

Medication Plan for Patient Data using Block chain Technology

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Abstract

This paper helps to prospect the block chain technology and smart contracts to build private ness and aware of applications. The main focus is on a medication plan containing prescriptions, built on a block chain system of smart contracts. First the problem is presented, why medication plans are in need of digit allocation and why block chain technology is a fitting technology for implementing such an application. Thereafter, a design is proposed for solving the problem. A system of smart contracts was built to prove how such an application can be built and suggested guidelines for how a block chain system should be designed to achieve the requirements that were defined. it is a permission block chain, and because the smart contracts contains logic which is independent from the block chain layer .a block of Doctor's prescription by the name of patient which will be visible to doctor as well as Pharmacy portal. The name of GUI is the medical smart contract demo .the blocks in block chain are secure because all blocks have their unique hash value .the hash value is used as a security purpose. And the hash value is result of solving the hashing algorithm and the hashing algorithm is used in this thesis is MD5 and SHA256.

Keywords: Digitalization, Block chain, Medication, Smart Contract.

I. INTRODUCTION

In this paper briefly discuss about the block chain technology and smart contract and how the smart contract is used in medication and pharmacy portal to secure the patient's data. The goal of this paper is to show how block chain technology and smart contracts can be used to securely share and control personal information among parties who do not necessarily trust each other. The requirements for storage of prescriptions, patient-, doctor- and pharmacy-profiles on a block chain application for prescriptions. This research question is focused on the architecture of the block chain application as a whole and attempts to evaluate it from a security perspective. This calls for an increased unification of existing analog and digital systems and forte development of a less error-prone model.

II. LITERATURE WORK

- Smart contract -"Dumb idea", IEEE Computer Society, 2017 KieronO'Hara Contracts are made since 19th century and have to follow hierarchy. The contracts were also made in 20th century and have to follow hierarchy which were based on trust .hierarchy have to follow by all but in this century the problem was that if third party makes any kind of issue then it was very difficult to know it .but the smart contract of 21th century was excellent idea . The third party issue or security based issue is very small by the smart contract . Smart contract does it with the help of ethereum block chain technology and bit coin block chain. Smart contract are speechless contract but great contract in digital era or digitally work .smart contract have its own rule and must be followed.

- Validation and verification of block chain” ,IEEE Computer Society , 2017Daniele Magazzeni et al .This paper describes briefly about block chain as what is block chain ? how can it be used and where to be used answer to all these question is that block has a chain in a perceptual mode and each block has separate data and hash value and can be used for the purpose of security. Block chain can be used in different sector such as online shopping, banking sector finance etc.
- Medical image sharing”,1st IEEE International Conference on Hot Information-Centric Networking (HotICN 2018) Huanrong Tang et al. The block chain technology is used because 90 percent of patient data are leakage and their personal information are not safe by this technology the medical image sharing which is based on smart contract and credit score is secured. Some rules and regulation and records were used by image sharing during the establishment of smart contract.
- Block chain Applications in the Biomedical Domain-A scoping reviews”, Computational And Structural Technology ,journal (17) , 2019George Drosa to set al In biomedical domain the block chain is used . Investigation is greatly focused on honesty, combination and access control of health records and related patient data. Other various and absorbing applications are submerged addressing medical research clinical trial medicine supply chain a medical insurance.

III. PROPOSED WORK

In the medical and healthcare sector, legacy systems generally only exchange medical resources internally and are not interoperable with external systems Yet, evidences show numerous benefits from connecting these systems for integrated and improved healthcare, calling health informatics researchers for an interconnection solution among different organizations. One of the most important challenges is inter-organizational data sharing, demanding the medical data collected by one healthcare provider to be securely accessible to other entities, such as a doctor or a research organization.

For healthcare data, the identity of the data, the network location, and the start time, and end time of the chunk for data stream belong to the privacy

of a patient, as well as the actual data. Thus, privacy protection is needed in Med Chain to disassociate DID, data location, and the actual data with data owner (i.e., patient).

Med Chain contains three user roles: patient, requester, and healthcare provider.

- **Patient:** shares their data through Med Chain with, for instance, a doctor, an insurance company, or a research center for medical consultancy.
- **Requester:** who could be, e.g., a doctor, asks a patient to share some of her healthcare data Through Med Chain.
- **Healthcare provider:** maintains the actual healthcare data of patients.

If someone wants to modify the block information, he/she has to modify the entire chain.

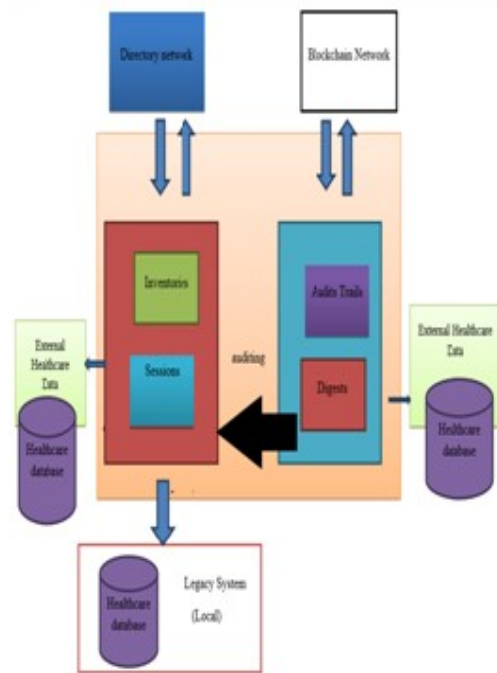


Figure 1: Modules of a Super Peer.

A session creation event is created when a patient grants the access of some of the healthcare data to a requester. It contains a list of DIDs. For the data stream, the start time (st) and end time (et) can be specified as an access constraint. It also contains the public key of the patient and the requester for identifying the session participants, as well as the signature of the patient (Sign pat). The session digest is generated by hashing the DIDs and the

time constraints of the shared data and the session participants' public keys.

The block chain servers run the block chain service on all super peers, which collectively provide a consortium block chain network. Each block chain server maintains a complete block chain and they run a distributed consensus algorithm to collectively determine the content of the next block. Med Chain is not coupled with a particular consensus protocol. The current implementation adopts BFT-Smart for its simplicity.

A patient may have multiple inventories from different healthcare providers (i.e., different Data). A session describes a data sharing between a patient and a third party, e.g., a doctor, called a requester. It includes a session ID (SID) and multiple sections. Session ID is the event hash of the corresponding session creation event in the block chain.

Besides the block chain service, super peers are also connected to provide the directory service.

In Med Chain, a healthcare record or data stream is identified by its unique identity (DID). On the block chain, however, DID is encrypted together with patient identity (i.e., PK pat) in the Content section for a privacy purpose. Given a DID, the entire block chain has to be downloaded, traversed, and decrypted to find the record as in some existing works.

IV. IMPLIMENTATION

Python is a high level language and it was created by van rossum and first released in 1991. Python can be used for web development (server side), software development, mathematics system scripting. And it is also work in different platforms like Linux, Mac, and Window etc. Python has fewer lines program than other programming language .The block chain technology also used the python language because in this coding is easy as compare to other.

In 2008 a technology was introduced by nakamoto named as block chain technology to used in financial institution as peer to peer network. This technology provides data integrity, security, anonymity without using third party authorization because of all these features the interest of this technology has been increased. in this paper the

block chain technology used the python libraries are numPy, pytorch, pandas , sciPy, keras etc. a design for a PoC electronic medication plan (EMP) using smart contracts and block chain technology is proposed.

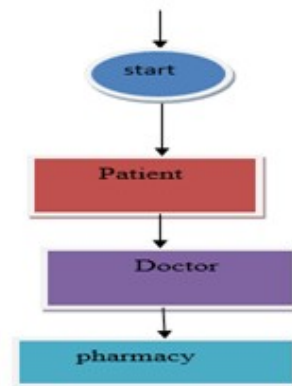


Figure 2: Flow chart.

The contracts in the PoC are the following:

Patient Info Db - A database contract to store information about patients. The information stored for each patient is prescription and the prescribing doctor for each respective prescription.
 Permissions Db - A database contract to store permissions. The different permissions that can be modified are: perms0 – Patient permissions, e.g. only allowed to read info related to one's own address .

- Pharmacy permissions, e.g. allowed to read info about patient who permitted it.
- Doctor permissions, allowed to add patients, add prescriptions and read info about patients .

Patient Doctor Consent When a patient wishes to grant a specific doctor or pharmacy the right to prescribe, sell medication or add patient as customer a consent Code can be added.

Permissions - Controller contract acting like interface with the Permissions Db contract.

Cmc-The contract-managing-contract is simply named Cmc and contains a collection of the different contracts.

Cmc Enabled - Base class for contracts that are used in a cmc system.

Patient - Application logic contract for handling requests from patients such as retrieving

Prescriptions, changing consent-level for a certain prescription-doctor tuple etc.

Doctor- Application logic contract for handling requests from doctors. These include adding a new patient, prescription or confirming that a certain medication has been prescribed.

Pharmacy - Application logic contract for handling requests from pharmacies. This is ultimately only to confirm a prescription.

V. COMPARISON

Base paper	Proposed Work
The base paper name is medical image sharing.	This paper name is Medication Plan for Patient Data Using Block chain Technology.
In these papers different medical institutions as a network node communicate with other directly.	In these papers only doctor patient and registered pharmacy can access the data.
In these papers patient history is organizing in image form.	In these paper patient history organized in data form.
The innovation of the design is the scheme of smart contract is credit scores.	In these blocks direct add data in network node.

VI. RESULT

The artifact presented is evaluated using a descriptive evaluation method as proposed in additionally manual, functional testing was carried out on the system using the online compiler provided by the Ethereum foundation Development of the smart contracts was done in Solidity. And IT artifact can be evaluated according to the criteria: "functionality, completeness, consistency, accuracy, performance, reliability, usability, fit with the organization, and other relevant quality attributes."

The most important non-functional requirement on the PoC, is the security of the patient data.. Knowing what medications are normally used to

treat that or those conditions, and finding a similar combination on the block chain, the physical identity is connected to the block chain account address. On the other hand, if there are a very large amount of patients, the data is also valuable.

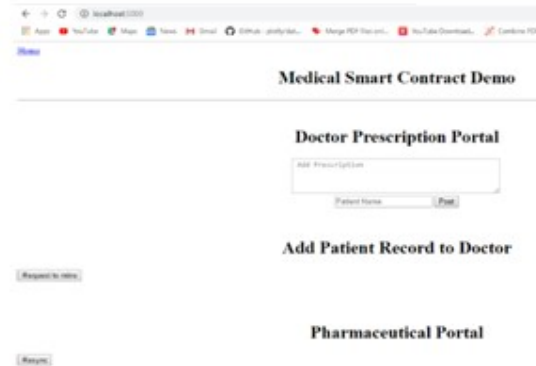


Figure 3. GUI of proposed model.

This is a GUI in which local host 5000 has been used to create a block of Doctor's prescription by the name of patient which will be visible to doctor as well as Pharmacy portal. The name of GUI is the medical smart contract demo.

VI. CONCLUSION

In this paper, a proof-of-concept application was built to function as an electronic medication plan in a completely decentralized way. In order to achieve a peer-to-peer network secure enough to store personal information a system of smart contracts developed in the Solidity programming language in combination with a permission block chain architecture and common cryptographic tools was proposed. The resulting artifact was then evaluated according to established design research criteria and found to fulfill all the necessary requirements. Although the evaluation criteria were fulfilled, it is important to take notice that no claims on the security outside of the PoC can be made, based on this paper.

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