Blockchain Enabled Healthcare Secure Data Storage System

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Abstract: *Data security or secure storage of medical information is usually asignificant concern for the bulk of the population. An efficient healthcare system needs a technology platform tospeak firmly and seamlessly. Block chain has beenemerging technology for a few years now. The key options of block chain which attract most developers are its immutableness, decentralization, transparency, distributed ledger. We tend to propose a Healthcare Secure Information Storage System (Life Care) that firmly manages personal medical records and creates an interaction between Doctors and Patients. The Life Care system is meant to improve the current systems because it provides interoperable, secure, and effective access for medical records by patients. It provides timed-based smart contract for governing transactions and dominant access to electronic medical records. The security is ensured by using SHA-256 encryption technique with Blockchain to store hash data for providing security, new incentive mechanism that leverages the degree of health suppliers concerning their efforts in maintaining medical records and making new blocks.*

Keywords: Blockchain, Health information exchange, Data Security, Healthcare.

I. INTRODUCTION

Data Health interoperability is a problem that remains open until now. The main question is how to provide open access to sensible data (health data) Block chain technology andsmart contracts seem to provide an interesting and innovative way to keep references to Electronic Health Records (EHRs)[11].Block-chainhas the potential to improve EHR solutions providing privacy and interoperability. The rapid uptake of digitization in healthcare has ledto the generation of massive electronic records about patients. Such growth poses unprecedented demands for healthcare data protection while in use and exchange. The rise of block chain technology as a responsible and transparent mechanism to store and distribute data is paving the way for new potentials of solving serious data privacy, security, and integrity issues in healthcare. Blockchain technology has attracted considerable attention from industry as well as academics over the past few years. Indeed, new block chain applications and research studies surface every day.

II. LITERATURE SURVEY

Personal health records (PHRs) are private and vital assets for every patient [9].There have been introduced many works on various aspects of managing and organizing the PHR so far. However, there is an uncertain remaining issue for the role of PHR in emergencies. In a traditional emergency access system, the patient cannot give consent to emergency staff for accessinghis/her PHR. Moreover, there is no secured record management of patient's PHR, which reveals highly confidential personal information, such as what happened, when, and who has access to such information.

Secure Attribute-Based Signature Scheme with MultipleAuthorities for Blockchain in Electronic Health Records Systems (EHRs) [2]**.** Electronic Health Records are entirely controlled by hospitals instead of patients, which complicates seeking medical advices from different hospitals. Patients face a critical need to focus on the details of their own healthcare and restore management of their own medical data. The rapid development of block chain technology promotes population healthcare, including medical records as well as patient-related data. This technology provides patients with comprehensive, immutable records, and access to EHRs free from service providers and treatment websites.

A Blockchain-based Architecture Framework [10] for Secure Sharing of Personal Health Data was proposed by Sandro Amofa and Emmanuel Boateng Sifah. Health information exchanges have been popular for some time with their advantages known and widely researched. In spite of their utility in increasing provider efficiency and decreasing

administrative costs, one challenge that has persisted is the data owner's inability to control data after transmission. The lack of technical mechanisms to effectively control patients' health data in the network significantly affects participation of health and medical institutions while perpetrating the silo-based data management that locks value and potential inherent in the data. This not only affects researchers due to the lack of data for research and analysis but the quality of life of patients

Authors are proposed a Blockchain based searchable encryption for electronic health record sharing [6]. Data leakage in electronic health records (EHRs) could result in the compromise of patient privacy (e.g. medical conditions). Generally most data in EHRs remain unchanged once they are uploaded to the system; thus, block chain can be potentially used to facilitate the sharing of such data. Different participating medical organizations and individuals

A design of block chain-based architecture for the security of electronic health record (EHR) systems was proposed by Guang Yang, Chunlei Li[11]. The architecture is built on top of existing databases maintained by health providers, implements a block chain solution to improve interoperability of the current EHR systems, prevent tampering and malicious misuse of EHRs by means of tracking all events that happened to the data in the databases. This proposed architecture also introduces a new incentive mechanism for the creation of new blocks in the block chain. The architecture is independent of any specific block chain platforms and open to further extensions, hence potentially fits in with other electronic record systems that require protection.

III. EXISTING SYSTEM

All the traditional methods of a healthcare system, once a person visits a hospital, he/she has to perform all the basic procedures such as taking an appointment, form filling and some basic tests. The patient has medical insurance, and then the amount is covered by the insurance company. But integrating this entire process becomes very time consuming and inefficient. Maintaining this entire information in the form of hard copies is again inefficient and tiresome. It was also seen that some doctors charged variable fees to patients in the pandemic world. Traditionally, the payment procedure in any sector works with the help of third parties which is entirely wrong in many ways.
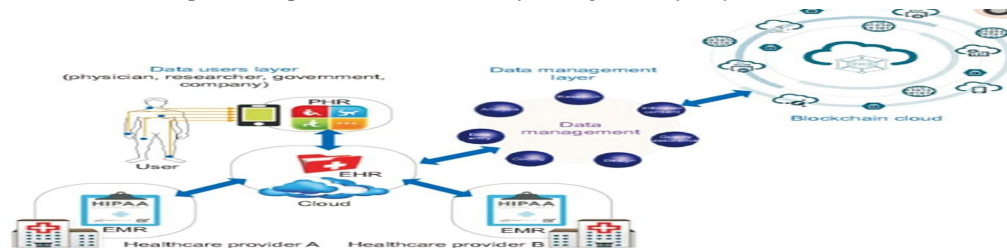

Fig.1 US pilot project for block chain healthcare

IV. PROPOSED SYSTEM

In this proposed work, it is an efficient way to revolutionize data storage using the concept of private block chain in a healthcare system. Private block chain for every patient would have all the details of doctors, insurance companies with whom they have ever interacted. So we proposed a Healthcare Secure Information Storage System (Life Care) that securely manages personal medical records of Patients. The system has modules which are classified by stakeholders of the system that are to be addressed separately and further integrate them accordingly. Every patient would have an account linked to Aadhar number to maintain uniqueness. Apart from keeping track of documents, patients can consult or book an appointment with doctors. The medical history of a patient who has provided his/her private key and examine accordingly. After proper analysis, prescription and medication will be uploaded by doctors. The Life Care system is used to improve the current systems because it provides interoperable, secure, and effective access for medical records by patients. The security is ensured by using SHA-256 encryption algorithm with Blockchain to store hash data for providing security.

V. MODULES

REGISTRATION

Registration is one of the primary modules in any data management system. A patient's medical record management starts with registering a patient with the system. OpenMRS is being a customizable and scalable solution to medical record management and also requires a customizablepatient registration system.

LOGIN

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.

ELECTRONIC HEALTH RECORD MAINTENANCE

An Electronic Health Record (EHR) is a collection of various medical records that get generated during any clinical encounter or events. With the rise of self-care and homecare devices and systems, a meaningful healthcare data will get generated 24×7 and also have long-term clinical relevance.

AUTHENTICATION

The files are encrypted before the files are uploaded to the block chain data base server using Secure Hashing Algorithm-256 encryption technique. SHA-256 is the cryptographic hash function that outputs a 256 bits long value. It moderates the creation and management of addresses, and is also used for transaction verification. The data owners are provided an option to enter the keywords forthe file that are uploaded to the server. These keywords are used for the indexing purpose which helps the search return values very quickly.

VI. IMPLEMENTATION
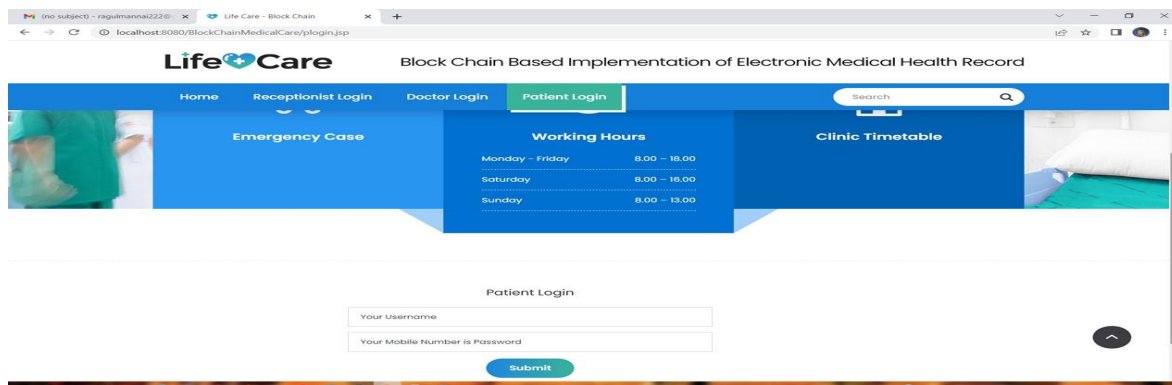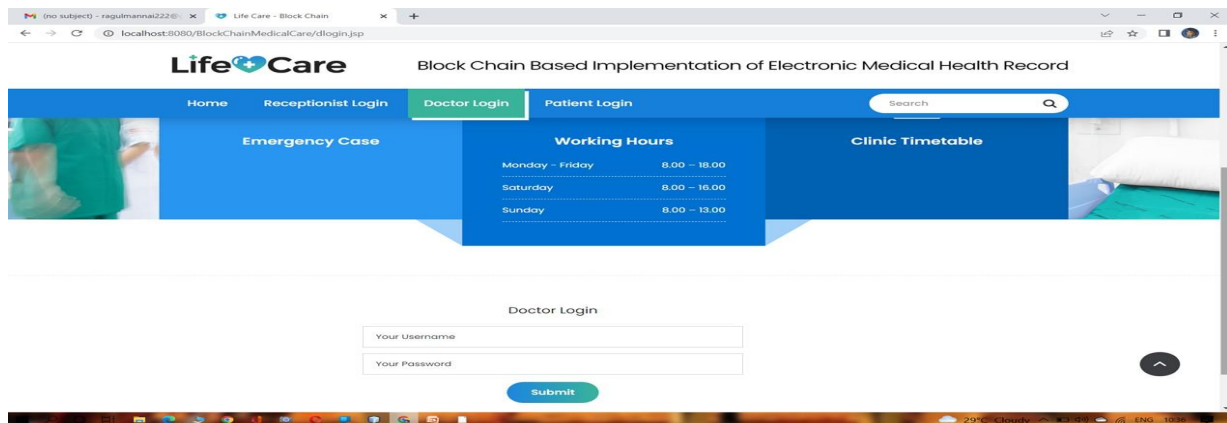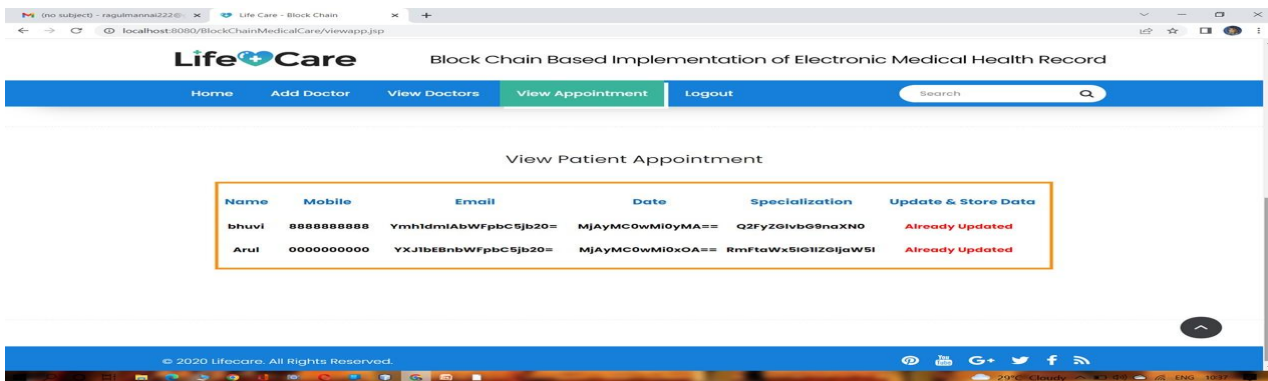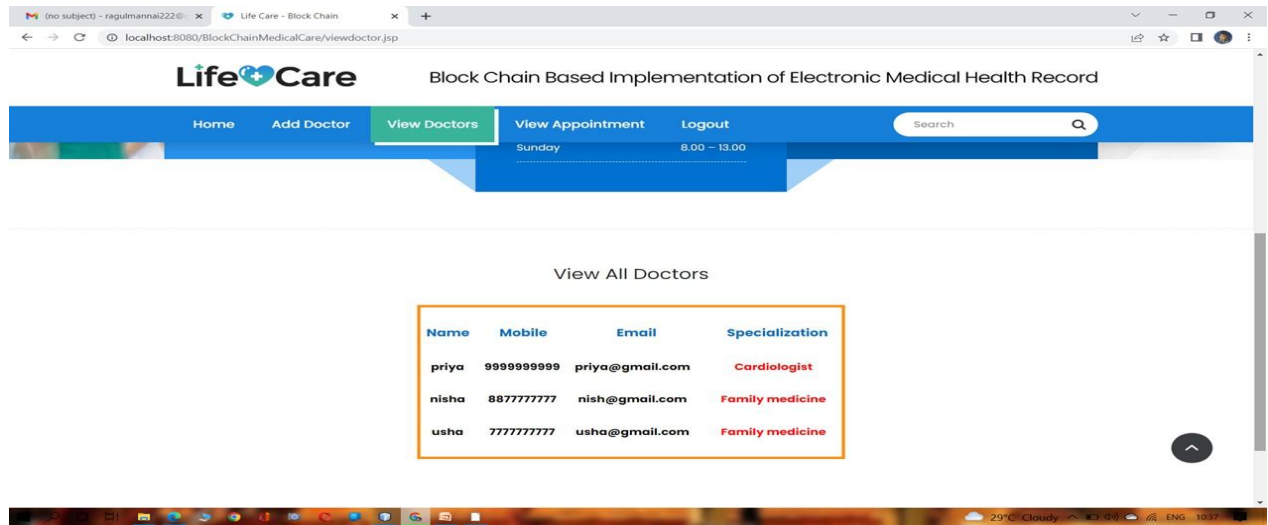
VII. CONCLUSION

In this project, we proposed situations of blockchain 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 Life care by using timed-based smart contracts for governing transactions and monitoring the computations performed on the Electronic Medical Record through the enforcement of the acceptable usage policies. The adoption of the hashing techniques ensures the integrity of information. Security and access control are maintained by the adoption of advanced encryption 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 the electronic medical records.

REFERENCES

[1]. A. R. Rajput, Q. Li, M. T. Ahvanooey, and I. Masood, ``EACMS:Emergency access control management system for personal health record based on blockchain,'' IEEE Access, vol. 7, pp. 8430484317, 2019.

[2]. R. Guo, H. Shi, Q. Zhao, and D. Zheng, ``Secure attribute-based signature scheme with multiple authorities for blockchain in electronic health records systems,'' IEEE Access, vol. 6, pp.1167611686, 2018.

[3]. L. X. Chen, W.-K. Lee, C.-C. Chang, K.-K. R. Choo, and N. Zhang,''Blockchain based searchable encryption

for electronic healthrecord sharing,'' Future Gener. Comput. Syst., vol. 95, pp. 420429, Jun. 2019.

[4]. L. A. Linn and M. B. Koo, ``Blockchain for health data and its potential use in health IT and health care related research,'' in Proc. ONC/NIST Blockchain Healthcare Res. Workshop., Gaithersburg, MD, USA, 2016,pp. 110.

[5]. D. Ivan, ``Moving toward a block chain-based method for the secure storage of patient records,'' in Proc. ONC/NIST Blockchain Healthcare Res.Workshop, Gaithersburg, MD, USA, 2016, pp. 111.

[6]. Lanxiang Chen, W. Lee, Chinchen Chang, Kim-Kwang Raymond Choo, N. Zhang ``Block chain based for searchable encryption for an electronic health and sharing'' DOI:10.1016/J.FUTURE.2019.01.018,June-2019.

[7]. A. Azaria, A. Ekblaw, T. Vieira, and A. Lippman, ``MedRec: Using blockchain for medical data access and permission management,'' in Proc.2nd Int. Conf. Open Big Data, Aug. 2016, pp. 2530.

[8]. Q. I. Xia, E. B. Sifah, K. O. Asamoah, J. Gao, X. Du, and M. Guizani, ''MeDShare: Trust-less medical data sharing among cloud service providers via block chain,'' IEEE Access, vol. 5, pp. 1475714767, 2017.

[9]. S. Amofa, E. B. Sifah, K. O.-B. O. Agyekum, S. Abla, Q. Xia, C. Gee,and J. Gao, ``A blockchain-based architecture framework for secure sharing of personal health data,'' in Proc. IEEE 20th Int. Conf. e-Health Netw.,Appl. Services (Healthcom), Ostrava, Czech Republic, Sep. 2018, pp. 16.

[10]. G.Yang and C. Li, "A design of blockchain-based architecture for the security of electronic health record (EHR) systems,'' in Proc. IEEE Int. Conf.Cloud Comput. Technol. Sci. (CloudCom), Nicosia, Cyprus, Dec. 2018,pp. 261265.

[11]. G. G. Dagher, J. Mohler, M. Milojkovic, and P. B. Marella, "Ancile:Privacy-preserving framework for access control and interoperability of electronic health records using blockchain technology,'' Sustain. CitiesSoc., vol. 39, pp. 283297, May 2018.

[12]. X. Zhang, S. Poslad, and Z. Ma, ``Block-based access control for blockchain-based electronic medical records (EMRs) query in eHealth,''in Proc. IEEE Global Commun. Conf. (GLOBECOM), AbuDhabi,United Arab Emirates, Dec. 2018, pp. 17.

[13]. S. Rahman, ``Privacy-friendly platform for healthcare data in cloud based on blockchain environment,'' Future Gener. Comput. Syst., vol. 95, pp. 511521, Jun. 2019.

[14]. L. Hang, E. Choi, and D.-H. Kim, ``A novel EMR integrity management based on a medical block chain platform in hospital,'' Electronics, vol. 8, no. 4, p. 467, Apr. 2019.

[15]. [Sandi Rahmadika and Kyung-Hyune Rhee," Toward Privacy- Preserving Shared Storage in Untrusted Block chain P2P Networks", DOI:10.1155/2019/6219868, May-2019.

[16]. Erikson Julio de Aguiar and Bruno S. Faical, Bhaskar krishnamachari and Jo ueyama,"A Survey of Blockchain-Based Strategies for Healthcare", Vol. 53, No. 2, Article 27, March-2020.