

BLOCKCHAIN BASED ELECTRONIC HEALTHCARE RECORD MANAGEMENT SYSTEM

Ms. Pooja Walke¹, Mr. Sachin Gaikwad², Ms. Poonam Kadam³, Mr. Suryakant Gawande⁴, Mrs. Sweta Khandekar⁵

Abstract— Modern healthcare systems are characterized as being highly complex and costly. However, this can be reduced through improved health record management, utilization of insurance agencies, and blockchain technology. Breakthroughs in blockchain technology have led to improved transactions involving medical records, insurance billing, and smart contracts, enabling permanent access to and security of data, as well as providing a distributed database of transactions. One significant advantage of using blockchain technology in the healthcare industry is that it can reform the interoperability of healthcare databases, providing increased access to patient medical records, device tracking, prescription databases, including the complete life cycle of a device within the blockchain infrastructure. Access to patients' medical histories is essential to correctly prescribe medication, with blockchain being able to dramatically enhance the healthcare services framework.

I. INTRODUCTION

Blockchain technology has emerged as a key technology recently in the digital revolution of the healthcare sector and several research studies have identified blockchain potential for the healthcare ecosystem. It is ready to transform the way traditional medical systems and businesses have been engaged in the healthcare sector for the last several decades. Information and Communication Technologies (ICTs) and blockchain are key enabling technologies for the decentralization and digitalization of healthcare institutions and provides modern and digitalized healthcare ecosystem to patients as well as service providers. Blockchain applications for healthcare data management create utilities for patient, doctors and healthcare institutes in the directions of patient record access and control, claims and payments management, management of medical IoT security and research data verification and exchange for financial auditing and transparency. In these applications, real-time updates to

an encrypted, decentralized blockchain ledger are done to understand, monitor, and control medical information. This also facilitates the healthcare institutions to restrict the unauthorized person to access sensitive information.

II. RELATED WORK(LITERATURE SURVEY)

This work is based on providing security and privacy through cryptography based access control to store data in the cloud and encryption through attributes. The generic public key encryption (PKE) based techniques uses high key management mechanism, or require encrypting a file using different users keys of different sets for using fine-grained access control. To enhance the scalability during the encryption schemes like ABE can be used. ABE information is encrypted under a based on a set of properties that different users who have proper keys can use and decrypt it. Thus it makes encryption and management of key efficient compared to others. Interoperability in care has historically been targeted around knowledge between business entities.[1].

This project includes challenges of data sharing within the healthcare domain. They have applied extra majors of security on the block chain. EHR systems is its Health Information Exchange (HIE) or in general data sharing aspect. With a number of EHR systems being deployed in various hospitals they have a varying level of terminologies, technical and functional capabilities which makes it to have no universally defined standard. Moreover, at technical level the medical records being exchanged should be interpretable, and that interpreted piece of information could be further used. [2].

In this work we look at on applying blockchain technology for facilitating this transition through 5 mechanisms: (1) digital access rules, (2) knowledge aggregation, (3) knowledge liquidity, (4) patient identity, and (5) knowledge immutableness. We have a tendency to verify barriers of blockchain-enabled patient-driven ability, specifically clinical knowledge dealings volume, privacy and security, patient engagement, and incentives. We have a tendency to conclude by noting that whereas

patient-driving ability is associate exciting trend in care, given these challenges, it is required to be verified as to how blockchain will facilitate the change from hospital-centric to patient-centric information knowledge sharing.[3]

III. Goals And Objective

Blockchain could reinvent the way patient's electronic health records are shared and stored by providing safer mechanisms for health information exchange of medical data in the healthcare industry, by securing it over a decentralized peer-to-peer network.

The main goal of this work is to describe an approach to effectively and securely share healthcare information within a data sharing network. We believe that a patient's record should be consistent and available across institutional boundaries, and the terms of its access strictly dictated by the patient. As a secondary goal, this data should not only be shared, but shared in such a way that all interested parties can understand the structure and meaning, ultimately leading to improved data utility and patient care.

IV. Motivation

Due to the lack of ability to exchange health information is preventing in treatment because data cannot be easily combined and pooled together for analysis. but because of this technology solves all of those issues and provides the way of sharing of health information in safe, private and secure way. This means you will have full access and control over your data. Patients can put their whole medical histories in a wallet from birth to where they are now in life that is they can put 24*7 monitoring and access of data.

And this data will make big motivations for the:
Pharma Companies – with blockchain platform in place it will be possible for pharma companies to collect data in real time that will allow them to offer a vast array of medical products .

Pharmacies – from these data they can give effectively guide the patients as to how they must take the medicine.

Also it provides various facilities like Form drop system, Robust monitoring, enhanced collaboration, data protection cost efficient process.

V.Existing System

As per our research and the information provided on google we came into conclusion that the medical organizations and the people around us are facing lot of issues regarding the medical reports and the documents. The system that exist now is the simple application that only records the information of the visited patients to the particular organization or the hospitals.

Disadvantages:

- Less Efficiency
- Decision creating is smaller in amount.

VI. Proposed System

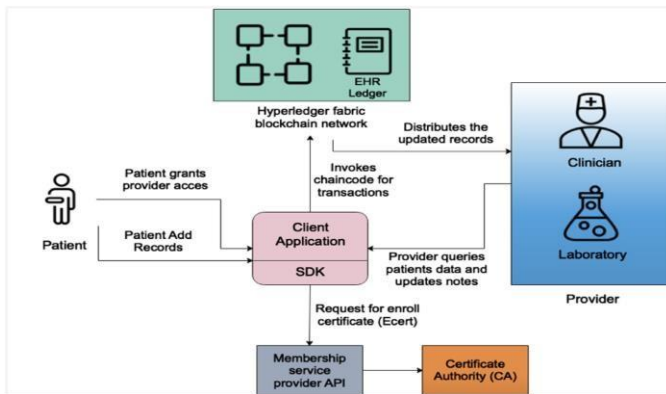
The blockchain based EHR system architecture is described in this section. There are four participants in the proposed system Patient, Clinician, Lab and System admin. In this system, various assets or smart contracts are defined, including, but not limited to: Create Medical Record, Grant Access To Clinician, Grant Access To Lab, Revoke Access, Revoke Access To Lab.

The system workflow is simple to use. Participants register through the client application or SDK, requesting an enrolment certificate via a Membership Service Provider (MSP) to the certificate authority. Then, the certificate authority issues the certificate and private key with a new ID to enroll the participant. All transactions are distributed over the hyper- ledger fabric blockchain network. Participants have different roles in the system and can only access records that they have been granted access. Patients can add records using the client application, which invokes the chain code for committing a transaction to the network. After committing the transaction into the blockchain network, the updated transactions are distributed over the network; this ensures that every transaction over the network is distributed to every participant in the system and that each transaction cannot be modified or deleted by unauthorized users. Transactions are only added to the previous hash with a timestamp, so the network is fully secure. Records are updated and visible to every user in the blockchain network. The providers, like clinicians and laboratory staff, can query required data over the network. If the patient grants access to view and update their records into the EHR ledger network, then the clinician or laboratory participant can view and update whenever needed for permission records of the patients.

VII. Advantages

- Distributed ledger: Transactions are appended in a distributed system on the network, which creates system recovery by eliminating a single point of failure or centralized entity;
- Consensus mechanism: Transactions are only updated when all verified users in the network agree to the condition of the transaction;
- Provenance: The complete data or asset's history is available on the blockchain network;
- Immutability: Records on the network cannot be modified or tampered with; thus, all information is secure and trusted;
- Finality: When a transaction is committed on a blockchain, it cannot be modified or reversed;
- Smart contract: The codes are created on a blockchain network, and the computer and nodes execute on a triggered event. Hence, The codes are auto-executed within the time frame.

VIII. System Architecture



IX. Conclusion

We propose an architecture that could be used to improve the current EHR, as well as the challenges behind its widespread adoption. We chose the hyper-ledger network to implement the ledger of the proposed scenarios. It is clear from these analyses That, a medical record is the most comprehensive record about the identity of a person and must be handle in a secure manner. Because blockchain encrypted information cannot be modified or

deleted, it ensures complete integrity and security of medical records from day one of its use. Thus, to enable trusted access to medical data, patients would be place at the center of their healthcare data and could grant or revoke access to any other institution who needs to access their information. The blockchain and distributed infrastructure technology are exciting developments that show promise in the healthcare industry. It should be a part of the strategic design for the business process modernization of an institution who worried about issues of security, interoperability, and privacy.

X. Reference

- [1] "Blockchain-based electronic healthcare record system for healthcare" Sudeep Tanwar, Karan Parekh, Richard Evans Journal of Information Security and Applications 50 (2020) 102407 1.
- [2] "A Blockchain-Based Approach to Health Information Exchange Networks" Kevin Peterson, Rammohan Deeduvanu, Pradip Kanjamala, and Kelly Boles Mayo Clinic Jan 2018
- [3] Asma Khatoon Department of Electrical & Electronic Engineering, National University of Ireland, H91 TK33 Galway, Ireland; Received: 8 December 2019; Accepted: 31 December 2019; Published: 3 January 2020
- [4] "Blockchain Technology applied to Electronic Health Records" Suboh M Alkhushyini , Du'a M Alzaleq, and Nadine L Gadjou Kengne Suboh.alkhushayni@mnsu.edu, daa.alzaleq@mnsu.edu, gadjoun@uwplatt.edu