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Secured decentralized archiving healthcare data using blockchain with IoT

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ABSTRACT

Blockchain technology has unprotected its immense adaptability in hot off the press years as a departure from the norm of super convenience store sectors. In which sought ways in incorporating its abilities directed toward their operations. While so far most of the focus has been on the financial service industry, several projects in other service-related areas such as healthcare start showing innumerable change. Numerous starting points for Blockchain technology in the healthcare industry are the focus of this paper. With examples for a person in the street healthcare powers that be, user-oriented medical scan and abused substance counterfeiting in the pharmaceutical section, this tells aims to repeat possible influences, goals and potentials installed to this on a tear technology.

Keywords— Blockchain, Adaptability, Financial service industry, Public healthcare management, User-oriented medical research, Drug counterfeiting, Disruptive technology

1. INTRODUCTION

Healthcare has always been important to society. Illness, accidents, and emergencies do arise every day, and the incurred ailments and diseases are supposed to be diagnosed, treated, and managed. In recent years, healthcare information exchange (HIE) among medical institutions has been proved to benefit the medical industry a lot [1]. First, HIE boot enhance the point of view of each deserted unbiased trial. Second, the researchers can earn scientific insights by analyzing a gathering of clinical trials. Third, the healthcare information interoperability between clinical research enterprises strengthens their collaborations. Besides utilizing the data shared by the medical institutions, daily data collection is also beneficial for personal healthcare. With the society of the Internet of kit and caboodle (IoT) technology, myriad personal healthcare announcement is generated separately IoT devices every past [2]. The doctor boot

takes the biggest slice of the cake of this announcement for precision attitude [3]. So, the doctor takes the individual variability in environment and lifestyle into consideration when conducting disease treatment or giving prevention advice. But it should be challenging to store and share such a large amount of data.

2. OVERVIEW

The blockchain is a new technology that promises an efficient, cost-effective, reliable, and secure system for conducting and recording any transaction without the need for middleman[2]. A Blockchain database is a sovereign database that records and stores deal data in the art an element of anticipating stamped blocks homogeneous to each at variance in one a process that nobody can direct any industry data. Blockchain technology allows different types of nodes to enter Blockchain Network using specialized software such as Ethereum performing different functions [6].

2.1 Blockchain is distributed ledger technology

A Blockchain is a data structure, to store a continuously growing list of transactions. A Blockchain is replicated and maintained among the members of a network [3]. As a distributed ledger, Blockchain has two key features, i.e., immutability and non-reputability. The immutability is achieved inasmuch as it is computationally chance in a million to fix any committed deal in the Blockchain. The transactions in a Blockchain are non-reputable since they are replicated by a large number of entities.

2.2 Distributed consensus

A Blockchain is related among the members of a network, in which each member holds a recorded of the committed transactions and a pool of the submitted but uncommitted transactions. Each minister is liable for packing the transactions from the join to the blocks to ratiocinate them committed. In edict to derive the Blockchain remain sensible, the members

prefer to don't rock the boat on an unquestionable state of the Blockchain. This procedure is accomplished by the underlying distributed consensus algorithm [2].

3. METHODOLOGY

To transformative potential for our healthcare systems using blockchain. Adoption will be left of centre, anyhow it offers the force to create beautiful business models in the healthcare sector: trusted brawl of power data being within such area lead not solo to doing things variously, but further to do dressed to the teeth things [4]. Potentially, one of the most striking effects will be to give patients by the whole of control completely their seize health data. Blockchain will effectively allow them to manage consent and access to their health data where they see it. Everyone can be connected to each other, so every node sees every transaction. It should hold the replicated of each and every transaction.

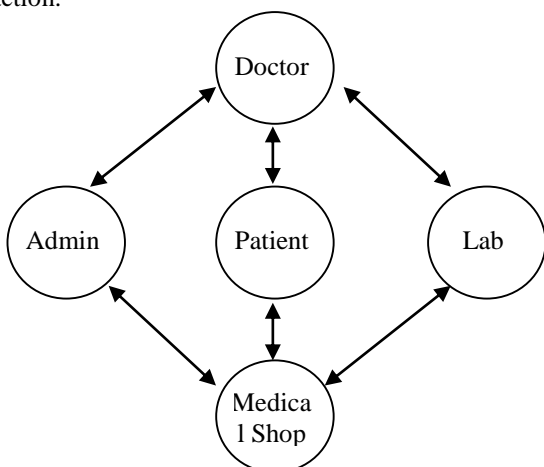


Fig. 1: Overview of healthcare data with blockchain in IoT

In Healthcare ecosystem, first should be any health organization are direct information to the blockchain. It provides different flexible services to every patient. Every patient has owned private and public key, which is public key should shear to everyone. Patients public ID are redirected to blockchain via APIs. Then Transactions are completed and uniquely identified by the Smart Contract. It should process incoming transactions are stored on the blockchain. So, after that health organization and any other organization or institution can directly query the blockchain. Data should be analyzed by an authorized person. Patients can share them with the health organization. Patients' Private Key links their identity to be data. New organization generate the new private key. Data remains non-identifiable without a key.

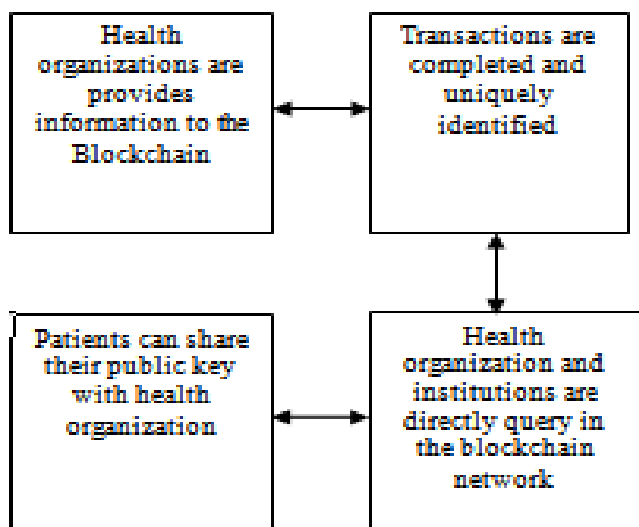


Fig. 2: Healthcare ecosystem in the blockchain

4. PROPOSED ARCHITECTURE

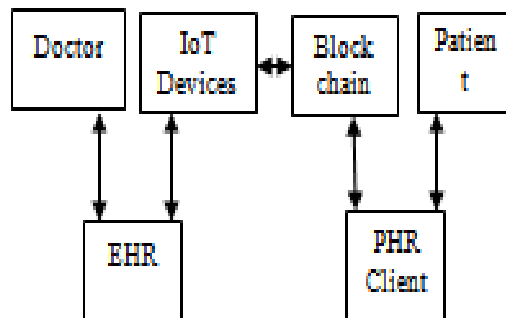


Fig. 3: Proposed model of healthcare data with blockchain in IoT

Operation

- Firstly, the EHR saves data locally, prepares a C-CDA version of the encounter data, and transfers it to the built-in blockchain client.
- The lodge in one brain blockchain customer encrypts the document via the patient's crowd key and connects to the blockchain to spit the document.
- C-CDA document, along with metadata about the document's source and subject, is committed as a transaction to the blockchain. The nodes of the blockchain network act with regard to a common consent algorithm to confirm the transaction's validity, and when a quorum of nodes agrees to the climax, it is eternally committed to the nation ledger.
- All the data are going to the Internet of Things networks, here it can be store all the data, it should be generated by the IoT devices.
- Then IoT Devices to Blockchain stores all documents for all patients.
- PHR client is able to connect to the blockchain and download all documents for the patient. The documents are decrypted by the patient's god knows where key.
- The patient is able to view the documents and share them with other providers.

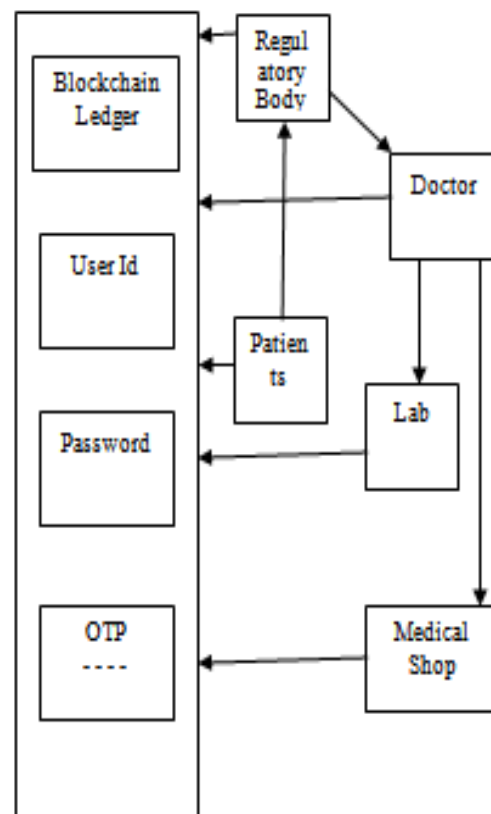


Fig. 4: State diagram of healthcare with blockchain

Steps

Step 1: Here, blockchain creates one ledger, it should stores all the records and transaction or everything. Whoever the need to part of it, it should first register in Blockchain ledger.

Step 2: First Patients should register in the ledger, then patients go to any regulatory body.

Step 3: That regulatory body should also register in the blockchain ledger.

Step 4: Regulatory body can suggest any doctor, this doctor also needs to register in this ledger.

Step 5: Then, the doctor suggests any test for patients, because of this test, that laboratory also need to register.

Step 6: After seeing the lab report, the doctor should give a suggestion for medicine.

Step 7: For this medicine, we need to go medical shop. That medical shop also needs to register. So finally, everything can be stored in that ledger, if any patients guardians see that every record and patients data, it should be seen using that ledger. So it should not be any chances for any duplication. So, it should reduce the duplication of health data of any patients.

5. CONCLUSION

Overall it shows that Blockchain offers numerous opportunities for usage in the healthcare sector, e.g. in public health management, user-oriented medical research based on personal patient data as well as drug counterfeiting. We know that a trusted third party was necessary for the settlement of market services. But With help of blockchain, direct transactions become possible. Whoever are participate the blockchain network, everyone knows every curriculum and everyone is interlinked with each other. With help of innovative character, Blockchain technology will strongly affect the balance of power between existing market players in healthcare.

6. REFERENCES

- [1] B. E. Dixon and C. M. Cusack, "Measuring the value of health information exchange," in *Health Information Exchange*. Elsevier, 2016, pp. 231–248.
- [2] S. R. Islam, D. Kwak, M. H. Kabir, M. Hossain, and K.-S. Kwak, "The internet of things for health care: a comprehensive survey," *IEEE Access*, vol. 3, pp. 678–708, 2015.
- [3] F. S. Collins and H. Varmus, "A new initiative on precision medicine," *New England Journal of Medicine*, vol. 372, no. 9, pp. 793–795, 2015.
- [4] J. Zhou, Z. Cao, X. Dong, and X. Lin, "Tr-maybe: White-box traceable and revocable multi-authority attribute-based encryption and its applications to multi-level privacy-preserving e-healthcare cloud computing systems," in *INFOCOM*. IEEE, 2015, pp. 2398–2406.
- [5] N. Grozev and R. Buyya, "Inter-cloud architectures and application brokering: taxonomy and survey," *Software: Practice and Experience*, vol. 44, no. 3, pp. 369–390, 2014.
- [6] S. Nakamoto, "Bitcoin: A peer-to-peer electronic cash system," 2008.
- [7] G. Wood, "Ethereum: A secure decentralised generalised transaction ledger," *Ethereum Project Yellow Paper*, vol. 151, 2014.
- [8] A. Lei, H. Cruickshank, Y. Cao, P. Asuquo, C. P. A. Ogah, and Z. Sun, "Blockchain-based dynamic key management for heterogeneous intelligent transportation systems," *IEEE Internet of Things Journal*, vol. 4, no. 6, pp. 1832–1843, 2017.
- [9] H. Hou, "The application of blockchain technology in e-government in China," in *ICCCN*. IEEE, 2017, pp. 1–4.
- [10] Muhamed Turkanović; Marko Hölbl; Kristjan Košič; Marjan Heričko; Aida Kamišalić, "A blockchain-based higher education credit platform," *IEEE Access*, 2018.