Proposal: (Electronic Health Records Blockchain)

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Problem Statement

Project Background
- Obscurity
- Inefficiency
- Insecure/Distrust
- Poor Coordination

Technical Methods and Explanation (not finalized)

Project Plan
- Roles & Responsibilities
- Workflow/Gantt Chart
- Project Evaluation
- Collaboration and Technologies
  - Google Drive
  - Github
- Challenges and Contingencies

Works Cited

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Problem Statement

The goal of this project is to use a blockchain to provide a globally accessible single true version of patients health care records that can be created and stored in a fast, auditable and secure way.

Project Background

To understand the rationale behind the application of a blockchain in the electronic healthcare records industry, it is essential to understand the current state of healthcare and its issues.

- ➢ Obscurity
    - The current system is woefully opaque. When a patient requires the services of a healthcare institution, health plans determine the coverage and the ratio of co-pay. For the right coverage and co-pay to be determined, the health plan provider must check if the particular services sought by the patient are part of the agreement between the provider and the patient. This part of billing and insurance is slow and inflexible, especially if it involves out-of-network claims. The agreements between the provider and the institution are often so complex and obscure that health care and health plans can continue to rise in costs without transparency of the factors leading to the price rise.
    - Another major concern is insurance fraud and lack of physician auditability. Due to the often broad coverage of healthcare plans, physicians take advantage of patients by entering false diagnosis or exaggerating diagnosed conditions to attain a greater payout from the insurance claims. Unless this is recognized at an earlier stage, this fraudulent record/diagnosis becomes part of the patient's permanent record
- ➢ Inefficiency

  There are two major sources of inefficiencies in the field of electronic healthcare records:

    - Mobility of patient data

In the modern day, patients are becoming more active about the quality of healthcare they receive. It is now not only considered reasonable to seek a second opinion but also it is encouraged that patients contribute towards the decisions made regarding the services and treatments they receive. However, exchange of medical information is prevalently inefficient as records are stored locally in a proprietary manner at the medical institutions. Since the health data is contained in these legacy proprietary systems, the data becomes siloed and difficult to share/transfer due to varying formats and standards.

- Administration costs for billing and insurance

  Billing and insurance include activities such as maintaining benefits databases and keeping records of services delivered. These administrative activities costed a total of $471 billion in 2012 and would take up to 3.8 hours for the average physician to navigate (Jiwani et al.). The condition has since been worsening.

➢ <u>Insecure/Distrust</u>

- Under the current state of centralized repository of medical data, there is no guarantee in the integrity and security of patient data. Moreover, risk in terms of data loss or hacking is inevitable. In this situation, individuals cannot autonomously utilize their medical information, have little trust in data credibility, and are exposed to high risk of personal information leakage.

➢ <u>Poor Coordination</u>

- The lack of coordination and auditability amongst the stakeholders of a patient's healthcare leads to ill-informed diagnosis and decisions. Since a patient's test results are localized to the healthcare institution where the test was carried, the diagnosis will be carried out based on the tests. This becomes a concern if the test was carried out at an institution that does not have a record of their past medical history. This leads to medical

errors that can be fatal. Medical error is the third leading cause of death and these errors represent “systematic problems such as poorly coordinated care” (Daniel).

The above outlined flaws of the current EHR system defines an exceptional application of a blockchain.

Technical Methods and Explanation

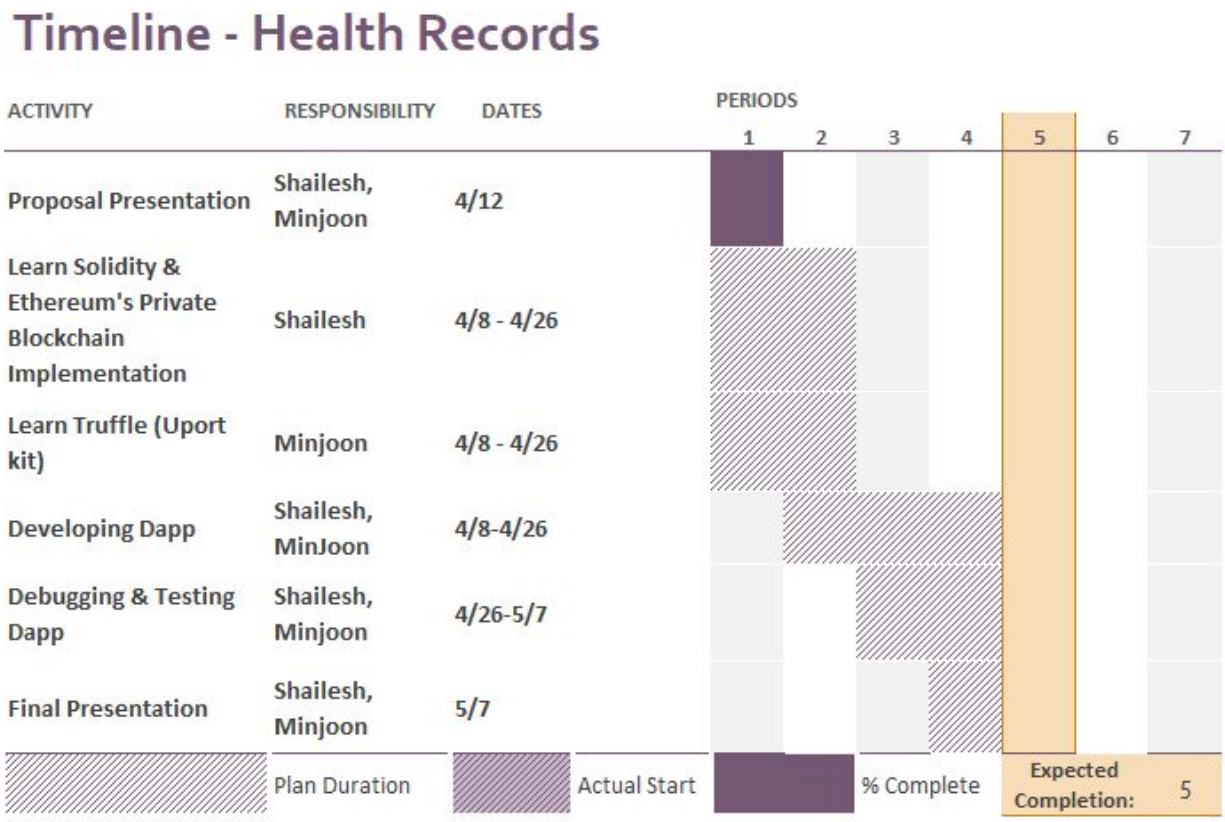
We will we using truffle framework to deploy our contract onto an Ethereum’s testnet and use Web3.js for interaction between the website and the blockchain. Truffle allows us to compile Solidity files (.sol), test them easily and deploy our contract onto a blockchain. Web3.js enables a website to interact with an Ethereum’s blockchain through making RPC calls. We will then use uPort to manage identities and signing transactions to be deployed on the testnet. Each identity can be classified as a patient, doctor, or both. uPort does have tutorial for using their system to connect to a DApp, from which we can learn. For any back-end needs for DApp, we will be using Firebase, which is an Google’s easy-to-use back-end tool. We plan to learn to use these frameworks and tools through tutorials available online, such as ‘Full Stack Hello World Voting Ethereum Dapp Tutorial — Part 2’. This example clearly demonstrates steps needed to start a DApp connected to Ethereum’s testnet.

Project Plan

- Roles & Responsibilities

There are two big tasks that need to be done: (1) connecting uPort to our DApp and (2) writing Solidity files that executes our contract. MinJoon will focus on the first task using JavaScript and Shailesh will focus on the other task to write contracts in Solidity. Also, Shailesh and Minjoon will each work on front-end and back-end for the DApp.

➢ Workflow/Gantt Chart



4/12: Proposal presentation
4/8 ~ 4/26: Learn Truffle, Uport, Web3js, Solidity(contract) through online tutorials
4/26: Minimal viable product due
4/26 ~ 5/7: Debugging, testing
5/7: Final presentation

➢ Project Evaluation

Project will be evaluated based on comparing our DApp and current pediatric EHR system regarding (1) security (2) cost and (3) latency.

➢ Collaboration and Technologies

- *Google Drive*
- *Github*

➢ Challenges and Contingencies

- Scope and Focus
- Industry knowledge
  - HIPAA Compliance and understanding

Works Cited

Jiwani, A, et al. “Billing and Insurance-Related Administrative Costs in United States' Health Care: Synthesis of Micro-Costing Evidence.” *BMC Health Services Research.*, U.S. National Library of Medicine, 13 Nov. 2014, www.ncbi.nlm.nih.gov/pubmed/25540104.

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