RAJIV GANDHI INSTITUTE OF PETROLEUM TECHNOLOGY

JAIS , AMETHI , UP

(2021-22)

PROJECT REPORT ON :

Implementation of Blockchain Technology in Healthcare(Backend process of storing and managing data in Blockchain).

SUBMITTED BY:

Utkarsh Shukla
B.tech (2020-24)
20PE3047

Saurabh Jaiswal
B.tech (2020-24)
20CS3058

UNDER GUIDANCE OF :

Dr. Daya Sagar Gupta
(Assistant Professor , DUGC , CSE Dept.)

RAJIV GANDHI INSTITUTE OF PETROLEUM TECHNOLOGY

JAIS , AMETHI , UP

ACKNOWLEDGEMENT :

I wish to express our deep gratitude to Dr. Daya Sagar Gupta , for all advice, encouragement and constant support he has given us throughout project work. This work can't be possible without his great support and valuable guidance. I sincerely thank to DIC team , for his great support in doing our project. I am also grateful to RGIPT , for giving the necessary facilities to carry out project work successfully. I would like to thank all our friends for their help and constructive criticism during our project work. Finally, I have not any words to express our gratitude to our parents who have shown me this world and for each and every support they have given us.

RAJIV GANDHI INSTITUTE OF PETROLEUM TECHNOLOGY

JAIS , AMETHI , UP

PROJECT REPORT

PROJECT TITLE :

Implementation of Blockchain Network in Healthcare.

ABSTRACT :

The project aims at taking a step into the field of Blockchain Technology and Cyber Security by developing a blockchain model which can be used for various purposes (like healthcare and education etc. It will be helpful in performing all large computations in a shorter execution time span with efficient speed for scenarios such as healthcare or educational organizations. Using file handling concept for security in my blockchain network. Whole implementation of this network in C programming only. I used various famous concepts or C programming like, structure, pointer, linked list, file handling, looping and jumping statements etc. Main aim of this project is to show the internal or we can say backend process of blockchain. This project shows how the data is stored and managed in blockchain. What is the role of hashing in Blockchain Technology.

1. Introduction :

Blockchain is a decentralized , distributed ledger that is append-only, immutable (extremely hard to change), and updateable only via consensus or agreement among peers. Blockchain is basically a technology that contains chain of blocks that contains information. Each transection is recorded as block in blockchain. Basic elements in a blockchain network are block , genesis block , nonce , address and transection . basically in blockchain , transection is the fundamental unit of blockchain.

2. Background :

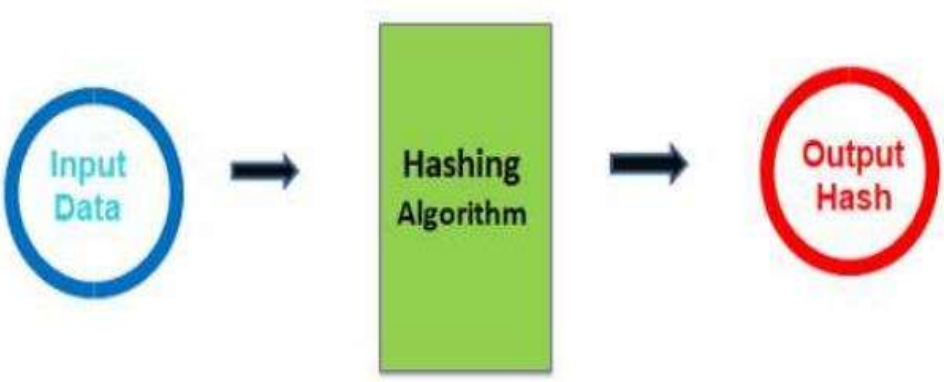
Stuart Haber and W. Scott Stornetta tried some computation model to provide more security of digital documents . Develop a system with the help of cryptography . After that so many person came and work on blockchain . In 2008 , Satoshi Nakamoto introduced the concept of distributed blockchain that is actual blockchain . People started mining money through Blockchain in the form of Bitcoin . Nowadays Blockchain's application is rising in various industries like finance , banking and healthcare .

3. Blockchain's Application :

In real world , there are lot of use of blockchain network such as Bitcoin , Law enforcement , voting , online music , health care etc. Our project is based on the impact of Blockchain network in healthcare . There are some countries that are using these concepts . Blockchain provides more security feature in appending data of patient .

4. SHA Concepts :

Hashing is the most important feature that gives security capabilities to process transection for making them immutable . For this , we use basic concept of hashing . there are lot of algorithm for this . SHA(Standard Hashing Algorithm) is one of the most important one .We use SHA-256 for our project .



Features of Blockchain :

1. Decentralized :

   Basically in decentralized blockchain , every node has the copy of the existing data in network in the form of ledger. With the help of decentralization of data , management and access of resources the data can be done easily . And decentralization of data provides more trustful environment. No one has to know and trust anyone else. Basically the centralization and decentralization of data depends upon the solution required . And security will increases with the number of network members .

2. Immutability :

   Blockchain is basically referred as ledger because of immutability feature . It means the data written to the blockchain network can't be change. This provides benefits for audit . The hardest thing in the world is to change a block from blockchain network . Basically we are working on a trust less system and immutability is providing us this feature . Cryptographic hash is used to make a blockchain network immutable (Hash can't be reversed engineered.)

3. Authentication :

Blockchain authentication is basically a process that verifies a user with distributed ledger and digital verification to protect data in a network .We can enable 2-step verification in blockchain for authentication . We can use different application for this like Google authenticator , SMS , YUBIKEY etc. This can resolve the problem of accessing and managing of the data and data integrity .

Existing Features :

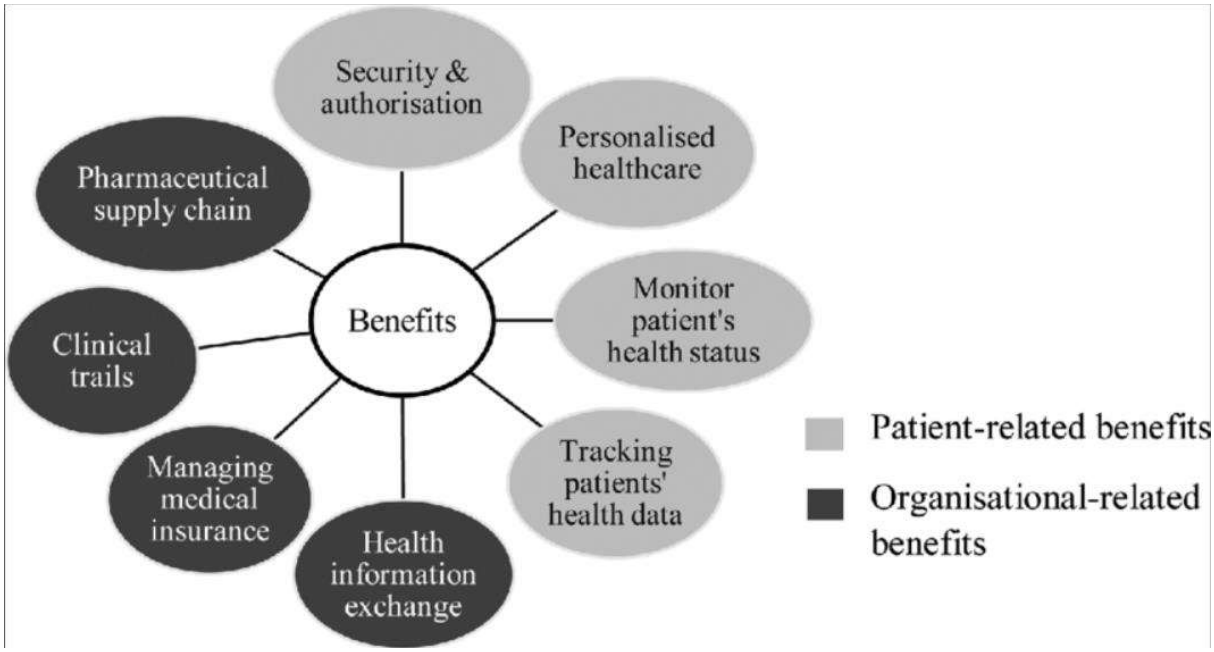
There are lot of reaches are going on Blockchain . Already we have get some things that are really very important like enhanced security feature , Consensus , fast settlement , distributed etc.

In blockchain , there is no central authority , that's why no one is able to change the blockchain's data so easily . The architecture of blockchain is designed so wisely. Still some country is not in the favour of use of blockchain , but in our opinion , it is safe to stay .

This is highly secured decentralized – distributed network . The data stored in blockchain network can't be corrupted .

Technological Advantage :

There is 2 kinds of blockchain technologies in the field of healthcare . one is patience oriented and other one is based on organization ‘s benefits :



With the help of blockchain , we can improve medical diagnostics as well . Blockchain can be helpful to stop black – marketing of medicines . Everything is associated with a hash value that will change every time and it is too hard to guess right hash code . so there is very less probability of black marketing .

Enhanced data and Privacy protection :

Currently we have to more work on the data security features . We have to make some ethically and logically changes to make blockchain more useful . Some organization is not in the favour of blockchain right now due to legally factors . We have to study more about it and do some changes so that we can use blockchain network everywhere .

Future Scope :

Blockchain is a emerging technology . if I talk about my project then in our model , we can create a block, add into the block and check the validity of the block. This will improve in maintaining access control, scalability and the content or transactions information stays secure. Further research is also needed to supplement ongoing efforts to address the challenges of better scalability, latency, interoperability, security and privacy in relation to the use of blockchain technology in healthcare.

Data integrity (Ensured by abstraction) :

Data integrity continues to be a persistent problem in the current healthcare sector. It ensures that the data is correct and has not even in any manner been improperly changed. Incorrect data might become significant health threats for patients and a big responsibility for clinicians, resulting in problems such as scam, misconduct, inadequate treatment and data theft. This sort of endangering scenario causes tremendous difficulty in handling healthcare data. This research intends to describe the threat plot of data integrity in healthcare through numerous attack statistics from around the world and Saudi Arabia and identify the criticality in Saudi Arabia in particular. A literature review by descriptive analysis, unit analysis and rating analysis to achieve the planned systematic literature review goal is outlined. The outcome of ranking analysis using a fuzzy analytical hierarchy process methodology offers a route for Saudi Arabian researchers to promote medical records or data security in Arabic healthcare. It is suggested that blockchain is the most prioritized method for regular use and adaptation across Saudi Arabia in all data integrity management techniques. To address the challenges of data integrity and future path, the authors critically examine the challenges posed by data integrity in the healthcare sector.

Consensus Algorithm :

A consensus algorithm is a process in computer science used to achieve agreement on a single data value among distributed processes or systems. Consensus algorithms are designed to achieve reliability in a network involving multiple unreliable nodes. Solving that issue known as the consensus problem is important in disturbing computing and multi-agent systems.

Blockchain, the distributed ledger most commonly associated with Bitcoin, also relies on consensus algorithms to reach agreement among nodes. A blockchain can be thought of as a decentralized database that is managed by distributed computers on a peer-to-peer (**P2P**) network. Each peer maintains a copy of the ledger to prevent a single point of failure (**SPOF**). Updates and validations are reflected in all copies simultaneously.

Smart contract :

Smart contracts allow records and information to be stored on a digital ledger. This means if a patient was moving from one hospital to another, they would be able to do so with ease and without having to fill out numerous forms. Records can then also be viewed by the patient's preferred physician on the blockchain network.

Hospitals and healthcare companies rely on a number of databases filled with patient information. However, these can be too restrictive to allow for the sharing of potentially life-saving insights around the globe. Without blockchain and smart contracts, this information may take a long time to reach the recipient and could potentially be hacked. If health records were kept in a smart contract and stored on the blockchain, that information would be available to hospitals and research institutions everywhere. With sufficient adoption, an individual could walk into any hospital in the world for treatment, and if they produce their private key, the hospital would have access to their information in a heartbeat.

Data sharing :

In recent years the healthcare industry has changed significantly by adopting technological innovation. Several crucial factors influence the way they make use of technologies, and these can be related to Security, Data Privacy, Regulations, Integrations, Collaborations, and Cost-effectiveness. When it comes to healthcare, as in many industries, data is gold. When it comes to research, the more diverse the data, the better the answer to all the questions. A simple example is found when someone performs research based on data derived from the population of a specific country, the outcome may not be entirely applicable for the people on the opposite side of the world.

Interoperability :

It is the ability of different information systems, devices and applications (systems) to access, exchange, integrate and cooperatively use data in a coordinated manner, within and across organizational, regional and national boundaries, to provide timely and seamless portability of information and optimize the health of individuals and populations globally.

Health data exchange architectures, application interfaces and standards enable data to be accessed and shared appropriately and securely across the complete spectrum of care, within all applicable settings and with relevant stakeholders, including the individual.

Mobility :

Blockchain is a secure technology that enables to transfer digital data through a sophisticated encoding information system. In other words, blockchain is a ledger that provides a way for information to be recorded and shared by a community. That is why it is usually compared to a ledger of digital transactions.

Mobile health :

Mobility is used to describe continuous network connectivity, providing the user with anytime, anywhere access to social media, clinical, or business application data.

Medical diagnostic:

blockchain can be used in medical diagnosis to prevent the frauds as many of medical representative increase the cost of medicine by them self and sell the customer at high rate . In order to prevent this , if blockchain is implemented on it , then each and every medicine will have its own SHA value so if the medical store representative makes any change in the price of medicine then it will be reflected in the ledger ,which would be checked and reported by the manufacturing company .

Potential of Blockchain in Healthcare :

The ledger technology helps healthcare researchers uncover genetic code by facilitating the secure transfer of patient medical records, managing the drug supply chain, and facilitating the safe transfer of patient medical records.
Simply put, blockchain holds the potential to revolutionize healthcare. With its full deployment, patients can be truly focused on at the center of all operations, which in turn will also be entirely overhauled with better security, privacy and accessibility.

Discussion :

The objective of the this study during our project is to understand the scope of blockchain in health care domain. Blockchain has capability to face the challenges of healthcare industry . Healthcare industry is facing problem in adapting growing technical infrastructure . As such technology enable the healthcare industry to be more better .

Implications :

Blockchain-study's findings can be utilized by multiple stakeholders including healthcare providers , managers and policy makers . Increased adoption of Blockchain technology will lead to disruptive changes in the current healthcare system. With some proper studies , administration can take decision after evaluating the potential disruptiveness . It can resolve the problem related to information storage , exchange and management issue in healthcare domain.

Acknowledgement :

This study is supported by our mentor Dr. Daya Sagar Gupta and our college Rajiv Gandhi Institute of Petroleum Technology (An Institute of national Importance).

References :

1. www.academy.binance.com/en/glossary/blockchain?utm_campaign=googleadsxacademy&utm_source=bing&utm_medium=cpc&msclkid=df59b3082c141f7d4819d143016dec91
2. www.ncbi.nlm.nih.gov/pmc/articles/PMC6764776/#:~:text=Table%201%3A%20%20%20%20Name%20%20,notifications%20to%20...%20%2014%20more%20rows%20
3. Blockchain%20in%20healthcare%20applications_%20Research%20challenges%20and%20opportunities.pdf
4. Blockchain%20in%20healthcare_%20A%20systematic%20literature%20review,%20synthesizing%20framework%20and%20future%20research%20agenda%20_%20Elsevier%20Enhanced%20Reader.pdf

RAJIV GANDHI INSTITUTE OF PETROLEUM TECHNOLOGY

JAIS , AMETHI , UP