

# Survey Paper on a Systematic Review of Blockchain in Healthcare: Frameworks, Prototypes, and Implementations

Himani H Mulay<sup>1</sup> Sareeka G Joshi<sup>2</sup>

<sup>1,2</sup>Department of Computer Engineering

<sup>1,2</sup>Vishwabharati Academy's College Of Engineering, Sarola Baddi, Ahmednagar, India

**Abstract**— In today's life healthcare security is most vital issue. Blockchain is one among distributed architecture during which it consists in several sectors like healthcare. In block-chain technology, each page during a ledger of healthcare data forms a block. That block has an impact on subsequent block or page through cryptographic hashing. Electronic Health Records (EHR) systems mainly used for securely exchanging the health related information which is primarily trustless and challenging. In other words, when a block is completed, it creates a singular secure code, which connects into subsequent page or block or node, creating a sequence of blocks, i.e. block-chain. In proposed system medical data got to store in secure manner. This work is meant using block chain concept and key-based cryptographic technique. It stores the hash values within the sort of the tables of data and files on the block-chain, validates other copies by running a hashing technique algorithm, then compares the information stored within the block-chain, any interfere with the information are going to be quickly found, because the first hash tables are stored on many nodes. Proposed system describes the knowledge about on storing data of healthcare system. This technique will work on consensus mechanism while adding data in blockchain. This technique will find malicious user's and inform to owner.

**Keywords:** Blockchain, Distributed Ledger Technology, Distributed computing, Digital Health, Security

## I. INTRODUCTION

Block-chain is an emerging technology for distributed and healthcare data sharing across an outsized network of untrusted participants. In today's day in healthcare system is growing fast also because the medical data got to store securely. It allows new sorts of distributed software architectures. Although the technology was mainly accepted in digital currency in initial days, but it's a promising technology for other areas too. This work is meant using block chain concept and key-based cryptographic technique.

Electronic health has become one among the most research topics. Due to the sensitivity of patient data, preserving patient privacy seems to be a challenge. In healthcare applications, patient data is usually stored within the cloud, making it difficult for users to possess sufficient control over their data. However, thanks to the overall data protection regulation, it's the information subject's right to understand where and the way their data was stored, who can access it and to what extent. During this article, we propose a block chain-based architecture for electronic healthcare applications that gives an efficient access control mechanism that preserves privacy. We cash in of the special features of the block chain, namely the immutability and anonymity of users, while modifying the classical structure of the block chain to beat their challenges in existing applications (for

example low performance, high overload and latency). For this purpose, we group the miners of the block chain, store and process the information within the group closest to the patient.

### A. Motivation

Block-chain is an emerging technology for distributed and important data sharing across an outsized network of untrusted participants. In today's day in healthcare is growing fast also because the data got to store securely. It allows new sorts of distributed software architectures.

### B. Problem Statement

Now a day's healthcare system is growing fast also because the data got to store securely. Some data could be sensitive that the users doesn't want to man ever to the cloud unless the info confidentiality and query privacy are guaranteed.

## II. RELATED WORK

Literature survey is the most important step in any kind of research. Before start surveying we need to study the previous papers of our domain which we are surveying and on the basis of survey we can predict or generate the drawback and start working with the reference of previous papers.

In this section, we briefly review the related work on Health care Systems and their different techniques.

A. M. Hölbl, M. Kompara, and A. Kamišali, 'A Systematic Review of the Use of Blockchain in Healthcare'

These paper systematically reviewed and investigated the potential uses of blockchain in healthcare to highlight challenges and future research. They also did not discuss the cost implication of blockchain application in healthcare.

B. C. Agbo, Q. Mahmoud, and J. Eklund, 'Blockchain Technology in Healthcare: A Systematic Review', Healthcare

These paper systematically reviewed and investigated the use cases and challenges including trends of blockchain application in healthcare. They also did not look at the performance, architecture or costs of blockchain in healthcare. They discussed blockchain standards, but provided no detail of the relevant digital health standards used in reviewed papers.

C. H. Jin, Y. Luo, P. Li, and J. Mathew, 'A Review of Secure and Privacy-Preserving Medical Data Sharing'

These paper explored healthcare data sharing using blockchain. The review process was not systematic, but it analysed the security, privacy and cost implication of using blockchain. Critical concepts reviewed include identity management, access control, data encryption, encrypted keyword search, data storage and smart contract and data interoperability.

*D. E. Meinert and C. F. Fcni, 'Implementing Blockchains for Efficient Healthcare, A Systematic Review'*

These paper looked at the efficiency of health records management, and surveyed 71 articles. Though this paper also used a systematic approach, its focus was not a technical analysis. It investigated the strategies proposed to improve electronic health records using blockchain. It covered security and privacy compliance but did not discuss performance, architectures, costs or standards.

*E. E. Lau, 'Decoding the hype Blockchain in Healthcare' These paper presented a non systematic analysis of the technical architecture and health standards, but did not address the other components.*

*F. S. Alla, L. Soltanisehat, U. Tatar, and O. Keskin, 'Blockchain technology in electronic healthcare systems'*

These paper systematically survey 14 papers looking at the people, process and technology and research gaps in the application of blockchain in healthcare. This paper only covered cost amongst the different metrics we are investigating.

*G. G. Drosatos and E. Kaldoudi, 'Blockchain Applications in the Biomedical Domain: A Scoping Review'*

These paper systematically survey 47 papers to understand the problems and solutions of using blockchain for biomedical science. This review was however non-technical nor detailed.

### III. SYSTEM ARCHITECTURE

There are three main sorts of system architecture emerged which is predicated on our review of blockchain application in healthcare reports. The architecture of prototypes and implemented blockchain network which was classified by its certificates of authority (CA).CA is that the infrastructure that generates, stores, manages, distributes additionally to revoking these keys and related information[1].

#### A. Block structure and content

The structure and content of typical blocks during a public blockchain application are shown during a fig 1.1. the most two public blockchain networks are Bitcoin and Ethereum uses the Merkel tree binary hash structure[1].In a blockchain , blocks stores hash value of data. Such information mainly contains header and therefore the message body. The header contains the block version, merkel root hash, parent hash, timestamp, nonce, and difficulty level. The hash is string of alphanumeric value obtained by passing a bit of data through a hashing algorithm(e.g. SHA-2, SHA-256, etc)[1].

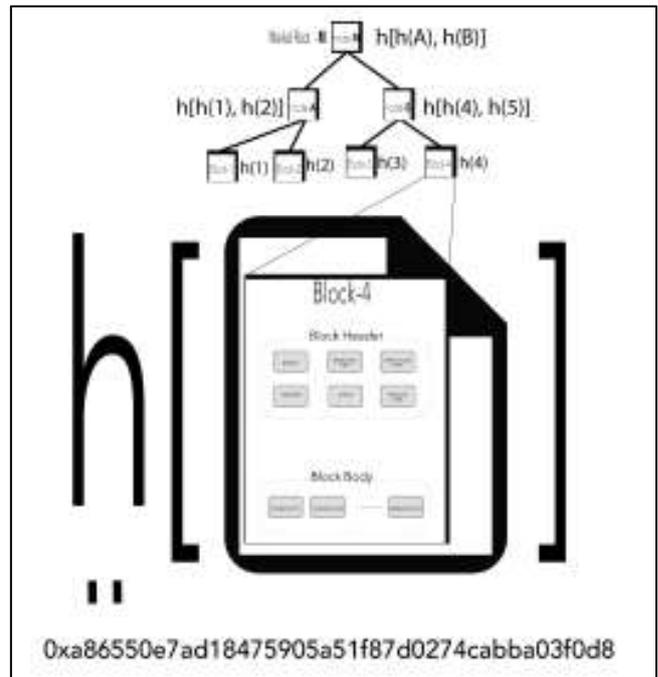


Fig. 1.1: The Structure and content of typical blocks in a public blockchain[1]

Each block of node have its own public and personal key pair to send asymmetric cryptographic encrypted message through trusted network[1].Using these public or private key pair user can encrypt a message there to only the corresponding key pair can easily decrypt it and see the message. Validated message are stored on the blockchain network and linked to the predecessor block and corresponding message metadata hashed employing a one-way cryptography[1].

There are three main architectures that emerged were:

- One-trusted-Certificate-Authority(One-CA)blockchain,
- Multiple-Certificate-Authorities(Multi-CA)blockchain,
- A Client-Self-Certificate-Authority blockchain

Public key cryptographic technique is a method technique to get an asymmetric key in blockchain applications. As surveyed therein this is often typically a pair of keys, one is named as public and therefore the other is private. These key pairs are wont to sign and validate transactions on blockchain network.

In a blockchain network, One-CA blockchain may be a a part of but use a trusted CA for asymmetric key generation.

Multiple-CA blockchain also a part of blockchain network but use multiple nodes in blockchain network as CA for asymmetric key generation.

Client-CA blockchain, each node generates its own asymmetric key locally and validates their key on the network.

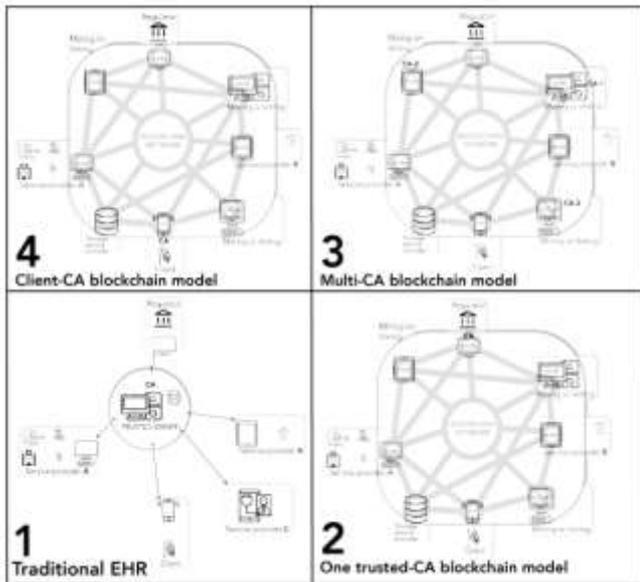


Fig. 1.2: General blockchain architecture compared with traditional digital health architecture[1]

#### IV. CONCLUSION

In work is meant using block chain concept and cryptography technique which estimate the safety of block-chains specifically using hashing. Proposed system work to security on healthcare data. Block-chain technology isn't just an application technology for new-generation data storage. It creates trust, responsibility and transparency while simplifying business processes. This approach allows users to authenticate the information access through the key of user sources, while improving network access performance by locally authenticating keys supported block-chain copies and its hash values. This work is meant using block chain concept and key-based cryptography technology to supply the safety to healthcare data. It maintains the reliability and anonymity of the messages simultaneously.

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