MedBlock System for Securing Medical Records

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Abstract - *Blockchain technology was introduced to overcome drawbacks in banking domain, but with advancements in the field it is now used in various applications including data security, healthcare industries, retail industries. The current healthcare record systems all around the world face issues for securely sharing medical data with the stakeholders without sacrificing privacy, integrity and security of data. There has been a tremendous interest in using blockchain technologies to provide safe and efficient data storage in healthcare. Blockchain has ability to handle patient health records safely and comprehensively. Blockchain has potential to transform conventional healthcare methods to efficient way of diagnosis and treatment through secure and efficient sharing of medical records. This paper proposes a system that uses the latest advancements in blockchain to resolve current drawbacks of healthcare systems. This paper evaluates the blockchain from the various perspectives around healthcare system like security, confidentiality, integrity, storage and interoperability.*

Key Words: *Blockchain, security, healthcare data, privacy, data sharing, secured access.*

1. INTRODUCTION

Healthcare is a data-driven environment in which an immense data is continuously generated and shared daily. Due to the vulnerability of information and constraints, such as confidentiality, security and integrity, the preservation and distribution of this vast volume of data is critical and significantly challenging. A study of data breaches done in 2012 found that the healthcare domain was third in terms number of data breaches, after the retail domain and finance and insurance domain .Secure and safe data access is important for diagnosis. The practice of data sharing is absolutely necessary in order to allow clinical practitioners to pass their patients ' clinical data to the authority concerned for rapid follow-up.

The current healthcare record systems all around the world face issues for securely sharing medical data with the stakeholders without sacrificing data privacy, integrity and security. Currently, there has been remarkable advancements in using blockchain technology for the provision of protected data on healthcare, biomedical and e-health data sharing.

2. LITERATURE REVIEW

Electronic Medical Records (EMRs) were never designed to manage multi-hospital, lifetime medical data of patients. Patients leave data dispersed around various organisations as activities in life drive them away from one healthcare centre to another. By doing so, they are lose access to previous records. Throughout their lives, patients connect with a vast number of health care services–including a physician, specialists, dentists, dieticians and more. They leave their medical reports dispersed in these various healthcare systems [9].Both public and private healthcare organizations, have large quantities of confidential and sensitive healthcare data of patients. Individuals have absolutely no control over how their medical data is stored, how it is used or shared [2].As Blockchain builds trusts, it can facilitate better healthcare data storage and sharing. Deloitte [5] Blockchain technology for medical records stores standardized fields on the chain while the expensive medical details are stored on off-chain. MedRec [1] is built on Ethereum in which smart contract is used to build relationship between patient and provider that associates a medical record with viewing permission and data retrieval instructions. Cryan, A.M. [11] introduced a comprehensive and creative blockchain-based infrastructure capable of protecting confidential information, resolving essential data protection concerns and integrating a blockchain software framework through a hospital network. Blockchain has shown tremendous promise in scientific research as well for recording data in tamperproof manner. Through the practical usage of blockchain technology, all clinical consents, schedules, and protocols will be recorded on a blockchain, long before a clinical trails or test starts.

3. PROPOSED SYSTEM

The new system must prioritize the security and confidentiality of patient's medical records. Patients gain trust in healthcare service from tamperproof system handling their medical reports.

The proposed system should help patients to manage one profile to maintain all his medical records with minimum complexity. Such system will not only benefit patients but also doctors for better diagnosis of the illness as all medical reports of patient are available for analysis. The following diagram fig 1 shows the architecture of the proposed system which has two main modules i.e Doctor and Patient.
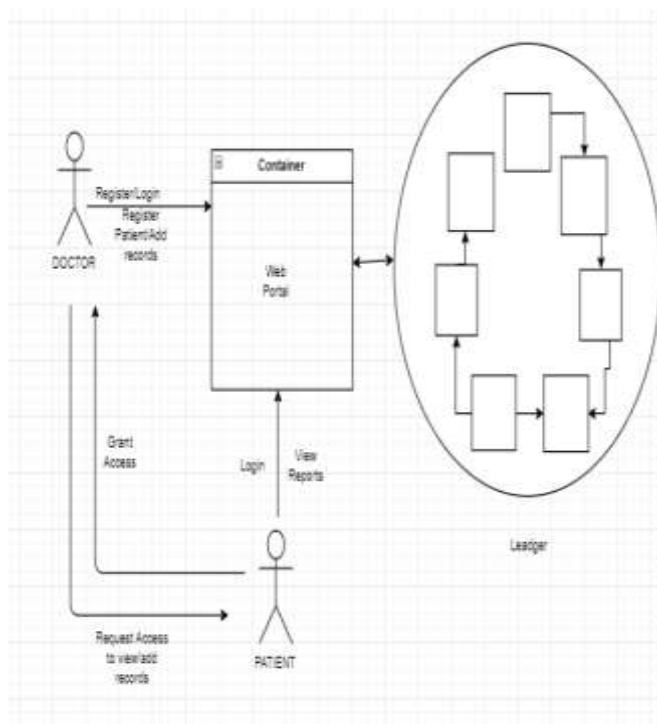
Proposed system contains two modules:

1.Doctor

- Doctor Login
- Add Patient Details
- Add Patient Visit Details
- View Patient Record

2.Patient

- Patient Login
- View Record
- Share Data

Fig -1: System Architecture.

Flow of the System:

1) Doctor registers himself on the MedBlock portal with his email-id and registration number.
2) Doctor can add a new patient record.
3) When patient visits new doctor for treatment he shares his previous records with the doctor by sharing the key received on registered email id.
4) Patient can login onto the system and view all his previous medical records and prescription.

Fig 2 Shows the Ledger Architecture, here one block will contain the following information about a particular transaction

1. Index
2. Timestamp
3. Previous block Hash value

4. The Transaction data i.e Profile create/update/ Medical file upload/shared
5. Hash of the block
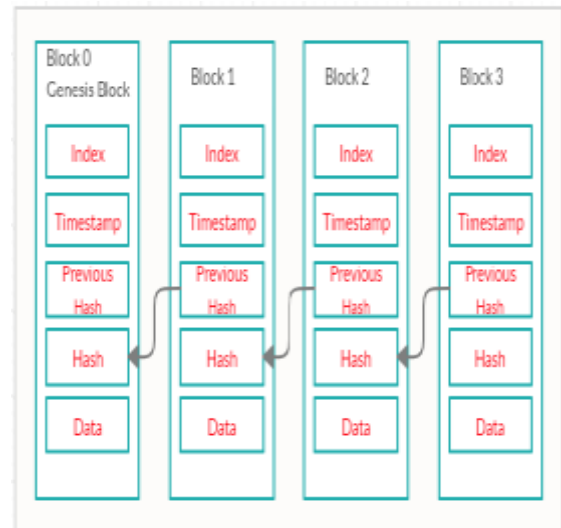
Fig -2: Legder Architecture

Sharing Patient's Medical Records:

1. When Doctor Uploads Medical record of patient the file is encrypted using AES Algorithm. The key is shared with the patient on registered maid id.
2. Patient needs to enter the key to download his medical record

4. COMPARATIVE STUDY OF EMR AND MedBlock

The following table shows comparison between the pre-existing EMR systems and proposed MedBlock system.

Table -1: Comparison between EMR and MedBlock.

NO	FEATURE	EMR	MedBlock
1	Digitalizing of medical record	YES	YES
2	Security of patients records	NO	YES
3	Consent of Patient taken for using his records	NOT TAKEN	TAKEN
4	Tampering of transactions	POSSIBLE	NOT POSSIBLE
5	Encryption of records	NO	YES

5. CONCLUSION

In the proposed healthcare system, there are mainly two operations, download and add/append the medical files. Patient can download the decrypted medical file using the key shared on email-id. Doctors can only upload the medical file with patient permission to add medical record. With this system, medical records can be kept more neatly and manageable. With implementation of our project the health records can be more secure and can avoid tampering of data. The proposed system can overcome the drawbacks of the EMR system and provide better security by using SHA-256 hashing, AES encryption algorithms along with Blockchain. This system will allow the patients to retain their medical records in a secure environment. System will also ensure that confidential information of the patient is accessed by authorized persons only.

6. REFERENCES

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