MEDCOIN: FACILITATING SECURE MEDICAL DATA AGGREGATION

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Keywords

Block chain, Medical Data, Decentralized, and Distributed.

Introduction

Medical data is a very confidential and vital piece of information. We've grown accustomed to private medical recording systems, or in most cases, no system at all. This has resulted in a significant information gap in a patient's diagnosis, which impacts not just the patient but also the doctors and institutions concerned. The latest epidemic also highlights a shortage of solid, clean data, preventing research institutes from conducting studies that may assist in pre-emptive measures. A medical aggregation system capable of supplying the aforementioned features to the above stakeholders is one of the answers to this problem. This is the perspective that this study takes. Med Coin is a medical data aggregation platform that uses block chain and IPFS as its guiding principles for execution. The system is decentralized, distributed, and safe thanks to the use of both of these technologies.

Objective

Make a Role-Based Block chain Ledger with Access/Consent functionality. Build a ML Model to utilize data aggregated for analysis. Build a Web Client for Patients, Doctors, and Hospitals and connect all the stakeholders. Create a Pipeline between Patient Data and ML Model (MLOps) for the research institutions. From the patient's perspective, collecting, organizing and storing all the information that the hospital provides like test results, prescriptions etc. is a very tedious task. Communicating this data with the doctor is another difficult process. This is where the motivation to create a decentralized system to store data securely and in a consistent format to help out all the users in this process came into place.

Methodology

The tools that have been used to create the System are as follows:

IPFS (Interplanetary File System) is a content and identity-based hypermedia delivery technology. It allows for the building of fully distributed applications, with the goal of making the internet faster, safer, and more open. IPFS is a distributed file system that aims to connect all computing devices through a single file system. Ethereum is a programmable block chain. Like any block chain, Ethereum is based on a peer-to-peer network protocol consisting of many computers worldwide. Instead of providing users the ability to use a few predefined operations (e.g. bitcoin transactions), Ethereum allows its users to run pretty much any code they want. The code is stored on the block chain for others to interact with and is often referred to as smart contracts. The computers (nodes) in Bitcoin's network maintain and update the blockchain.Next.js is a React framework that allows you to create single-page JavaScript apps. Its authors tout it as a single-command, zero-configuration tool chain for React projects.

It provides a common structure that makes it simple to create a frontend React application while transparently handling server-side rendering. Polygon, formerly known as the MATIC network, is an interchain scalability solution that provides an infrastructure for developing block chain networks that may communicate with one another. It aspires to combine the adaptability and scalability of alternative chains with the security, liquidity, and interoperability of Ethereum. One will combine many off-chain transactions into a single transaction, while the other will run on top of the Ethereum network to speed up operations. REST is an acronym that stands for Representational State Transfer. A REST API is an API that adheres to the REST architectural requirements. It serves as a bridge. HTTP is used for communication between the client and the server.

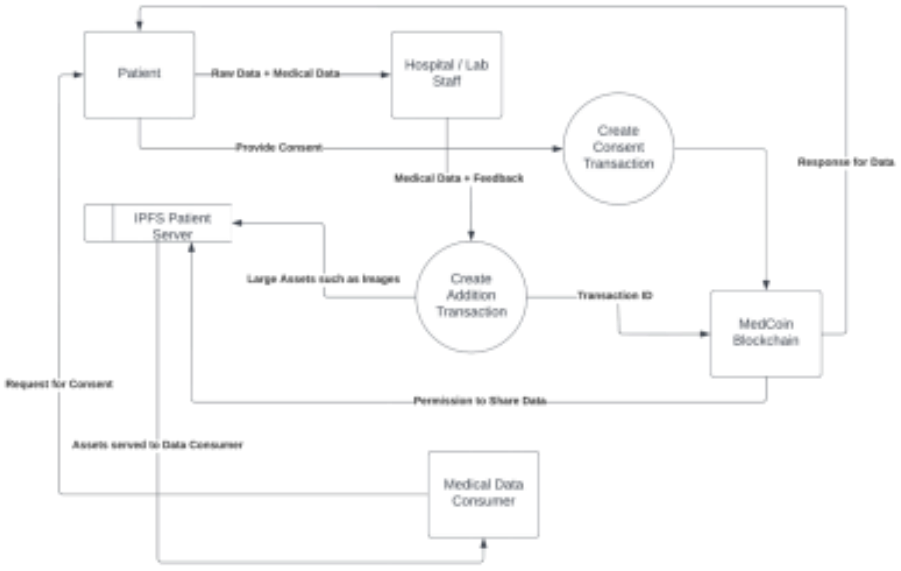

Figure 1- System workflow

Results and Conclusions

As seen in recent data breaches, a centralized database which holds important, private data can be easily compromised, since it has a single point of failure. A decentralized

solution plays a vital role in enhancing the security and trust in the system. The need for a decentralised block chain which stores Medical Data and other PID (Personally Identifiable Data), enabling easy sharing and collaboration between Actors are paramount. Additionally, it also provides a reliable solution for patients to access all of their medical data in a single interface. Our project demonstrates the capabilities and advantages a block chain has to offer

Figure 2- IPFS numbers

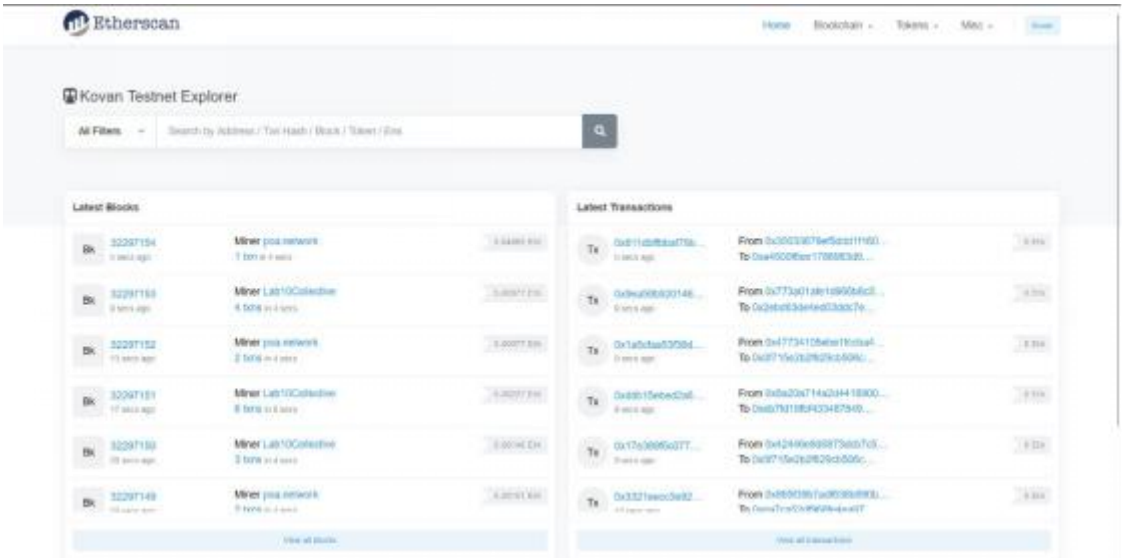

Figure 3- Kovalan Test Number Stats

Scope for future work

Add Machine Learning pipelines to further help Research Institutes connect to their models. Increase the usability of Medcoin by building APIs that can be integrated with any 3rd party application. Add the ability to exchange MedCoin with other Cryptocurrencies. Deploy the Medcoin token in the Ethereum Mainnet.