Block Chain based Implementation of Electronic Medical Health Record

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***Abstract*— Block chain-based implementation of EMR is a secured transaction and maintaining of medical records in various hospitals. Now technology has developed, but the technology in the medical record transaction has not developed. Still now, each hospital is maintaining a separate database to maintain their patient details. When the patient moved to another hospital, they need to carry document each and every time. If they missed the document, they need to take all the report from starting. It takes more time and cost. To avoid this, we need to maintain the globalized database to store the data in secure manner using block chain technology. Here the donor database also connected to it, when there is any emergency in the organ transplantation and any blood requirement, the hospital can approach the donor who are connected to this system and get the immediate transaction. It also reduces the time to get the donor at the necessary time. This project helps us to connect the hospitals and the voluntary organization under the one umbrella. This system maintains security in block by using Ethereum.**

Keywords*— *EMR, Block chain, immediate access, secure maintenance, globalized database, reduce time and cost.

I. INTRODUCTION

Some applications for health care services and medications may be dealt with third parties and the public for the extraction of the useful report [1], [2]. In some cases, the sensitive data for critical patients may be exposed to attacks, and the risks are involved in this process such mitigate and unauthorized access. So, they are maintaining separate database in each hospital [3]. Since, it is an important issue to be considered and to ensure security and privacy during the system design for sensitive healthcare data [4],[5],[6]. And also, it is important to connect all the database together to maintain globalization. Connecting the database of all hospital is not a easy thing.

It is very important to maintain all the record in secure manner and also confidentiality is very important. Because the medial reports are more sensitive.

In this project we connect the donor to our system. The transaction of organs and the blood is also a critical task in the traditional system [7],[8]. If there is any emergency need of transaction, there is only possibility of contacting each and every donor in the traditional system. But it is very difficult of contacting the donors at the necessary time. So, we are maintaining the separate database for donor and connecting those details to the globalized system. It is very easy to connect the donor at the necessary time. It also reduces the time and reduces the rate of death.

In this system, we use block chain technology for maintaining the database in the cloud. The information in the EMR should be correct, trustworthy complete and in clear manner. In the emergency condition, the medical staff needs some necessary elementary and valuable health information about the patient for increasing the chance to supply appropriate cure to save the patient's life or defuse in risky conditions. In the emergency situation, such pre-defined access control policies is very important because there is no policy defined that would allow an emergency medical team to access the patients' health record. In the base they used hyper ledger fabric and hyper ledger composer [9],[10]. It is very easy to create the block chain system. Our system is more efficient than that.

III. BLOCK CHAIN

A. BLOCK CHAIN TECHNOLOGY

Block chain is a new emerging technology. It is a collection of records and store it in a block. There are of blocks to store the records in a safe and secure manner. Each block is connected to another by using cryptographic technology.

B. BLOCK CHAIN NETWORK

Block chain network is a decentralized system. The intruder cannot steal the data without any access permission. The block chain is safe to store the data in the cloud. The number of block can created to store the data. New block can add by using cryptographic technology. The user can access the block by authentication method. If the intruder tries to access the system, it will show access denied in the popup window. Hence no third party can access the data without any permission. In our system block chain network, it maintains the records of doctor, patient and donor.

II. ETHEREUM ALGORITHM

A .ETHEREUM

Ethereum is an open source platform. It is a public, block chain-based distributed computing and also provides smart contract. Ethereum is a decentralized distributed system. It was founded by Vitalik Buterin in 2013.He is a programmer and cryptocurrency researcher. Ether is a fundamental token for operation of Ethereum, which provides a public distributed ledger for transactions in block chain. It is better than other technology of cryptocurrencies because the validity of each ether is provided by a block chain, which is a continuously growing list of records, called blocks, which are linked and secured using cryptography.

B. ETHASH

Ethash is a algorithm based on hashing method used in blockchain. The hashing is every much useful in creating a new and connecting these blocks with the hash value. The hash value of each block is unique.

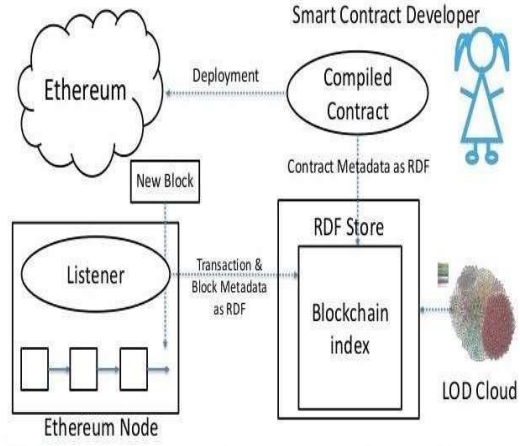

Figure1: Ethereum Architecture.

Abbreviations and Acronyms

Table1:

EMR	**Electronic Medical Record**
RFD	Resource Description Framework
LOD	Limit Of Detection

IV. EXISTING SYSYTEM

In existing system bitcoin-based scheme has been implemented in existing system. Authentication based scheme has been implemented, encryption- based scheme has been implemented. A crypto graphically secured and a decentralized currency that would be helpful for financial transactions scheme has been implemented. Attributed based scheme has been implemented.

A. Blockchain for Electronic Medical Record (EMR) Data management

The potential for the use of blockchain technology in hospitals has started to be tested in several pilot projects globally. Last year in the United States, Booz Allen Hamilton Consulting developed and implemented a blockchain-based pilot platform designed to help the Food and Drug Administration's Office of Translational Sciences explore how to use the technology for healthcare data management (Figure 2). The pilot project is currently being implemented at four major hospitals; it is using Ethereum to manage data access via virtual private networks. The project is built on the IPFS to utilize encryption and reduce data duplication via off chain cloud components with cryptographic algorithms to create user sharing.

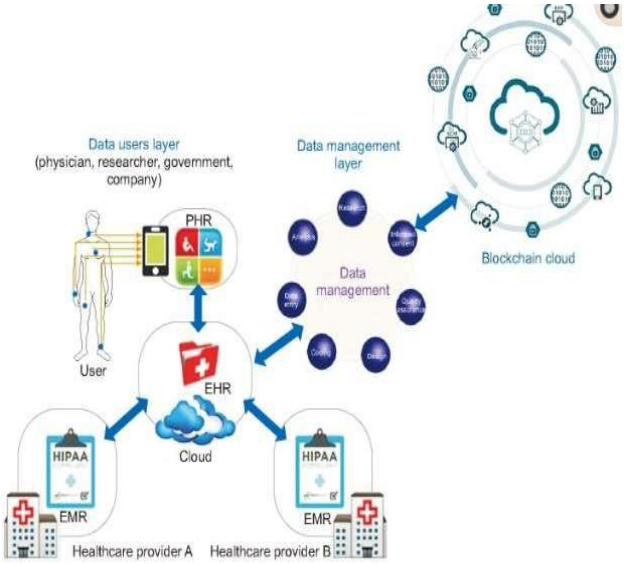

Figure 2: US pilot project for blockchain Health care.

B. Blockchain for Personal Health Record (PHR) Data Management

Personal life-long data recently has begun to be captured through wearable sensors or medical IoT devices as personal health records (PHR). Real- time artificial intelligence (AI)-powered healthcare analytics will be fed back to the related users, including patients, physicians, pharmaceutical researchers, and payers. This entire PHR service trajectory is becoming a valuable source of data for blockchain service providers.

Distributed or decentralized applications (Dapps) developed on the blockchain enable physicians and patients to easily participate in telemedicine with no middleman costs aside from the minimal fees of the Ethereum network, thus enhancing patient empowerment.

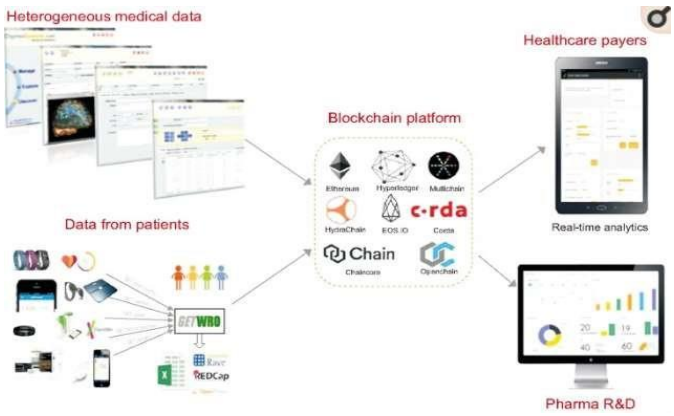

Figure 3: Personal health record data for blockchain service providers or data brokers.

V. PROPOSED SYSYTEM

A framework for administering and EMR sharing information for cancer patient care. In collaboration with a Hospital, a framework is enforced during a paradigm that ensures privacy, security, availableness, and fine-grained access management over EMR information. The pro- posed work will considerably cut back the turnaround for EMR sharing, improve deciding for treatment, and cut back the value. This provides a novel chance to design and implement a secure, trustable EMR information management and sharing system victimization using block chain.

This proposed system ETHEREUM. Ethereum is a distributed blockchain network that uses the idea of blockchain that was previously used in the popular crypto currency Bitcoin. Ethereum was formally introduced in year 2015 and the idea behind Ethereum was to create a trustless smart complementary standards if required. The focus is on enabling services that directly benefit patients.

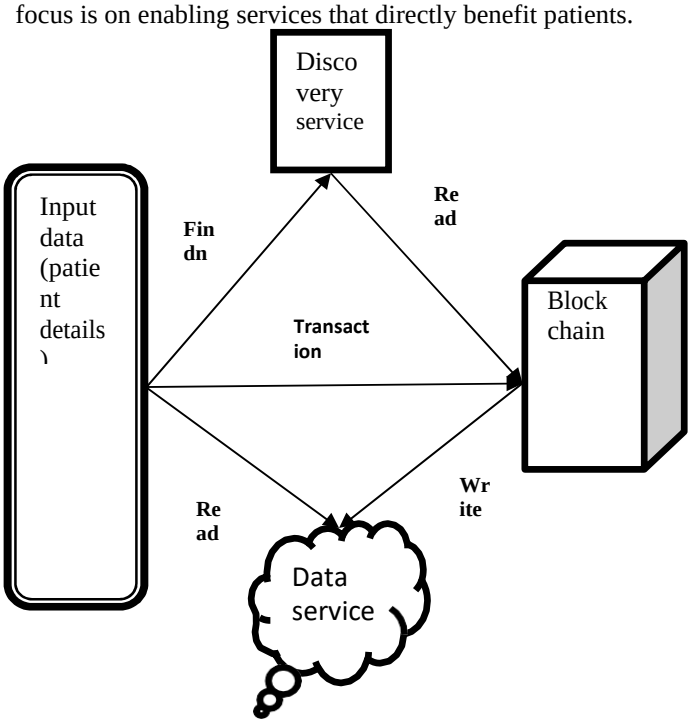

Figure 4: Architecture for blockchain healthcare

VI. SYSTEM IMPLEMENTATION

A. *REGISTRATION*

Registration is one of the primary modules in any contract platform that would be open-source and would also hold the feature of this technology also shares the peer-to-peer networking that makes it distributed.

In the future, these private blockchains could have the most significant impact on healthcare policy and management. The potential of blockchains is also addressed by the European Commission Research & Innovation Program IMI (Innovative Medicine Initiative) Pilot project named "Blockchain Enabled Healthcare" lead by Novartis, which aims to leverage existing standards, such as Ethereum, and to develop data management system. A patient's medical record management starts with registering a patient with the system. Open MRS being a customizable and scalable solution to medical record management also requires a customizable patient registration system. The donor plays a major role in the blockchain technology. The donor registers the data in the database. If the details needed by the users or either in the hospitals the data will be taken by them easily because the data will be stored in the database and it will be very easy to interact with the donor and easy to save the patient life. The donor is mainly for the welfare of the patient. The donor donates the organs then the patient life will be saved quickly.

B. *ELECTRONIC HEALTH RECORD MAINTENANCE*

Blockchain technology has the potential to transform health care by placing the patient at the center of the health care system and increasing security, privacy, and interoperability of the health care data. This technology could provide a new model for health care data information exchange by making electronic health records (EHRs). It is more efficient and secure. EHRs which contain critical and highly sensitive private information for diagnosis and treatment in healthcare.

These data which contains valuable source of healthcare intelligence. The sharing of healthcare data is an essential step towards making the healthcare system smarter and improving the quality of healthcare service. An EHR is a structure in the digital format of a patient's health data that is created and maintained throughout the patient's life. It is typically stored and spread among multiple hospitals, clinics and health providers. A Blockchain is a distributed protocol that was originally associated with Bitcoin.

C. *DATA OWNER*

The files are encrypted before the files are uploaded to the cloud. The data owners are provided an option to enter the keywords for the file that are uploaded to the server. These keywords are used for the indexing purpose which helps the search return values very quickly.

D. *AUTHENTICATION*

An authentication module is a plug-in that collects user information such as a user ID and password, and compares the information against entries in a database.

If the user provides information that does not meet the authentication criteria, the user is not validated and denied access to the requested resource.

VII. CONCLUSION

In this project, we proposed situations of block chain innovation utility in numerous social insurance settings: critical attention, restorative data inquire about, and associated wellness. We talked about how keeping up a permanent and easy document, which video display units every one of the occasions took place over the device, may want to improve and inspire the administration of restorative records. Medical scans provide valuable data from which there can be valuable conclusions resulting in providing valuable conclusions.

Privacy is maintained in the MedChain by employing timed-based smart contracts for governing transactions and monitoring the computations performed on the EMRs through the enforcement of the acceptable usage policies. The adoption of hashing techniques ensures the integrity of data. Security and access control are maintained by the adoption of advanced encryption and authentication techniques throughout the blockchain. Interoperability, auditability, and accessibility are provided by the use of comprehensive logs. Our proposal is independent of any specific system, and its variations can potentially accommodate other similar systems with multiple access for electronic records. As medical records are patients' assets and not a cryptocurrency or digital currency to be exchanged, this work propose a new incentive mechanism integrated with the POA for mining.

It leverages the degree or significance of providers regarding their efforts on maintaining medical records and creating new blocks. Since most of the current health providers are welfare oriented that have no intend to involve any monetary value, our mechanism rewards the ``block's creator" an incentive to be added to its degree and accordingly decreasing its probability of re-creating the next block instead of just creating a digital currency. Thus, achieving the fairness and the equality among providers and ensuring the sustainability of the system. Extensive experiments are conducted to evaluate the Med Chain performance on different aspects, including response time, throughput, and communication overhead. Results indicate the efficiency of our proposal in handling a large dataset at low latency.

VIII. REFERENCE

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