MEDCHAIN
Medical Record Securance using Blockchain

SAJITH S R

SREEJITH P NAIR

RIMO BINOY

REENU ANNA PHILIP

ABSTRACT

Medicalchain uses blockchain technology to create a user-focused electronic health record whilst maintaining a single true version of the user's data. Medicalchain enables the user to give healthcare professionals access to their personal health data. Medicalchain then records interactions with this data in an auditable, transparent and secure way on Medicalchain's distributed ledger. The project shows how blockchain technology is used and how Medicalchain is utilising it to address specific issues to make healthcare better for users. **Our mission is to improve care for people by placing the patient at the centre of the digital transformation of healthcare.**

CONTENTS

INTRODUCTION

The most common thing that moves around every second, every minute, every hour, every day all year long is "DATA". When It comes to " medical data", we are still living in the stone ages

- Lack of Patient Centricity

- Security Risks to Patient Data

- Insurance Fraud

- Record Tampering

- Wrong diagnosing

"Your **medical information** is **worth 10 times** more than your **credit card number** on the black market."

To minimize the privacy/security risk of Telehealth encounters, providers require reliable methods for verifying and authenticating the identities of the patient and practitioners

KEY PROBLEMS

- Current EHR systems are centralized silos with limited communication capability.

- They lack both transparency and interoperability.

- Current systems also limit the access and control to patients over their own medical information

- A significant percentage of patients now receive care from multiple providers. So there is an inevitable increase in information delays and costs, repeated procedures, and decrease in the overall quality of care.
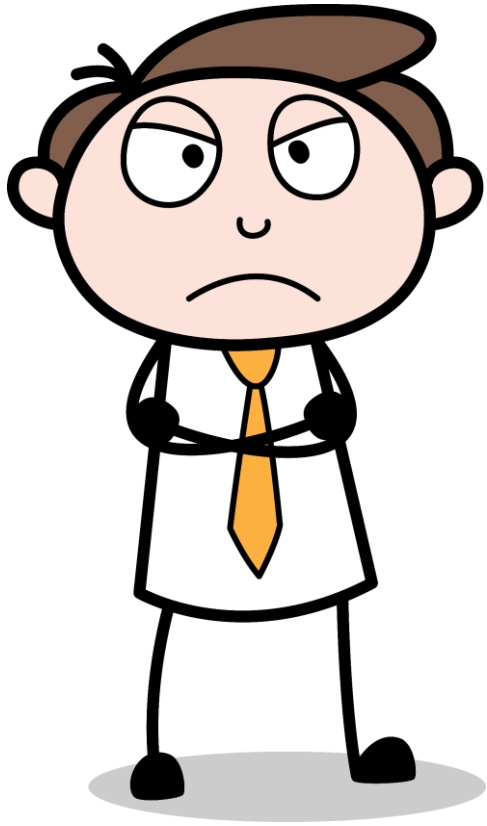
The current system is a mess !!!!!

HEALTHCARE CONTINUES TO LAG FAR BEHIND OTHER INDUSTRIES WHEN IT COMES TO IMPLEMENTING SECURITY AND INTEROPERABILITY. IT IS LITERALLY COSTING LIVES, AND IT IS TIME FOR THINGS TO CHANGE…

SOLUTION

- The two primary challenges of data security and interoperability are solved by MedChain by decentralizing Electronic Health Records and putting control in the hands of the patient.

- MedChain's combination of cutting-edge blockchain protocol technology, distributed storage, coupled with open-source framework will set a new standard in globally-compliant medical record-keeping.

- Healthcare providers that implement MedChain infrastructure will have access to vastly more secure storage and a far more effective data transfer mechanism.

- Finally, by putting control of EHR in the hands of the patient, MedChain ensures that critical medical records are no longer trapped in isolated, inaccessible silos.

- Patients can quickly grant access to any authorized healthcare provider, ensuring that the right information is in the right hands at the right time.

Proposed Idea

Our Idea is to create a medical blockchain which can ensure data confidentiality and also to give centricity to patients data

Using blockchain technology, Smart Contracts MedChain **provides the platform for digital health applications and services**
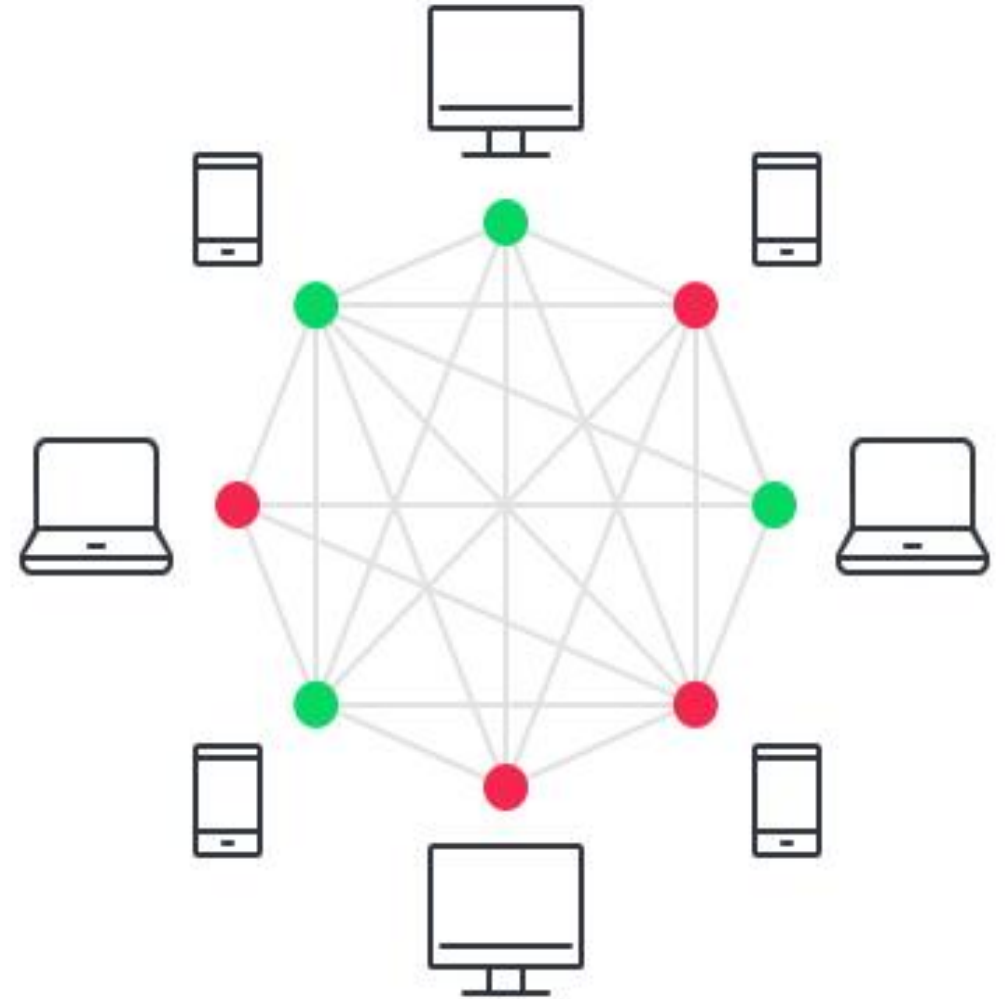
BLOCKCHAIN

Blockchain solutions are a great tool to overcome these issues.

What exactly is blockchain ??

It is a technology that creates immutable and distributable data records which are shared peer to peer between networked database systems

Fig 1. Basic Structure of medchain [8]

Structure Of Medchain

Fig 2. Basic Functioning [8]

Basic Functioning

1. **Data generation**

2. **Storage on network**

3. **Data access queries**

4. **Decryption & data display**
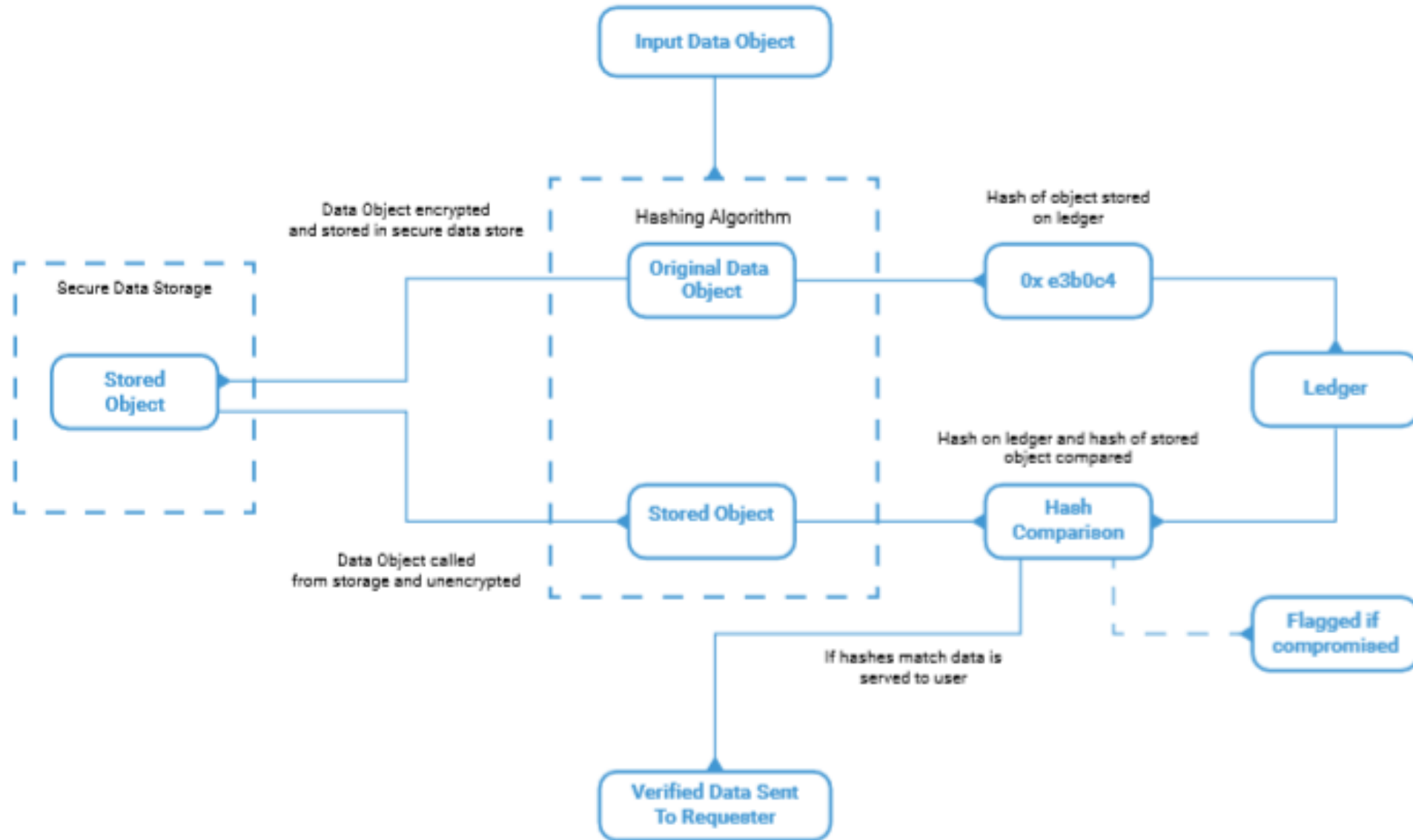
DATA FLOW DIAGRAM

Fig 3 Data Flow Diagram

How?

We create a blockchain which controls access to health records and is built using Hyperledger Fabric.

Hyperledger Fabric is an enterprise-grade permissioned distributed ledger framework for developing solutions and applications

Inter Planetary File System (IPFS)

The InterPlanetary File System is a protocol and peer-to-peer network for storing and sharing data in a distributed file system

IPFS is used in our project for overcoming the scalability issue commonly found in blockchain applications

Rather than storing the medical records on the blockchain network, they are stored on the IPFS network.

Blockchain ensures the security of these records by storing the Pointer to the records which is obtained by the encryption techniques undergone by the medical records.

Encryption Mechanism

For privacy guarantee, symmetric key cryptography is used for encrypting the health records. The record is encrypted and it is stored in a data store (IPFS) within the appropriate supervisory authority.

When an entity is given authorization to access the patient's record:
1. The record is decrypted with the owner's private key
2. The symmetric key is encrypted with the public key of a RSA key pair.

In the case that a participant's access is removed from a health record:
1. The symmetric key is decrypted with the private key of the owner of the EHR
2. The EHR is decrypted using the symmetric key
3. The record undergoes re-encryption with a different symmetric key
4. All the remaining authorised users public keys is used to encrypt the symmetric key.

BASIC DESIGN

This is a basic design for demonstration which includes

Patient, practitioner, health insurer and a TTP
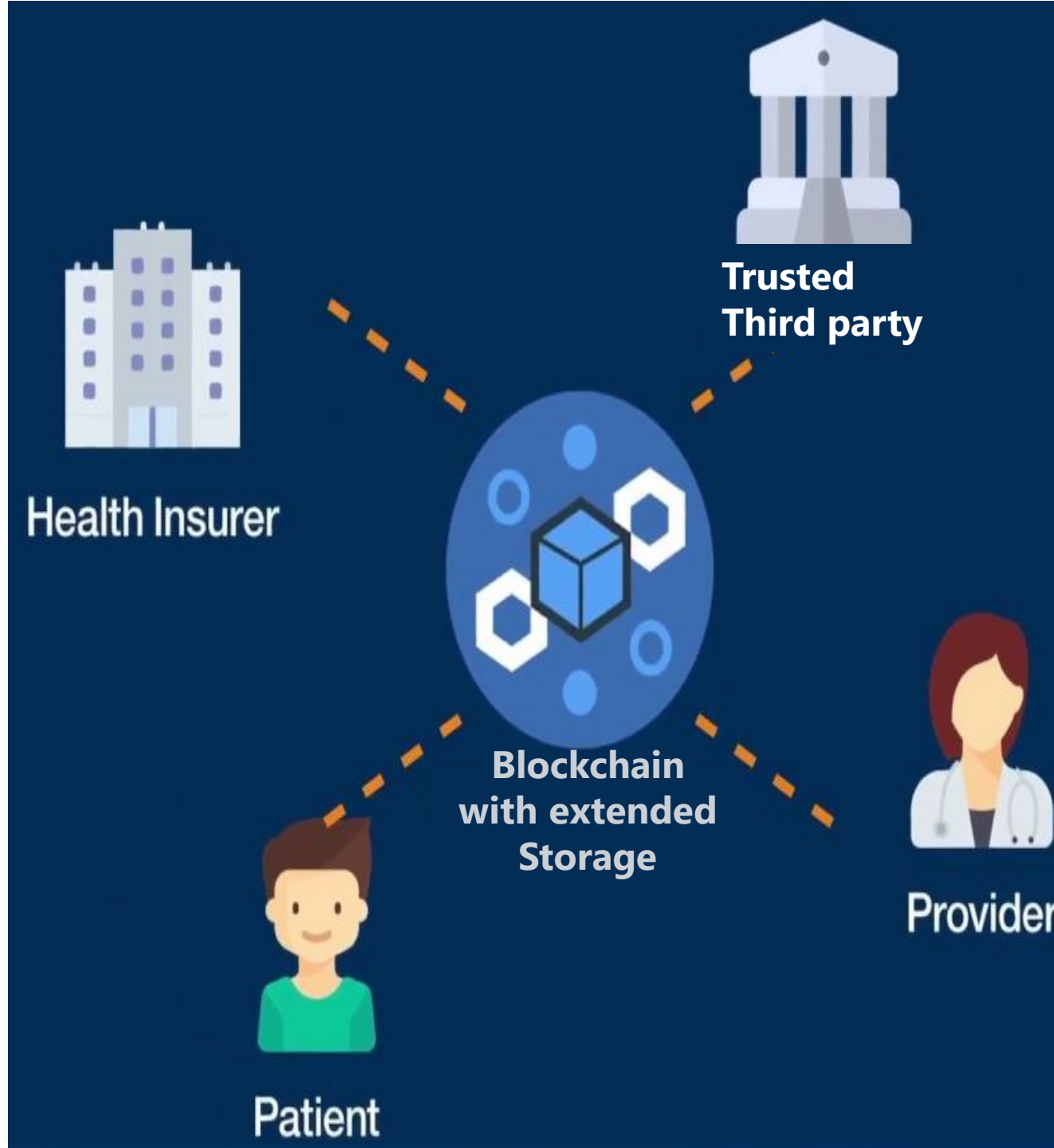
Existing Solutions

There are existing medical chains

- MedicalChain
- MedRec
- Nano Vision
- Gem
- SimplyVital Health

MedChain v0.0 – Basic Working Prototype

Application & Scope

- According to Hyperledger's survey, 42.9% of healthcare organizations suppose that the interoperability of electronic health records will help for faster blockchain implementation

- 28.6% of respondents ready to use this technology in care settings today.

- All country's including India is now spending more on healthcare.

- Lack of efficient technologies in one of the roadblock in India's health care.

Future Modifications

- Insurance Fraud Detection

- Prediction of medicines , precautions to avoid diseases and early detection of disease by using ML in Smart Contracts

THANK YOU