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Health Insurance Management Process in Hospitals Using Blockchain Secured Framework

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***Abstract*: The number of healthcare insurance frauds increases year by year, which causes tremendous concern in society. Healthcare insurance fraud exists in various forms, such as falsifying information, concealing third-party liability, falsified electronic bill and so on. The current healthcare insurance system requires a lot of manpower and resources which bears heavily on the system. Hundreds of millions of medical records have been compromised in 2016 and the number increases. The emerging blockchain technology is a revolutionary mechanism, which ensures data integrity and confidentiality inside any system. We design a distributed platform with blockchain as a system service for supporting transaction execution of health insurance processes.**

***Keywords*: Blockchain, Hospital, Insurance.**

1. Introduction

Block chain is distributed, decentralized public ledger used to store the transactions that are made on peer to peer network. A data storage unit with a time stamp is a block is linked with the previous block in the block chain in chronological order. Each block consists of block header and block body. The block header consists of block sequence number, time stamp, block size and a hash value of the previous block. Block body consist of transaction counter, transactions. The storage and transmission of data in the block chain no longer dependent on central nodes, but the data is transmitted freely between communication nodes according to consensus mechanisms.

2. Motivation

The need for decentralization is the key motivation behind the blockchain technology, and decentralization is achieved by distributing the computation tasks to all the nodes of the blockchain network. This is something that's achieved by maintaining a distributed ledger of blockchain data. In the Existing System, there is no automatic process to identify the Insurance method and its security. In this insurance trade is heavily smitten by multiple methods between transacting parties for initiating, maintaining and shutting many reasonably policies. It's a time taking operation, not efficient and many security issues.

3. Blockchain Types

Currently, there are at least four types of blockchain networks,

- Public blockchains
- Private blockchains
- Consortium blockchains and
- Hybrid blockchains

1) Public blockchains

A public blockchain has absolutely no access restrictions. Anyone with an Internet connection can send transactions to it as well as become a validator (i.e., participate in the execution of a consensus protocol). Usually, such networks offer economic incentives for those who secure them and utilize some type of a Proof of Stake or Proof of Work algorithm. Some of the largest, most known public blockchains are the Bitcoin blockchain and the Ethereum blockchain.

2) Private blockchains

A private blockchain is permissioned. One cannot join it unless invited by the network administrators. Participant and validator access is restricted.

3) Hybrid blockchains

A hybrid blockchain is combination of centralized and decentralized features. The exact working of the chain can vary on which portions of centralization, decentralization is used.

4) Consortium blockchains

Federated blockchain or consortium blockchain is a blockchain technology where instead of only a single organization, multiple organizations govern the platform. It's not a public platform rather a permissioned platform.

4. Implementation

This require softwares like Ganache, truffle or remix to be installed in system first. Once installed Ganache platform provides us with 10 wallet address which we can link to our entities created in network, along with wallet address this platform also provides 100 Ethereum for each address to carry out transactions. Firstly, invoke "web3.eth.getAccounts()" this function will provide 10 number of wallet address from ganache fig 1 In ganache we can see which wallet address has how much

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amount of ether. Every wallet has private key, index number and total transactions occurred on that address.

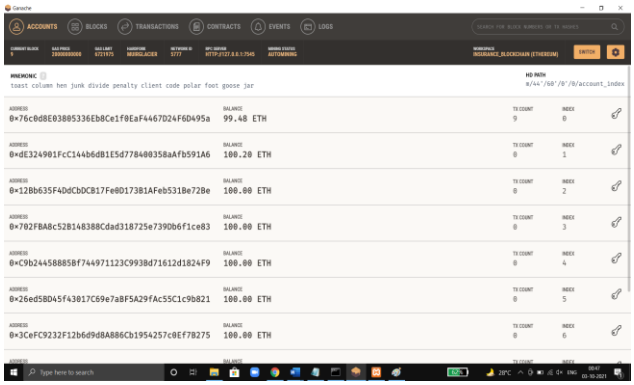

Fig. 1. All entities wallet address and balance

Login to insurance panel, we have already registered insurance companies, doctors and patients. Doctor sends the bill amount with details directly to insurance company of that patient. Now, insurance company has all the details and now anyone can't provide false bills to take undue advantages from insurance company, all the information will be stored in block in blockchain network which can't be modified. Fig 2 shows the transaction that needs to be executed, i.e. the same bill sent by the hospital. On clicking view, details of that transaction will be filled automatically along with wallet address of the hospital that is receiver in transaction section. Click on send and transaction will occur. The transaction will be stored in block which will have unique address. The current executed transaction gets added on logs and on clicking on view of that particular transaction the address, block hash and amount will get filled automatically.

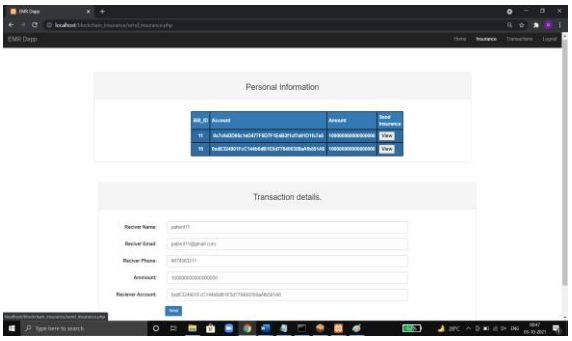

Fig. 2. Transaction by insurer

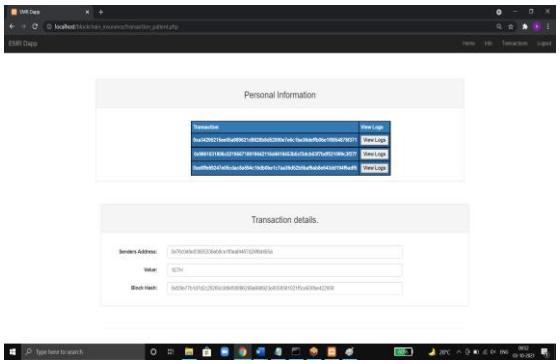

Fig. 3. Same transaction detail at patient panel

Login to patient's panel, here on clicking on info tab we can see patient's name, wallet address, account balance, prescription/files if any uploaded etc. Fig. 3 shows current executed transaction at patient's panel also, here patient can view details like value, address, blockhash.

Fig 4. shows transaction details in ganache. We can clearly see the wallet address

0x76c0d8e03805336eb8ce1f0eaf4467d24f6d495a

which resembles Insurance company was earlier 99.48ETH and is now 99.38ETH, also the wallet address

0xdE324901FcC144b6dB1E5d778400358aAfb591A6

was earlier 100.20ETH and is now 100.30ETH.

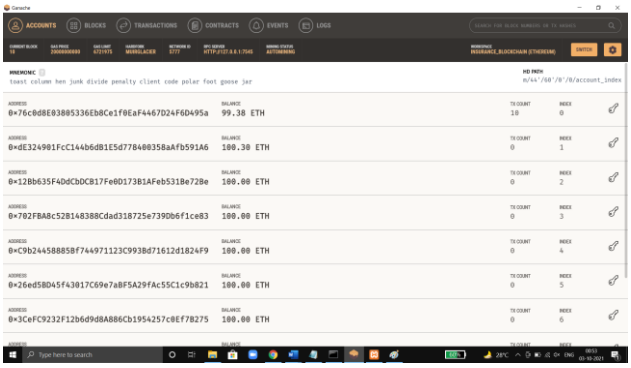

Fig. 4. Transaction details in Ganache

Now, in the background inside Ganache platform. Fig. 5 shows blocks getting added as transaction occurs along with timestamp and block numbers. In case of public blockchain, in order to verify transaction, the mining is done by miners. Fig 5 shows complete details of each block added to chain, it is important to note that the data inside block cannot be modified thus standing true to what blockchain is about. Fig logs of each process is also generated when transaction is carried out for example which methods were invoked and the same info which we can see in Ganache User interface.

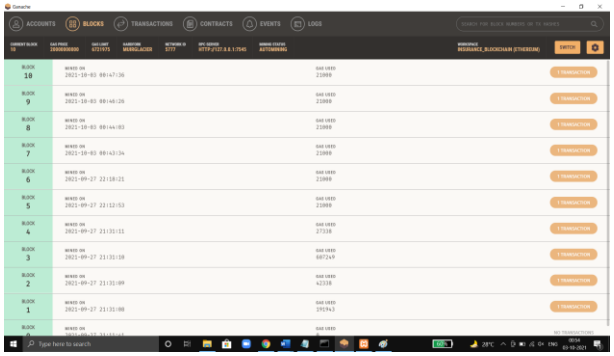

Fig. 5. Blockchain formed

Fig. 6 shows sender's and receiver's address and amount transferred, along with blockhash and mining, here mining is taken care by Ganache framework only.

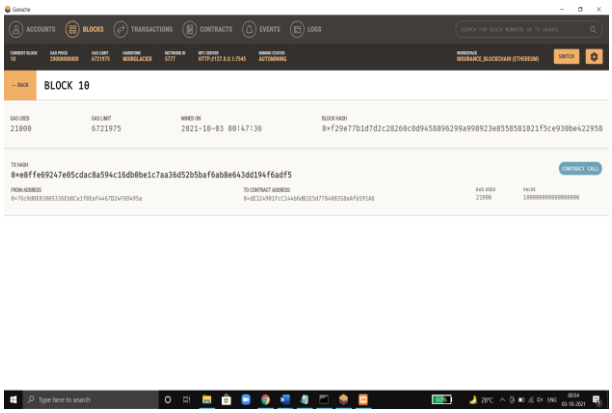

Fig. 6. Information inside block

5. Applications of Blockchain

1) Health insurance claims

The blockchain is uniquely adapted to claim processing because of its ability to present medical events as they occurred, without the potential for changing the data at a later stage for purposes of fraud.

2) Mobile health apps and remote monitoring

Mobile health applications are becoming more important nowadays, with advancing technology. In this context, electronic medical records (EMRs) were found to be kept secure in a blockchain network, and the data can be sent to medical personnel rapidly, as well as being available for self-monitoring and home care as well.

3) Interoperable electronic health records

The blockchain could provide a single transaction layer where organizations can submit and share data through one secure system, by storing a specific set of standardized data on the chain, with private encrypted links to separately stored information such as radiographic or other images. The use of smart contracts and uniform authorization protocols can immensely support seamless connectivity.

4) Money transfer and payment processing

Potentially the most ideal and rational application of blockchain technology is using it as a means to accelerate the transfer of funds from one party to another. Most transactions carried over via blockchain can be settled within a matter of seconds, while banks take lot of time.

5) Digital voting

Blockchain provides the ability to vote digitally, and it is transparent enough that any regulators would be able to see if something was altered on the network. It integrates the ease of digital voting with the immutability (i.e., unchanging nature) of blockchain to make the vote really count.

6) Empower the medical supply chain

As per the 2017 WHO research, 10% of medical goods flowing in developing nations are either low or falsified. It is assumed that at least 1% of all drugs on the market are fraudulent. A blockchain-based system can guarantee a chain-of-custody record, tracing each level of the drug supply chain. Also, add-on functionalities (e.g. private keys, smart contracts) strengthen the credibility of the pharmaceutical supplier at any delivery step and better maintain the agreements between different parties.

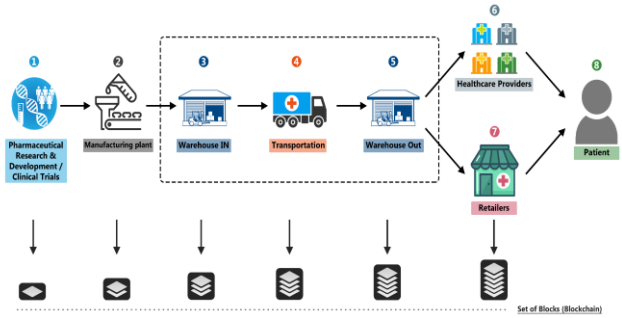

Fig. 7. Tracking of medical supply chain

6. Conclusion

In this, we examine the feasibility and implications of these use cases in terms of how blockchain could directly and indirectly improve an insurer's basic processes and business models. The use cases address improvements in an insurance company's operational functions as well as dealings with providers, intermediaries, and policyholders, thereby improving the customer experience, enhancing product value, and laying the groundwork for greater consumer choice in the market. The end game is to decrease costs, improve operational effectiveness, and strengthen relationships with the insured. The following are the use cases presented in this report. Implementation of blockchain system would decrease the frauds growing in the sector of healthcare, patient and Insurer, also it will make the process very simple by using smart contracts and with implementation of cryptocurrencies, there would be no need for dependency on third parties and transactions can occur securely without any fraud and delay.

References

[1] Deloitte, "Independent review of new zealand's electronic health records strategy," 2015.

[2] A. Azaria, A. Ekblaw, T. Vieira, and A. Lippman, "Medrec: Using blockchain for medical data access and permission management," in 2016 2nd International Conference on Open and Big Data (OBD). IEEE, 2016, pp. 25–30.

[3] Sujatha Alla, Leili Soltanisehat, Unal Tatar, and Omer Keskin, "Blockchain Technology in Electronic Healthcare Systems," 2018.

[4] B. Lakshma Reddy, A. Karthik, S. Prayla Shyry, "A Blockchain Framework for Insurance Processes in Hospitals."

[5] F. Tang, S. Ma, Y. Xiang and C. Lin, "An Efficient Authentication Scheme for Blockchain-Based Electronic Health Records," in IEEE Access, vol. 7, pp. 41678-41689, 2019.

[6] https://medium.com/@filzatariq92/build-your-ethereum-dapp-on-windows-with-truffle-ganacheand-metamask-beginners-guide-8c62b55ef556

[7] Mohanty, S. N., Ramya, K. C., Rani, S. S., Gupta, D., Shankar, K., Lakshmanaprabu, S. K., & Khanna, A. (2020). An efficient Lightweight integrated Blockchain (ELIB) model for IoT security and privacy. Future Generation Computer Systems, 102, 1027-1037.

[8] Maseleno, A., Othman, M., Deepalakshmi, P., Shankar, K., & Ilayaraja, M. (2019). Hash function based optimal block chain model for the Internet of Things (IoT). In Handbook of Multimedia Information Security: Techniques and Applications, pp. 289-300, Springer, Cham.

[9] https://medium.com/coinmonks/a-really-simple-smart-contract-on-how-to-insert-value-into-theethereum-blockchain-and-display-it-62c455610e98