Secure Approach For Medical Record Using Blockchain Technology

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Abstract - *Electronic Health Records (EHRs) are used to protect the history of the Patient's data. But it is entirely controlled by the hospitals. This project tends to enforce our framework in an exceeding image that ensures privacy, security, convenience, and fine-grained access management over EHR (Electronic Health Record) knowledge. The deliberate paper will appreciably reduce the turnaround for EHR sharing, enhance the better cognitive manner for clinical aid. Hospitals stores all the data of patient's medical records in their electronic health record system. In critical situations, patients need to focus on the details of their health records and restore their data. Blockchain technology provides an encrypted electronic healthcare system, including medical records as well as data of every patient and their treating doctors. This technology is based on a proof of work algorithm-based system, in which all the data of every patient is encrypted and cannot be manipulated.*

***Key Words*: Blockchain, Electronic Health Record (EHR), Database, Proof of work Algorithm.**

1. INTRODUCTION

In the modern world, we stock each element like emails, photos, videos, and banking services but we do not have a proper system to check the entire history of the health record. Electronic Health Records (EHRs) offers service which is efficient for health record storage. It removes the traditional problem in which patient medical records are written on paper and in the current system it is electronically easily accessible on the secured website. In today's world, the patient loses their medical data across different locations during life events. So the patient may lose control of the prevailing medical data. There's limited access to the EHR system for patients and unable to access data with providers. In this article, we will discuss how blockchain can be applied to improve the way electronic health records (EHR) are handled across various health institutions. The main issue is how to put patients at the centre of their healthcare data and share medical data while ensuring the protection of patient privacy, data integrity, and avoiding data manipulation. To do that, we will first present the blockchain methodology used to handle electronic health records then, we will discuss and analyse the usability of our software implementation for electronic health records.

2. LITERATURE SURVEY

A patient report database is that the set of additives that shape the mechanism via way of means by which affected person data are created and stored. Patient records appear during a sort of form, for instance, a paper, a disk, a computer Hard disk. They are created and stored frequently in medical institutions such as hospitals and public health infirmaries. A machine-based Medical record system is an electronic patient record stored in a system specifically designed to support users by giving access to accurate data, alerts, reminders, medical selection aid systems, hyperlinks to clinical knowledge, and different aids.

As stated by Agajo, Adedokun, and Karngong, In their paper, Crypto Hash Algorithm-Based Blockchain Technology for managing Decentralized Ledger Database. "This research work presents a unique secured decentralized ledger in during a database that manages petroleum product distribution records employing a secure hash algorithm-based blockchain."

As stated by Mayer, Da Costa, and Righi, In their paper, Electronic health records in a blockchain. "In this study, a scientific literature review regarding EHRs within a blockchain was conducted, to identify and discuss the foremost issues, challenges, and possible benefits from Blockchain adoption within the healthcare sector."

As stated by Malavika M.B, Richa Kumari, Nihara S.M, In their paper, Blockchain technology in an electronic health record system. The consequences of this paper are particularly targeted on maintaining the records of the patients with the help of using imparting protection via blockchain and more than one ABS scheme. This subsection compares the performance and different vital homes of the proposed and previous ABS schemes with the aid of using thinking about the hash function.

3. METHODOLOGY

Blockchain technology is formed together by different blocks that are connected as chains in a network. It makes a decentralized system. Each block contains a hash code of previous blocks in them along with current block data. Any records can be added to this type of blockchain because it uses cryptographic functions that provide security to the database connected to its network.

The proof of Work (PoW) concept was first publicized in 1993 by Dwork and Naor. It was later used by Nakamoto in bitcoin paper in 2008. The proof of work algorithm involves solving a challenging puzzle to create new blocks in the bitcoin blockchain. All transactions are confirmed in the new block then later the next block will be created. The block gets introduced to the chain, and it is the highest block height.

The main purpose of this project is to secure the data of medical records in a database using blockchain that uses the Proof Of Work Algorithm. It is a peer-to-peer distributed ledger that records all agreements and transactions. It provides all complete information about the history of the patient's treatment with the timestamp. All the medical data is stored in a database in encrypted form. The database

includes all data of Doctors and patients. The patient has quick access to check records and keep up to date. It is secure access for patients and doctors to maintain the integrity of the system. The benefit of this Project is to reduce medical errors and provide self-care. It helps to upgrade patient and provider cooperation and conversation as well as health care facility with more honest prescribing.

3.1 SYSTEM DESIGN

The main actors of this system are Admin, Doctors, and Patients.

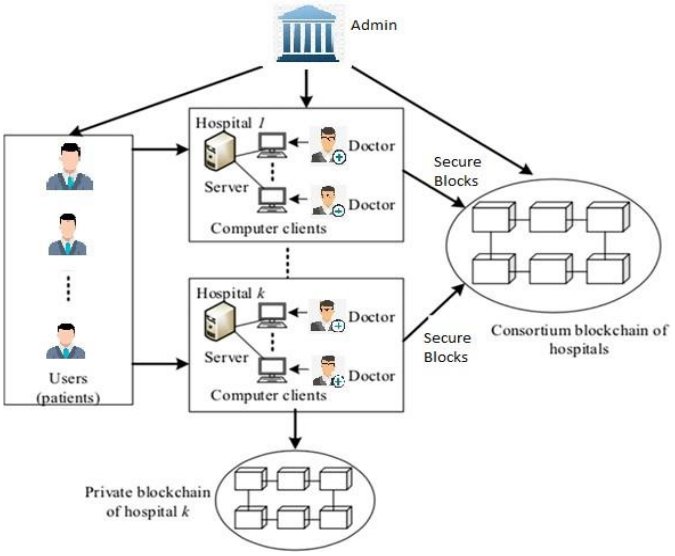

Fig -1: System Architecture

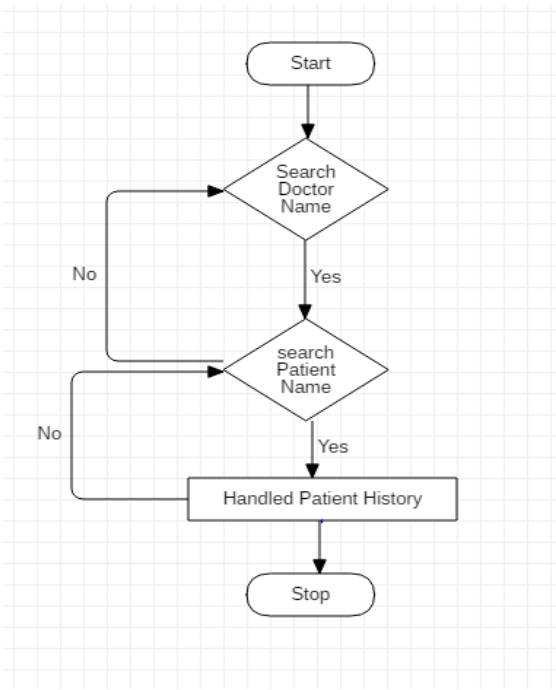

Fig -2: Flowchart

3.2 HASH FUNCTION

Hashing is a mathematical function that takes set of inputs and fits them in the form of blocks or table or different data structure that contains fixed-size values. It is a combination of the latest message block and the output of the previous block. The integrity of data is a common factor in the hash function that is used to generate the sum of correct digits to use later for comparison to find out errors in the data blocks. It will detect any changes made to the original file. For every block, there is a hash value generated to check the previous block and in this way, all blocks are connected in a chain of hash codes without the data being tampered with. hash codes can be verified by the administrator to check the data have not been tampered with. If any attempt to compromise the data in all the blocks in the database then the chain of hash codes will be irrational and it can be easily recognizable by the administrator.

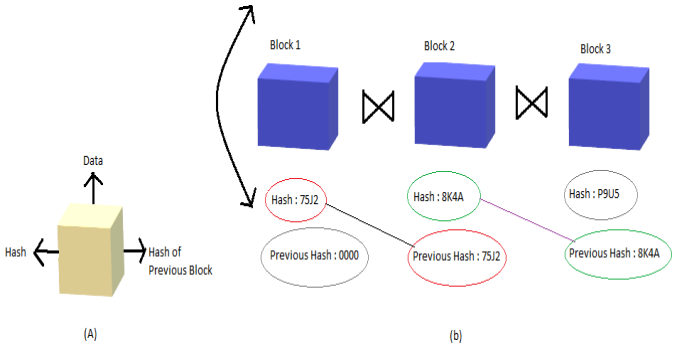

Fig -3: Block Diagram of Hash

Data is stored in form of blocks. those blocks are connected using the hash value. All blocks have specific hash values. Every Block has a previous hash value excluding the startingone which consists of either zero or null. The next block contains a hash value of the previous block, similarly, the nextblocks are connected like this. Parameters are used to calculate hash values are previous hash, patient's ID, Doctor's ID, treatments, and timestamp. Considering all these parameters, Hash values are generated. This is called the Proof of Work Algorithm.

3.3 IMPLEMENTATION

In this system, the main actors are Admin, Doctor, and Patient. Admin has all the rights of giving secure access to doctors and patients to check medical records. Admin adds all the details of the Doctor including Name, Email, Phone number, Password, and Degree along with his photo. Also, he can check all the doctors added from the previous history. The same procedure is done for Patients to give access to their medical records. The Accuracy of the system is that nobody can tamper with any data in the database including admin. All treatment details of patients can be viewed but cannot manipulate anything in it. The patient has medical documents that are important that can also be added to the treatment section in PDF format.

As we can see, Admin has provided login access to doctors. So whenever a new patient is visiting that specific doctor, he can

check that patient's entire history. On that basis Doctor can add more treatments further for that patient and that patientwill be added to that doctor's list. If somehow some data has tampered with within the database, then the doctor cannotadd any more treatment to that specific patient. This confirmsthat no more data can be stored in blocks until all issues are resolved. Admin has given access to the patient to check theirmedical history. The patient can also check their treating doctor's name and treatment with a timestamp.

4. RESULT

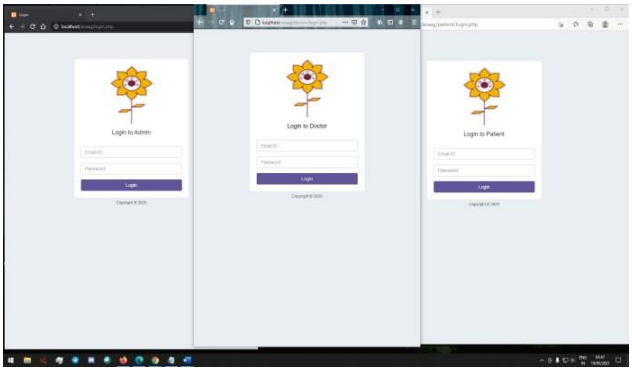

Fig -1: Login Page of Admin, Doctor, and Patient

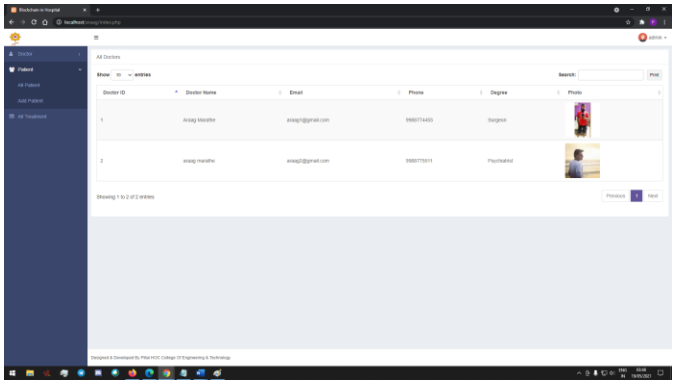

Fig -2: Doctor Details

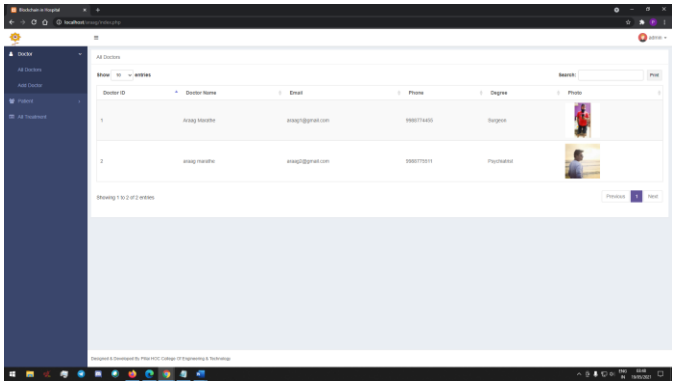

Fig -3: Patient Details

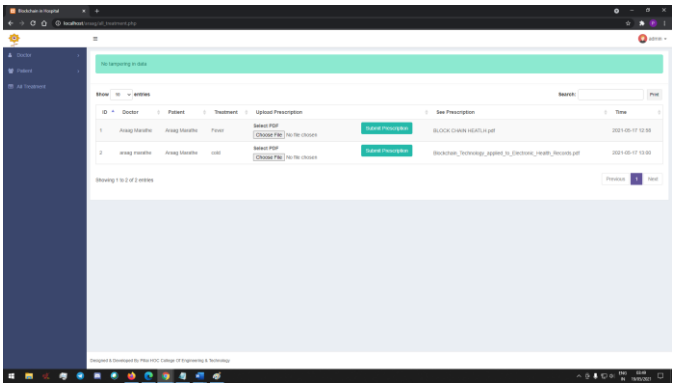

Fig -4: Treatment Data with Timestamp

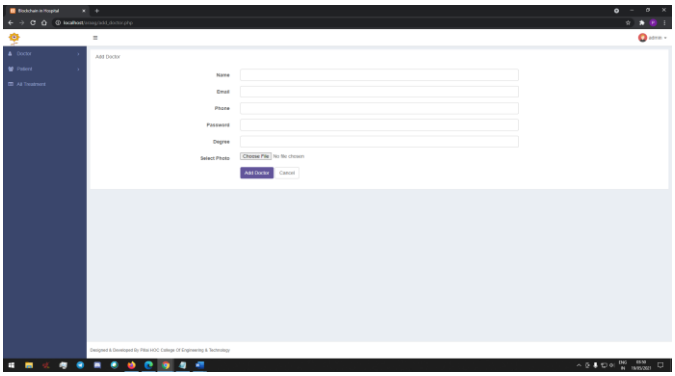

Fig -5: Add Details of new Doctor

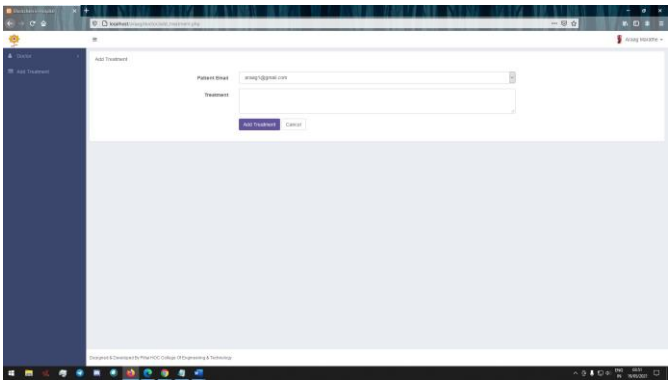

Fig -6: Add Details of new Doctor

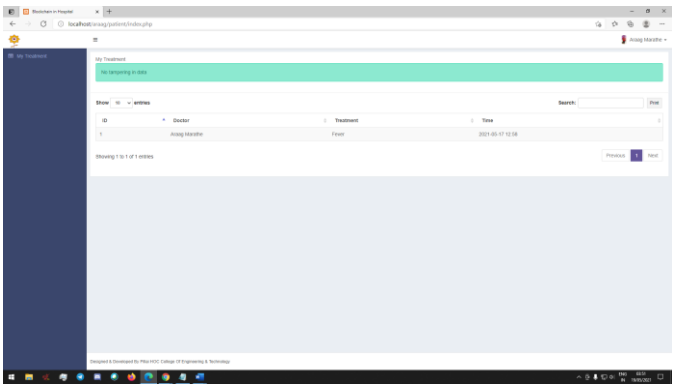

Fig -7: Patient's Medical Record

5. CONCLUSION & FUTURE SCOPE

In this paper, we have shown how blockchain technology is useful for the healthcare sector as well as safeguarding patient's privacy of data in electronic health records. we have added several options to the structure of blockchain as patient's treatment data history with prescriptions provided by doctors. This system allows accessing data of medical records to multiple patients who are registered in the system. To reduce the paperwork environment, Electronic health records are created in a database with all the digital documents are stored. In this framework, the patient can access their records from the secure database system provided by the administrator. This system is created in such a way that it is easy to use and understand.

In the next development of this technology, several options like payment and appointment booking can be added to the existing framework. For this, we should consider a few possibilities that decides how much the patient will pay for the doctor's consultation fees. In this distributed system of blockchain, we have to create certain policies that should be effective with the principles of all systems in healthcare.

6. REFERENCES

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