUI, and Redux, a server built with Node.js, and user data stored on MongoDB. Additionally, this endeavour provides users with a service that enables them to test Ethereum transactions using the Goerli Ethereum test net on their computer.

Key Words: Blockchain, TranKrypto, MongoDB, Node.js, React, Ethereum, MetaMask

1. INTRODUCTION

In the digital age, blockchain technology has become a potent and creative answer to a variety of issues. The blockchain concept can be used in the healthcare industry to store and distribute patient information amongst hospitals, pathological laboratories, medical supply stores, and doctors [1]. The implications of this technology extend to industrial applications, from production to sales [2]. The view of blockchain today is that technology may be used to solve a variety of business problems with safe transactions. Blockchain is fundamentally a distributed ledger that enables safe and open transactions without the use of middlemen like banks or other financial organizations. By offering different applications, this cutting-edge inventive approach is responsible for resolving various case studies in the banking and financial industry [3]. The idea of blockchain technology has recently gained enormous popularity for cryptocurrencies that, by offering a wide range of services, govern the global economy in the financial sector [4]. Blockchain technology is more adoptable for a variety of applications because to its immutability and decentralization, including supply chain management, identity verification, and digital currencies like bitcoin.

TranKrypto intends to provide a dependable and effective platform for conducting Ethereum transactions for all users. This platform provides a useful service for users who want to conduct Ethereum transactions securely and effectively from their computers. The platform is a useful tool for consumers thanks to its user-friendly layout, high security focus, and quick transaction processing.

2. LITERATURE REVIEW

A comparative summary of the state of research on Ethereum, blockchain technology, and related subjects is given in this literature review section. The following factors are present in recent blockchain-based study work: Overviews of Ethereum, decentralized applications of blockchain technology as well as security and privacy challenges.

Janvi Dattani et al. [5] describe several blockchain-enable platforms in the financial industry by utilizing the concept of cryptocurrency. Wenzheng Li et al. [6] created typical blockchain architecture for a variety of applications and discussed the difficulties that such applications present for blockchain technology. A comparative review of several algorithms that operate in blockchains approach was introduced by Zibin Zheng et al. [7] and various challenges in applying such algorithm to solving real-world problems. Vinay Surendra et al. [8] offer a novel blockchain application in the world of agriculture and discuss the potential of this technology in future research work. Wei Cai et al. [9] and Kaifeng Yue et al. [10] pioneered the development of numerous decentralized applications and the potential of blockchain technology, and their study paper offers numerous directions for aspiring researchers. To maintain the ledger digitally in encrypted formats that preserved the information in multiple nodes of a public network by maintaining proper block format with the aid of a decentralized approach, Thanh Chung Dao et al. [11] introduced an innovative concept of blockchain. As blockchain deals with decentralized systems today, traditional designs are incompatible with them. As a result, Chibuzor Udokwu et al. [12] present a novel strategy in which researchers can select any development methodology in accordance with their challenge with the aid of blockchain for decentralized applications. Most often now, cryptocurrencies like Bitcoin control the world's economy, and the foundation of cryptocurrencies is blockchain technology. Dejan Vijicic et al. [13] provided an overview on how to create a coin using blockchain. In similar way Hussein Hellani et al. [14] explore the fundamental prerequisites for developing of digital currency as well as define the role of blockchain technology to create such type of virtual money. Due to the decentralized nature of cryptocurrencies, security mechanisms are a fundamental requirement. As a result, Tuan-Vinh Le at el.

[15] proposed several security issues that must be addressed in order to use blockchain technology for digital currency. User identity for authentication in blockchain is another crucial security technique; Liang Liu at el. [16] suggested this idea.

3. MOTIVATION AND CONTRIBUTION

The need for safe and open transaction platforms gave rise to the concept behind TranKrypto. Blockchain technology has gained popularity as a means of developing decentralized and secure transaction systems in the wake of the emergence of digital currencies like Bitcoin and Ethereum. However, even if the blockchain's underlying technology is well-established, there is still a demand for accessible and user-friendly blockchain applications. By giving users a simple and convenient platform to conduct blockchain transactions securely and effectively, TranKrypto seeks to close this gap.

In this research work, we create a blockchain transaction platform that is safe, simple to use, and open to all technical users. With the extra benefit of increased security due to the usage of blockchain technology, TranKrypto's goal is to give people a simple, effective way to conduct Ethereum transactions from their computers.

4. METHODOLOGY

This section outlines the process through which TranKrypto offers a safe and effective environment for conducting Ethereum transactions from user machines. The platform provides a variety of features and functionalities to improve its usability and security.

A. Architecture Design

Our suggested approach is made to give users a safe and effective way to complete Ethereum transactions. We employ a three-tier design that consists of a blockchain network, a backend server, and a frontend user interface. The backend is created with Node.js and MongoDB, while the frontend is developed with React with Tailwind CSS. Using Solidity smart contracts, the blockchain network is constructed on top of the Ethereum platform.

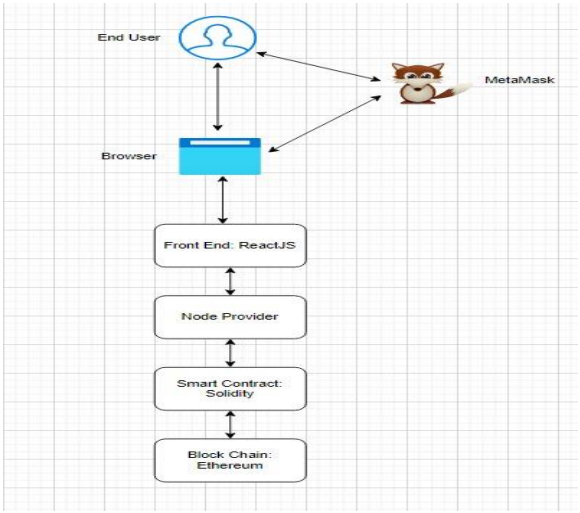

Fig-1: Technology Stack of TranKrypto

B. Proposed Features and Functionalities

TranKrypto offers a range of features and functionalities that enable users to securely carry out Ethereum transactions from their machines. The key features and functionalities of TranKrypto are as follows:

i. **User Authentication and Authorization:** Only confirmed users are allowed access to the platform thanks to the user authentication and authorization mechanism provided by TranKrypto. By doing this, the platform's security is improved and unwanted access is prevented.
ii. **Admin Panel:** TranKrypto provides an admin interface that enables administrators to examine and control user and admin data as well as handle user verification.
iii. **User Verification:** It provides the opportunity for user to verify their credentials on TranKrypto. Users are required to submit identification documentation as part of the verification process, which increases platform security and aids in preventing fraud.
iv. **Ethereum Transactions:** TranKrypto enables users to carry out Ethereum transactions from their machines, providing a simple and efficient way to transfer funds.
v. **Secure Storage:** To securely store user data, TranKrypto makes use of MongoDB. This helps to avoid data breaches by ensuring that user data is shielded from unauthorized access.
vi. **User-Friendly Interface:** All technical users can utilize TranKrypto because of its user-friendly interface. The platform's user interface has been created to be simple to use and navigate, making it simple for users to conduct transactions.
vii. **Test Environment:** TranKrypto uses Goerli Ethereum for test purposes, providing users with a safe and secure environment to test the platform and carry out transactions without risking actual funds.

C. User verification process in TranKrypto

User verification is implemented during the signup procedure in TranKrypto. A user must enter personal data throughout the registration process, including their name, email address, and phone number. The admin then uses the admin panel to confirm the user's information.

D. Required Tools

We use a variety of tools and technology in our research activities. The front end is built using React with Tailwind CSS, and the back end is built using Node.js and MongoDB. The Ethereum network is constructed using Solidity smart contracts, while Metamask provides the wallet service. It also uses several frameworks and libraries, including Web3, Redux, Vite, and MUI.

5. IMPLEMENTATION

In our proposed system we develop a web-based platform that allows users to securely carry out Ethereum transactions using their own machines. Implement user authentication and authorization functionalities to ensure only verified users can

access the platform. The system provide an admin panel to manage user verification, as well as view and manage user and admin data with the help of secure storage using MongoDB.

A. *Operation procedure*

The operation procedure of TranKrypto is simple and user-friendly. The user needs to follow the steps given below to carry out Ethereum transactions:

Step-1: Login: The user needs to log in to the system with their registered email id and password.

Step-2: Connect Wallet: After successful login, the user needs to connect their wallet to TranKrypto using the "Connect Wallet" option. This process is done using Metamask, a popular browser extension wallet that allows users to interact with the Ethereum network.

Step-3: Transaction Details: Once the wallet is connected, the user is redirected to the transaction page. Here, the user can input the amount they wish to transfer, the address of the recipient, and an additional message (if required).

Step-4: Send Transaction: After entering the required transaction details, the user can press the "Send" button to initiate the transaction.

Step-5: Metamask Verification: Metamask prompts the user to verify the transaction by showing the details of the transaction. If everything looks good, the user can accept the transaction.

Step-6: Transaction Confirmation: Once the user accepts the transaction, the Ethereum network processes the transaction. The user can view the transaction details and status on the TranKrypto dashboard.

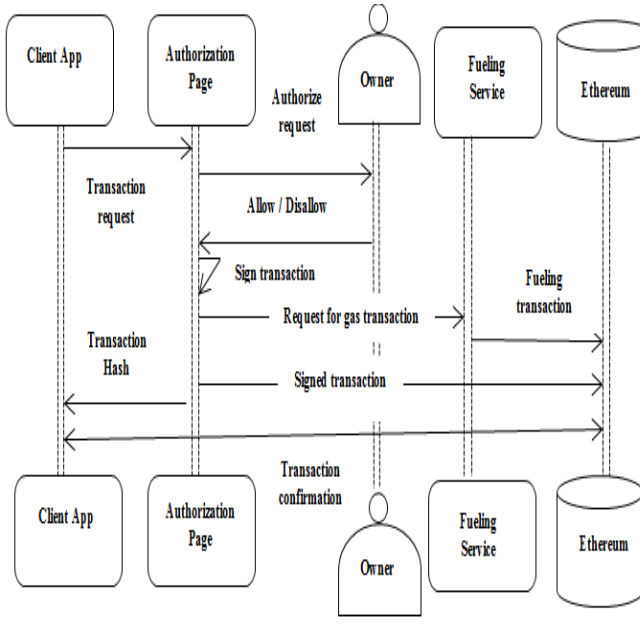

Fig-2: Ethereum Transaction work flow diagram

B. *Role of Admin Panel*

TranKrypto's admin panel includes several features that help administrators manage user activity effectively. These features include verifying users, adding and removing admins, and viewing all admins and users.

C. *Authentication Management*

TranKrypto's authentication management is implemented through Node.js, which provides a secure and efficient way to manage user authentication. Users are required to sign up and verify their identity before being allowed to access the platform. Additionally, TranKrypto checks if the user is verified before logging them in.

D. *Data Storage*

TranKrypto's data storage is implemented through MongoDB, a highly scalable and secure NoSQL database. MongoDB provides a robust and reliable way to store user data and ensure its security and integrity.

6. RESULT AND DISCUSSION

Our proposed system is thoroughly tested using a variety of testing frameworks and tools, such as Jest and Supertest. For testing purposes, the Ethereum network is installed on the Goerli test network, and the project is made available on a Heroku server. The project was additionally examined using a range of testing methodologies, including unit testing, integration testing, and end-to-end testing, to see if all features and functionalities work as intended.

A. *Test environments of our proposed system*

Blockchain transactions require test environments because they enable the testing and validation of transactions prior to their deployment to the main network. Test environments assure the security and integrity of transactions, as well as the detection and prevention of errors.

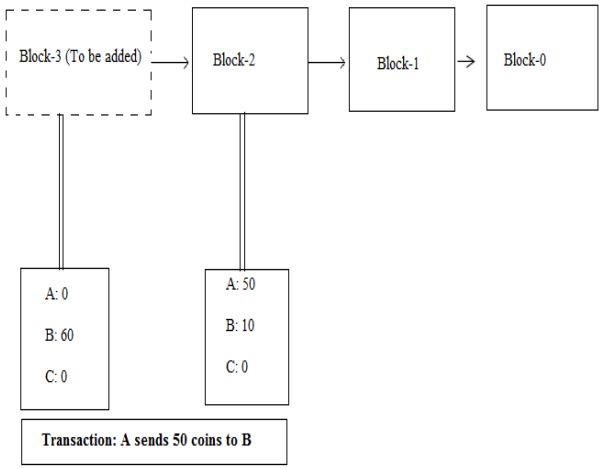

Fig-3: Blockchain Transaction

B. Goerli Ethereum test network

We use Goerli Ethereum for testing purposes, a public Ethereum test network that allows us to test our smart contracts and applications in a secure and reliable environment. Goerli Ethereum provides a stable and predictable test environment, ensuring that transactions function as intended before they are deployed to the main network.

The Ethereum transaction process is made easy and streamlined by TranKrypto. Even inexperienced users may easily transfer and receive Ethereum using the platform because to its user-friendly design and connection with Metamask.

C. Deployment process

The deployment procedure for TranKrypto includes several processes, such as code review, testing, and deployment to the main network. Before being put to the test on the Goerli test network for Ethereum, the code is checked for mistakes and vulnerabilities. The main network is where the code is released for public use after it has been verified as secure and functional.

7. CONCLUSION

In future more security mechanism, such encryption and access control, can be introduce to TranKrypto's data storage to improve its performance. This can guard against unauthorized access to sensitive data and assist maintain the security and integrity of user data which make the system more reliable.

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