Blockchain Platform For Healthcare Information Exchange

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ABSTRACT

In my dissertation work, Blockchains also referred as technology emerged to facilitate money exchange transactions and eliminate the need for a trusted third party to notarize and verify such transactions as well as protect data security and privacy. New structures of Blockchains have been designed to accommodate the need for this technology in other fields such as e-health, tourism and energy. I concerned with the use of Blockchains in managing and sharing electronic health and medical records to allow patients, hospitals, clinics, and other medical stakeholder to share data amongst themselves, and increase interoperability. The Process of the Blockchains used architecture depends on the entities participating in the constructed chain network. Although the use of Blockchains may reduce redundancy and provide caregivers with consistent records about their patients, it still comes with few challenges which could infringe patients' privacy, or potentially compromise the whole network of stakeholders. I investigate different Blockchains structures, look at existing challenges and provide possible solutions. I see various problem that may expose patients' privacy and the resiliency of Blockchains to possible attacks.

Keyword - *Smart Contracts, Healthcare including Block Chains, Interoperability of Healthcare.*

1. INTRODUCTION

Block chains can guarantee security of sensitive data by tracking access to confidential medical records and ensuring authorized access. Block chains can serve as a distributed database that hardens medical reports against tampering [3]. As a distributed trusted mechanism, Block chains addresses security issues associated with a deployed distributed database of patient records which could be managed by different advisories such as caregivers, hospitals, pharmacies, insurance companies, regulators and the patients themselves. Block chains as a technology relies on public key cryptography and hashing mechanisms as a mean to keep track of historical transactions pertained to distributed patients' records while preserving confidentiality, integrity and availability. This will ensure that records are not lost or being wrongly modified, falsified or accessed by unauthorized users. In Block chains, patients' records can only be appended to the data base, but not removed. New information can be securely linked to a previous record using cryptographic hashing. Records are added to the block chain based on a consensus among the majority of miners in the block chain. Miners are a set of special nodes working together to validate new transactions added to a block chain. To be able to add are cord to a block chain, miners have to compete to solve a difficult mathematical problem known as Proof of Work (POW) which takes 10 minutes on average. Hence, this will insure that no single party can modify or tamper with verified stored records.

In addition, Block chains can enable caregivers to provide encrypted alias targeted personalized health recommendations to patients without the need to reveal their identities.

2.LITERATURE REVIEW

N. Zhuma bekuly Aitz han; D. Svetinovic, "Security and Privacy in Decentralized Energy Trading through Multi-signatures,N. Zhumabekuly Aitzhan; D. Svetinovic, "Security and Privacy in Decentralized Energy Trading through Multi-signatures,"[1], Smart grids (SGs) are expected to provide not only fine-grained consumption monitoring, but also en-gage increasing number of residential power generation sites into distributed energy trading (e.g., a community microgrid).

Xiaoyuan K. Christidis and M. Devetsikiotis, "Blockchains and Smart Contracts for the Internet of Things," [2] As we have demonstrated, the combination of block chains and IoT can be pretty powerful. Block chains give us resilient, truly distributed peer-to-peer systems and the ability to inter- act with peers in a trustless, auditable manner. Smart con- tracts allow us to automate complex multi-step processes. The devices in the IoT ecosystem are the points of contact with the physical world. When all of them are combined we get to automate time-consuming workflows in new and unique ways, achieving cryptographic verifiability, as well as significant cost and time savings in the process. We believe that the continued integration of blockchains in the IoT domain will cause significant transformations across several industries, bringing about new business models and having us reconsider how existing systems and processes are implemented.

A. Yasin and L. Liu, "An Online Identity and Smart Contract Management System," [3] proposed a theory on Collaborating Filtering (CF), where past transactions were analyzed in Abstract—In today's online environment, people attend various kinds of activities, exhibit different digital presence, build personal digital reputations, issuing and receiving feedbacks from online communities being involved with. These diverse information sources once aggregated can provide a valuable future reference for personal online digital identity and credits check. The primary objective of this paper is to propose a systematic framework for aggregating online identity and reputation information, to provide a holistic approach to personal online behavioral ratings. Major contributions include: An identity aggregation mechanism based on social dependency network is proposed, a smart contract management framework referring to personal online ratings based on the aggregated digital identity, an experiment implementation based on block chain technology, with illustrative examples and theoretical evaluations to the proposed approach.

3. DATAMODEL AND DESCRIPTION

Data Flow Diagram (DFD) is also called as Bubble chart is a graphical technique, which is used to represent information flow. DFD represents system requirements clearly and identify transformers those becomes programs in design. DFD may further partitioned into different levels to show detailed information flow for e.g. Level 0 DFD, Level 1 DFD etc.

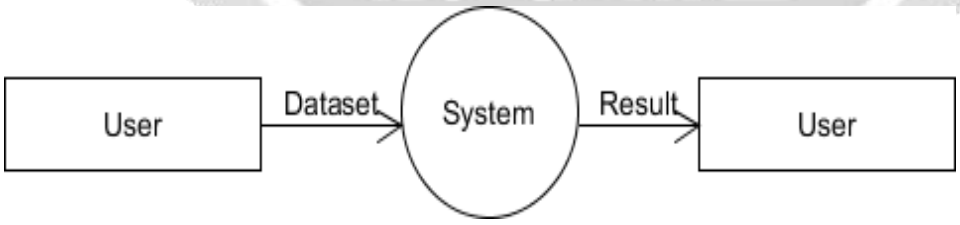

Figure 1: Level 0 DFD.

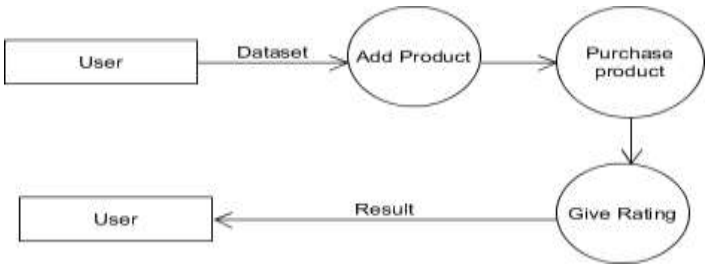

Figure 2: Level 1DFD.

4. DESIGN MODEL

In this section presents the structure and functionality of a case study DApp for Smart Health (DASH)2 we developed to explore the efficacy of applying Block chain technology to the healthcare domain. This prototype was implemented on an Ethereum test Blockchain to emulate a minimal version of a personal EHR system. It provides a web-based portal for patients to self-report and access their medical records, as well as submit prescription requests. DASH also includes a staff portal for providers to review patient data and fulfill prescription requests based on permissions given by patients. Figure shows the structure and workflow of DASH.

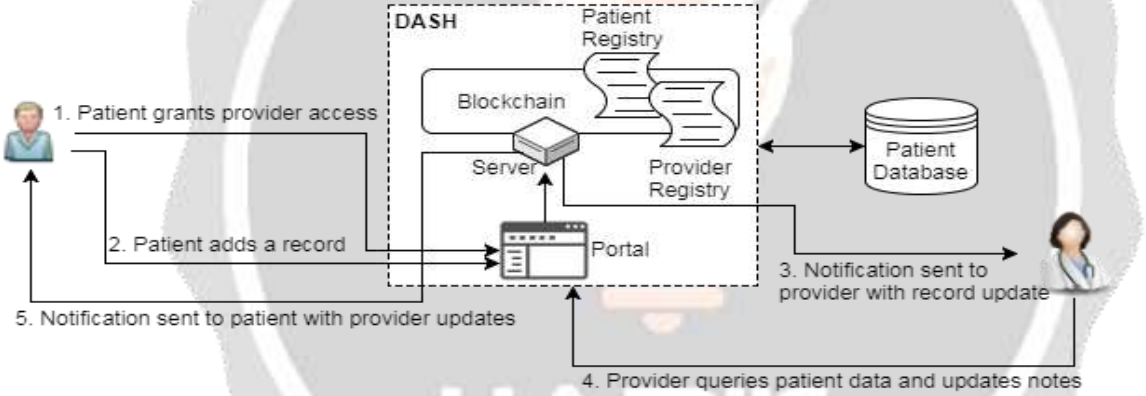

Figure 3: Architecture Design.

4.1 DATA DESIGN

Hardware Requirements

Hardware requirement for the system are given below:

- RAM: 2 GBRAM
- Hard disk: 20GB
- Monitor: 15LED
- Input Devices: Keyboard, Mouse

Software requirements

- Operating System: Ubentu

- Platform: Java
- Database: elligo, blockchain.

Global data structure

Database Blockchain

Temporary data

There is no temporary data.

Use case Diagram

Ausecasediagramisagraphicrepresentationoftheinteractionsamongthecomponent of a system. A use case diagram is a graphic representation of the interactions between the components of a system. A use case is a methodology used in system analysis to identify, clarify, and organize system requirements. The above use cases are used to show the use case view of the system

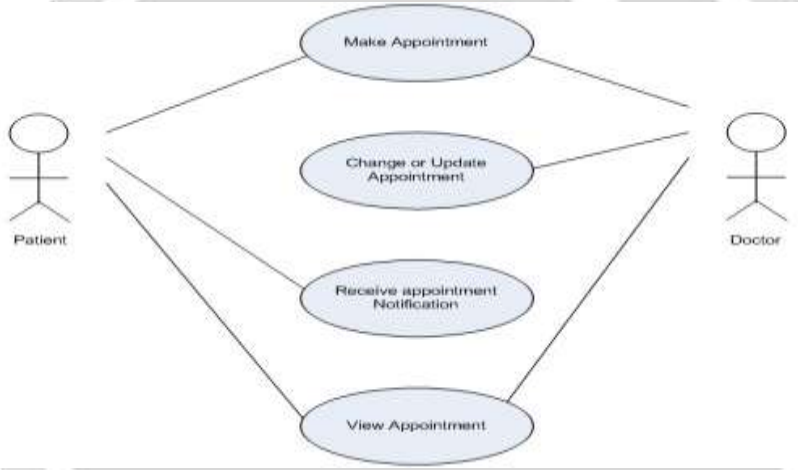

Figure 4: Use case Diagram.

The proposed system i.e. Smart contracts can store data objects and define operations on the data, enabling development of DApps to interact with Blockchains and provide seamless services to the application users. Interoperability: Healthcare interoperability describes the ability for heterogeneous information technology systems and software applications, such as the Electronic Health Record (EHR) system, to communicate, exchange data, and use the exchanged data. In existing system Lack of knowledge in Social network analysis. Existing system Implemented only for cancer disease.

4.2 Breakdown Structure

The work breakdown structure Private Blockchains are blockchains where write permissions are kept centralized to one organization/entity whereas read permissions may be public or restricted to an arbitrary extent. Private Blockchains are based on a decentralized topology with an aim to make sure that chosen participants can view Blockchains activity, introduce control over which transactions are permitted, enable mining securely without proof of work and additional associated costs [24]. In private Blockchains high privacy is available because of the restriction over write and read permissions. The other advantage of private Blockchains over public Blockchains [19] is that a company running private Blockchains can easily change/modify the used rules and revert transactions. Moreover, the validators are known which restricts any addition of falsified blocks to the chain. Furthermore, in

very well-connected nodes, faults can be fixed by manual.

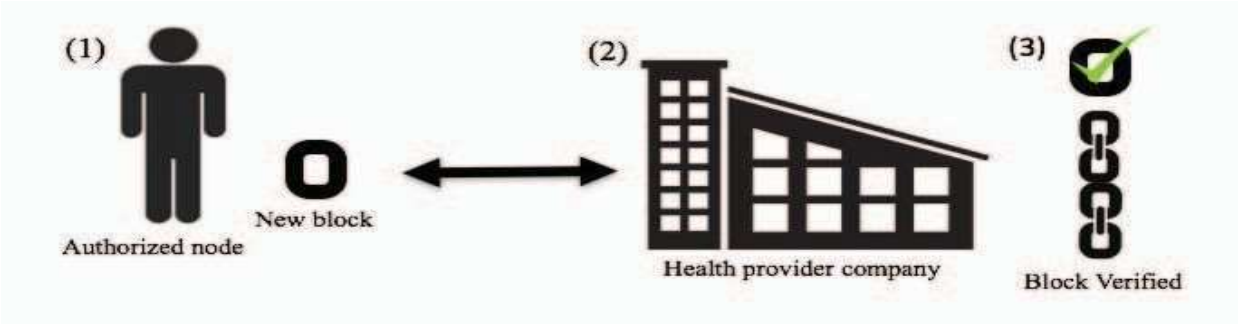

Figure 5: Breakdown Structure

4.3 Display

1. Recommended: - Patient can recommended a product to another Patient which is liked by the most.
2. Patient Request: -We can accept Patient request and will send confirmation message to a person who sent Patient request.
3. Medicine rating: - Products purchases by user user's ratings and their votings for that purchased medicine.

5 IMPLEMENTATION

In this we employing Implementing Blockchains for Efficient Health Care. Any user can initiate the registration. After registration is begin, other users can see the registration as well as Event registration. Admin can add the Patient into the database also activate the user. The user can search for patient as well as join the groups. The user performs multiple tasks as review the particular medicine, Perches the medicine, provide the athorization along with this allows the recommendation of the medicine.

Add Patient:- This option list out the patients who are nearest to the active user

so that the user can give request to know persons.

Add medicine:- Admin is responsible to upload allmedicine.

Display:-

Recommended: - authorization can recommend a medicine to another patient which is liked by the most.

Patient Request: - We can accept the patient request and will send a confirmation message to a person who sent a patient request

Figure 6: Display data on Hyperledger

Figure 7 GUI

- GUI is a hierarchical, graphical front end to the application, contains graphical objects with a set of properties.
- During execution, the values of the properties of each objects of a GUI define the GUI state.
  - It has potential to exercise GUI events like key press/mouse click.
  - Able to provide inputs to the GUI Objects.
  - To check the GUI representations to see if they are uniform with the expected ones.

It strongly rely on the used technology.

Figure 8: Login of user or admin into blockchain healthcare

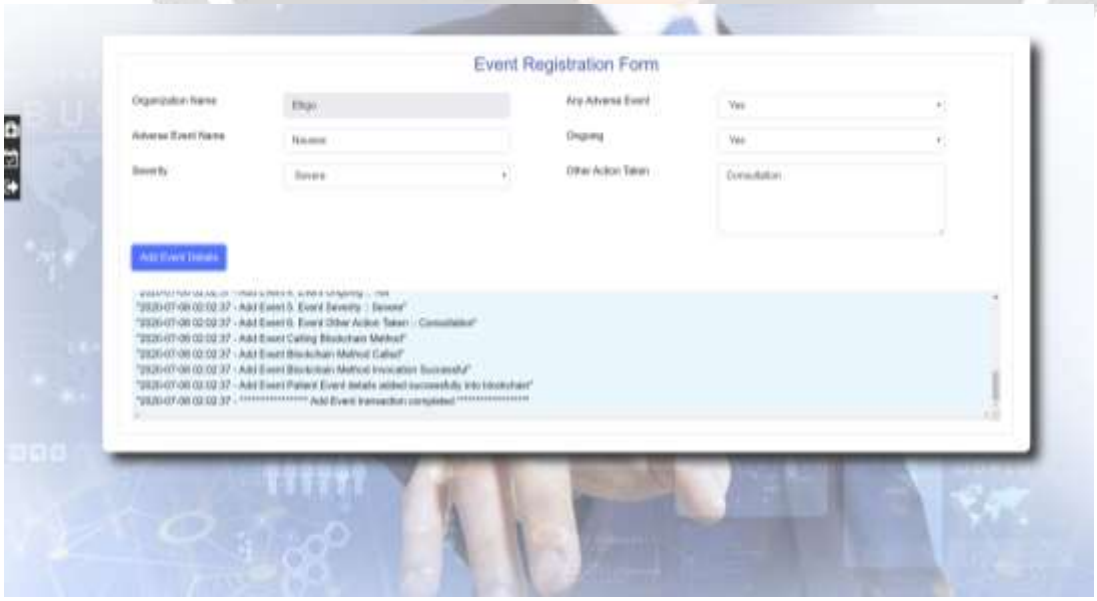

Figure 9:Registration of events

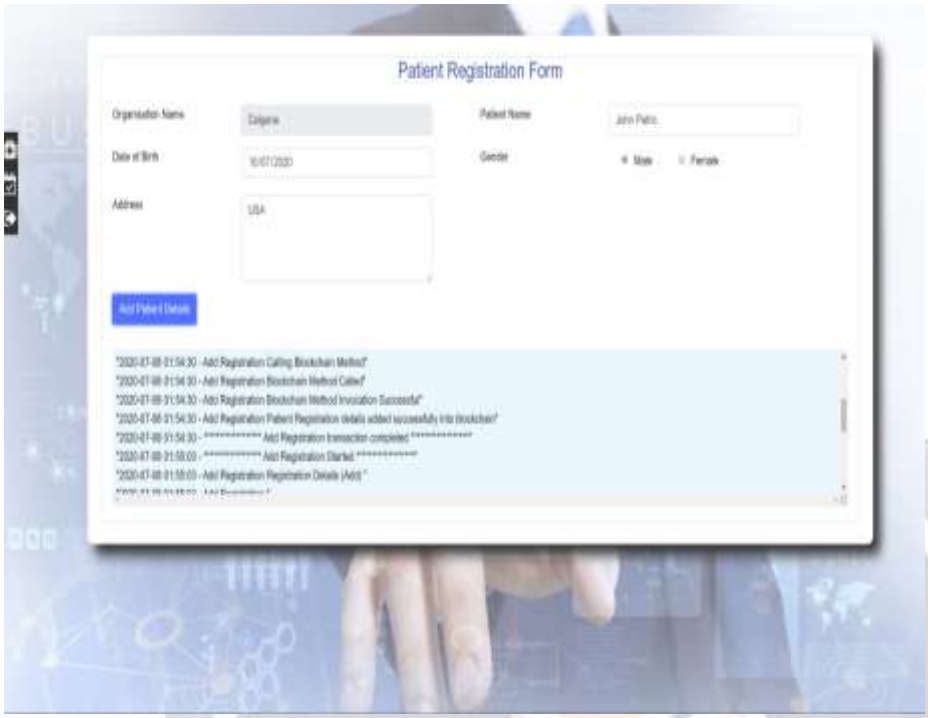

Figure 10: Registration of patient

It is the first page when all user can login with there username and password also new user can register in system. Fig shows registration form where user have to register first to use this application. And if patient has give permission to access data to doctor then that time doctor can see patients reports and history and with the help of this many people add their history and form blockchain.

4. CONCLUSIONS

In this paper discussed about permissioned and permission less Block chains with their architecture, and also how they could be implemented in healthcare. In addition, I also try to discussed related (about) security and privacy challenges, involving the Sybil attack, and how the use of Block chains could come to an end due to quantum computers. Moreover, the paper suggested possible solutions for the aforementioned problems. scenario we can now consider in addition to health, health records are also wealth. So it is more important to keep our health records safe. The world has started moving towards patient-driven interoperability where patients provide the on-demand access to their health records.

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