

AarogyaCoin: Secure and Scalable Blockchain-based Electronic Health Records Management

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Abstract—The healthcare industry is undergoing a digital transformation, with the adoption of electronic health records (EHRs) becoming increasingly widespread. However, the centralized nature of traditional EHR systems poses significant challenges in terms of data security, privacy, and interoperability. This paper presents the AarogyaCoin framework, which leverages blockchain technology to address these issues and provide a secure, scalable, and interoperable solution for EHR management.

Index Terms—Blockchain, Electronic Health Records, Interoperability, Data Security, Scalability

I. INTRODUCTION

The healthcare industry is rapidly evolving with the adoption of electronic health records (EHRs). However, traditional EHR systems face challenges related to data security, privacy, and interoperability due to their centralized nature. In this paper, we introduce the AarogyaCoin framework, a blockchain-based solution for secure and scalable EHR management.

II. TECH STACK

The AarogyaCoin framework utilizes several key technologies:

- **Blockchain:** The core of the system is a blockchain-based architecture, ensuring the immutability and traceability of EHR data.
- **InterPlanetary File System (IPFS):** IPFS is employed for off-chain storage of large medical records, providing scalability and decentralization.
- **Ethereum:** The Ethereum blockchain facilitates the deployment and execution of smart contracts, defining access control rules and data management policies.
- **Ganache:** A local Ethereum blockchain development environment used for testing and deployment.

- **Metamask:** A browser extension enabling secure connection between the user interface and the Ethereum blockchain.

III. METHODOLOGY

The AarogyaCoin framework adopts a multi-layered approach to tackle traditional EHR challenges:

- 1) **Blockchain-based data storage:** EHR data is stored on the blockchain, ensuring immutability and transparency. Smart contracts define access control rules and data management policies.
- 2) **Off-chain data storage:** Large medical records are stored off-chain using IPFS, with their hashes recorded on the blockchain.
- 3) **Interoperability:** The framework adheres to healthcare data standards and provides secure data exchange mechanisms between different healthcare providers and systems.
- 4) **User access control:** Robust user access control mechanisms allow patients to granularly control permissions and sharing of their health records.

IV. EXPERIMENTAL SETUP

The AarogyaCoin framework was developed and tested locally using the following setup:

- **Ganache:** A local Ethereum blockchain development environment.
- **Truffle:** A development framework for Ethereum-based applications.
- **IPFS:** InterPlanetary File System for off-chain data storage.
- **Metamask:** A browser extension for secure interaction with the Ethereum blockchain.

- NodeJS and npm: JavaScript runtime and package manager for developing the frontend application.

V. RESULT ANALYSIS AND DISCUSSION

The AarogyaCoin framework was evaluated based on criteria including data security, privacy, scalability, interoperability, and user experience. The results demonstrate its effectiveness in addressing key challenges of traditional EHR systems, providing a secure and scalable solution for EHR management.

VI. CONCLUSION

The AarogyaCoin framework represents a significant advancement in electronic health records management. By leveraging blockchain technology, it addresses data security, privacy, and interoperability challenges. With its successful implementation and evaluation, AarogyaCoin offers a promising solution to revolutionize medical records management and enhance patient outcomes.

REFERENCES

- [1] Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. <https://bitcoin.org/bitcoin.pdf>
- [2] Ethereum Foundation. (n.d.). Ethereum. <https://www.ethereum.org/>
- [3] Benet, J. (2014). IPFS - Content Addressed, Versioned, P2P File System. <https://ipfs.io/>
- [4] Truffle Suite. (n.d.). Truffle - A Development Framework for Ethereum. <https://www.trufflesuite.com/>
- [5] Metamask. (n.d.). Metamask - A crypto wallet & gateway to blockchain apps. <https://metamask.io/>