Health Care Privacy Approach using blockchain Technology

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***Abstract*—Based on continuous operational states, a vast volume of data produced by various computer network applications is exponentially increasing. Such applications are producing an information avalanche that is disruptive to the cloud's ability to manage predictable data processing and analytics capability prior to the explosion of Big Data. Blockchain technology eliminates the need for a centralised authority to certify data integrity and ownership, mediate transactions and the exchange of digital assets, and certify ownership of information, while also enabling secure and fictitious-anonymous transactions and agreements made directly between partiesIt has important characteristics like immutability, decentralisation, and openness that could potentially address urgent concerns in healthcare including incomplete records at the time of care and challenging access to patients' own health information. Interoperability, which enables software apps and technology platforms to connect safely and easily, exchange data, and utilise the transferred data across health organisations and app vendors, is necessary for an efficient and effective healthcare system. Unfortunately, the lack of interoperability in the healthcare industry has resulted in segregated and fragmented data, delayed communications, and inconsistent workflow tools. Blockchain presents a chance to provide safe and pseudo-anonymous access to longitudinal, comprehensive, and tamper-aware medical records that are kept in dispersed systems.**

.Keywords—Blockchain, Smart contracts, PHR (Personal Health Records), healthcare, access control

I. INTRODUCTION

The edge of the network is becoming the new logical stream for computing applications, data, and services as a result of fog computing, fog networking, also referred to as fogging. Critical medical data may be stored in a blockchain system, which is essentially an incorruptible encrypted database. Anyone using the software can access the network of computers that maintains the system. Blockchain functions as a pseudo-anonymous system, but although being tamper-proof in terms of data integrity, privacy is still an issue because all transactions are visible to the public.It was necessary to properly plan the access control of heterogeneous patients' medical records across numerous medical institutions and gadgets. Blockchain was not intended to be a method for massive amounts of data storage. A decentralised storage solution would significantly supplement the shortcomings of blockchain in the healthcare sector.

II. LITERATURE SURVEY

Blockchain has given patients control over their medical records [1]. The Ethereum blockchain-based smart contracts give patients decentralised, unchangeable, transparent, traceable, reliable, and secure control over their data. The suggested approach makes use of trustworthy reputation-based re-encryption oracles and decentralised IPFS storage to safely gather, store, and communicate patient medical data. Along with comprehensive implementation details, algorithms are described. We evaluate the suggested smart contracts using two important performance metrics: price and precision. We also go over our technique's generalisation components and provide security analysis. The shortcomings of the proposed approach are listed. We publish the source code for the smart contract on Github for public access.

IPFS [2] offers a secure access and storage solution for electronic medical data based on blockchain technology. Based on the ciphertext policy attribute-based encryption system, IPFS storage environment, and blockchain technology, we developed an attribute-based encryption scheme for secure storage and effective exchange of electronic medical records in the IPFS storage

environment. Our approach is based on ciphertext policy attribute encryption, which successfully limits access to electronic medical records while preserving retrieval effectiveness.

Health records management is being done with blockchain technology [3]. a patient-centered, totally decentralised approach that offers patients access control, can stop data change, and can identify data theft. The most efficient method for resolving all problems and satisfying all expectations is blockchain technology. Blockchain, a decentralised and distributed ledger, has the potential to influence financial data crimes, record sharing, billing, and medical research in the future. Further simplification may be possible with smart contracts in the health care industry. Invoking, creating records, and validating will all happen on the blockchain.

a blockchain-based system for the exchange and security of medical data[4]. A medical data interchange and protection plan built on the hospital's private blockchain was created to improve the electronic health system. The system may, to begin with, satisfy a number of security needs, such as decentralisation, openness, and tamper resistance. Doctors will be able to retrieve patient history information or keep track of medical information using a secure method that respects their privacy. Additionally, a method of symptom matching between patients is offered. It makes it possible for patients with similar symptoms to complete mutual authentication and produce a session key for future disease communication. The proposed method is implemented using PBC and OpenSSL libraries.

III. Problem Statement

Utilizing blockchain technology, the problem of insurance claims made by patients due to incorrect data exchange between hospitals and insurance companies will be addressed. to provide a method for storing medical data in a distributed computing setting that enables users to save all data in a single Blockchain.

IV. Motivation of the Project

The Blockchain Technology envisions distributed agents working together in a decentralised manner.Data recovery from various threats is automatic thanks to the decentralised architecture.In addition to the cases that are being discussed, the research's primary drivers are the protection of human values and the confidentiality of patient data. The fact that the blockchain is incredibly safe and secure is another reason for writing the post. Another reason for the study is to employ a majority vote in the consultation of medical centres to recommend the best course of action for the patient.

V. Goal And Objective

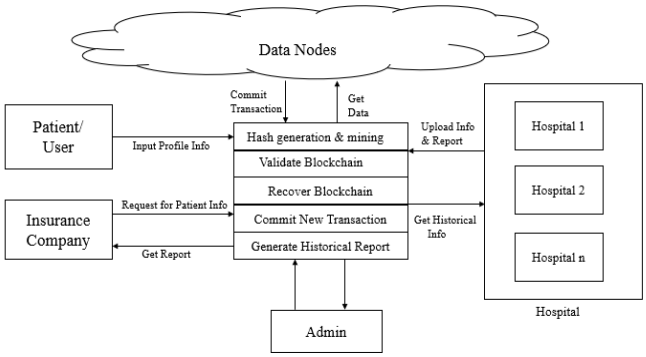
- To develop a strategy for a health insurance provider that stores all historical data on a block chain.
- To build a distributed computing environment hierarchy for effective data extraction through parallel data processing.
- To create and expand a blockchain for the safe storage of all transaction data.
- To put in place a peer-validation method that can examine each access request.

VI. Methodology And architecture

A. Methodology of problem solving

The majority of the time, treating a patient requires consulting with multiple hospitals or medical facilities. Sharing patient records with other treatment facilities is one strategy to enhance the way in which patients receive care. The data should be subjected to each medical center's analysis, and then those analyses should be shared with other medical centres. A medical facility can use patient feedback to determine the best course of therapy for each individual patient and, ultimately, to use the majority of them. Each treatment facility in the suggested method employs a learning algorithm to identify the disease kind.. To increase data secrecy, the suggested technique for each hospital uses the blockchain to store and distribute information.

SYSTEM ARCHITECTURE



The system includes the modules listed below:

Hospital: An organisation that interacts with patients to produce symmetric data for every medical record. a local organisation that wants medical records.

Patient: Patients are in charge of signing up for the system, downloading and submitting their medical records, and responding to doctors' requests for data (requests to share medical records).

Insurance provider: Upload patient history and policy information.

Distributed Block chain: The Blockchain serves as the distributed ledger for the system's current delegation of access rights. The Root Authority and the Attribute Authorities are in charge of managing permissions to communicate with the Blockchain.

Expected Result:

1. The patient can access any of the requested data from the Internet, and their description appears right away.
2. When a transaction is finished, all of the nodes are instantaneously updated.
3. When a node record contains faulty data, other nodes will automatically attempt to recover it.

FUTURE SCOPE

Future Scope

The majority of research focuses on exposing and fixing Blockchain's privacy and security flaws, although many of the suggested fixes haven't had their efficacy scientifically proven. Numerous other issues with blockchain scalability, such as throughput and latency, remain unresearched.

Statement of Scope

Industry experts believe that blockchain, a digital ledger technology that can securely manage continually expanding lists of data records and transactions, has the potential to revolutionise the healthcare industry. Blockchain technology has the potential to significantly lower back-office data input and maintenance costs while also enhancing data security and accuracy by streamlining and accelerating the way the health care industry processes data in areas like revenue cycle management, health data interoperability, and supply chain validation.

Application:

1. Peer-to-peer transactional communication apps.
2. Bitcoin transactional software

CONCLUSION

Due to the complexity of this field and the demand for more reliable and efficient information technology solutions, there are numerous research avenues in applying Blockchain technology to the healthcare sector. Many healthcare use cases that confront comparable data sharing and communication constraints would definitely benefit greatly from an interoperable architecture. From a more technical standpoint, considerable investigation is required to identify the best viable design approach for developing an interoperable ecosystem leveraging the Blockchain technology while balancing crucial security and confidentiality concerns in healthcare.Additional research on secure and effective software practises is required for applying Blockchain technology in healthcare, whether it be through the creation of decentralised applications leveraging existing Blockchains, in order to inform software engineers and domain experts about the advantages and disadvantages of this novel technology. Likewise, it's crucial to use validation and testing methods to compare

Blockchain-based health care architectures' effectiveness to that of current systems (e.g., via performance metrics related to time and cost of computations or assessment metrics related to its feasibility). In other situations, a new Blockchain network might be more appropriate than the ones that already exist, therefore another course of action might be to look into expansions of an existing Blockchain or to build a healthcare Blockchain that just offers health-related services.

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