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Blockchain Based Patient Health Record Management System

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ABSTRACT

Medical record of a patient is important in knowing the detail of medication and their health history. The medical records of a patient can be miss used or hacked by hackers and it creates a confusion to the doctors to give the treatment .loss of this medical records leads to wrong medication or surgery. Healthcare systems provide less security to secure medical records. Block chain is a distributed and decentralized ledger that plays an important role in securing the data and transactions. Applying the block chain in the health care systems protect the medical records from the hackers. This paper provides security for the medical records and allows patients to know about the ongoing treatment and transactions of it. Here only patients and doctors can access the information of records. Here the third parties or others cannot access the data.

Keywords— medical records security Block chain decentralized ledger heath care systems transactions third parties

I. INTRODUCTION

With the development of new technologies, health care sector started using these technologies to store the patient private information. Patient information like digital prescriptions in jpg or pdf format or some test reports. All these information's are stored using centralized storage system. Lose of health record will lead to wrong medication of patient which will affect his health and may lead to loss of life. Various stakeholders are responsible for storing, manipulating these electronic health record for efficient use and proper care of patient. Access of specific record should be provided only to authorize stakeholder when required. These traditional centralized electronic health record system still face some issue regarding the security of medical record, user authorization and data integrity etc. Solution to this is making use of Block chain technology.

Blockchain is a shared, digitally distributed, decentralized public ledger that exist across a network. It provide a secure, tamper proof platform for maintaining medical records and other related information. The blockchain categorized to three types

(i) Public (ii) private and (iii) consortium blockchains.In public everybody can participate. Private block chain has strict data access management, only those nodes who have access can only participate in the block chain. Consortium block chain, a blockhead which are used between the businesses

Blocks in the blockchian are linked each other and stored in a distributed ledger. Each block in Blockchain contains a timestamp, hash, and previous hash, private and public keys. Hash is created from secure hashing algorithm. In block chain transaction is verified by all nodes. Validating these transaction is known as mining. New blocks can be added to blockchain,but it is necessary to perform Proof-of-Work (Pow).Proof-of-Work is a mathematical puzzle which uses difficulty values and nonce.

This paper proposes block chain based framework for electronic health record management model which creates a decentralized platform which will store patient's medical records. Patient record access provided to concerned individuals that is patient. Scalability is one of the problem here.Its planned to solve this by using off-chain scaling method.

This paper is organized as follows the section II of this paper includes the related work, section III narrates the proposed work done in this domain. Section IV contains preliminaries and section V

explains the design and architecture of the proposed framework and the last section provides the conclusion and references.

II. RELATED WORK

A.ANALYTICAL BLOCKCHAIN BASED RESEARCH

Gordon and catalini[12] , conducted a study that focused on the methods by which block chain would facilitate the healthcare sector. The increasing pace of innovations and also the altering face of healthcare are rapid, but still don't seem to be sufficient in meeting today's challenges. The problem of interoperability in healthcare institutions, continuous2 cyber-attacks on hospitals centralized systems, and a huge amount of critical big data from clinical and biomedical research is leaving one to brainstorm and bringing the target to these areas. Block chain is a distributed, decentralized, digital technology with the power to provide transparent, immutable, trust, and security. Block chain technology in healthcare is utilized in the hopes to solve various issues of medical sciences. Donating organs, the supply chain in medical sciences, crowd funding medical research, cybercrimes, and interoperability might be some of the problems that block chain could solve. This paper tells us the concept of block chain and its origin, use cases in healthcare, and also how different platforms like Ethereum, Linux Foundation Hyper ledger, are useful to medical science.

III. PROPOSED WORK

A framework for administering and EHR sharing information for patient care. In unity with a Hospital, a framework is enforced during a paradigm that ensures privacy, security, availableness, and fine-grained access management over EHR information. The preferred work will considerably reduce the turnaround for EHR sharing, improve deciding for treatment, and cut the worth. This provides a novel chance to design and implements security, trustable EHR information handling and shared system victimizing with help of block chain.

IV. PRELIMINARIES A. ETHEREUM

Ethereum allows us to build the decentralized application and also provide s deployment of smart contract without fraud, access with a third-party. It uses a consensus algorithm proof of work which make it unique and provides security. It contain its own programming language called solidity, which is used to develop the smart contract as its the main feature of ethereum.It also has its own crypto currency called ethers this can be shared between two accounts on Ethereum block chain. It used the peer to peer networking which makes its distributed

B.SMART CONTRACT

Smart contract is a piece of code which is used to perform any operation on the block chain. This code is executed when the users wants to do the transactions. They run on the block chain by making themselves secure from any kind of alterations. Smart contract usually uses solidity language and it can be used to program any kind of operation that a programmer wants to do on the block chain. After programming the required operations the programmers will compile them by using EVM byte code.

C.ETHEREUM VIRTUAL MACHINE

The main benefits that Ethereum platform provides us is a programmable block chain. It helps the users in creating their own application on block chain. The applications which were built by using this platform are called as Distributed Applications (DApps). There will be certain protocols that are connected together for creating a platform for DApps. These DApps will have smart contracts that contains code which were predefined by the user to perform some task of an application. This code is now deployed and executed by using the Ethereum Virtual Machine .By this way applications that are created using the smart contract are in being run on EVM.

V. SYSTEM DESIGN AND ARCHITECTURE

System design is the main part of the framework. It will be the backbone of the development of the proposed framework. This section contains modules and architecture of framework. The aim is to create a decentralized system that's secure and tamper proof block chain based electronic health record system. Block chain consist of set of nodes which are capable to transfer the records. It contains smart contract like permissions contract, service contract.

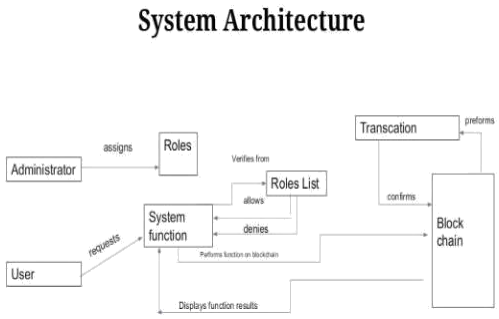

Fig.1 System Architecture

Proposed frame work has three modules. These three layers together combined make the system working.

A.*USER LAYER*

Users are the one who effectively makes use of the system and its resources. User will be having different roles and features on the given system. Users can be patients, nursing staffs, lab person or staffs,administration.These users performs the basic tasks like reading the medical records, creating new records, updating the records etc. They will be performing these tasks from the frontend of the proposed system. Depending on the role of the users specific functionality will be assigned. Only assigned functionality will be visible to the users in the graphical user interface.

B.*BLOCKCHAIN LAYER*

This is where the mechanism for interaction between the proposed framework and user is defined. In Ethereum using transaction users will update the information that is stored on the Ethereum network. These transactions treated as an asset by Ethereum.

Some set of rule will be followed during the transaction in block chain .For this purpose it makes use of some consensus algorithms to keep block chain secure and tamper proof. Governance of block chain is maintained in a trusted manner by using Proof of Work consensus algorithm

Peer to Peer network is used in Ethereum, Here all nodes will be connected to each other and no node will act as central node .By this approach we can achieve distributed platform.

System will be consist of these transactions like creating patient record which will be containing patient Id ,name ,blood group ,lab results or other medical reports. Doctors will be given right to delete the patient record and update the patients information which are related to patient health.Patient record will be viewed by patient and doctors.

C.*SYSTEM IMPLEMENTATION*

System implemented using Ethereum and its dependency

D.*SMART CONTRACT*

Smart contract is used to give access to users to perform CRUD operation. Roles are a predefined smart contract is used. It's defined in Open Zeppelin smart contract library. This library contains a several functionalities which can be used to define our own smart contract.

VI. CONCLUSION

In this paper we discussed how block chain can used in healthcare sectors.eventhough we are using advance technology it will face some issue .This system gives access to only patients and doctors and avoid unauthorised access by third parties. Role based access provides a way to give access to only trusted individuals.Futher we can improve the security by using face recognition instead of using passwords while logging in.

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