
50th year
HACETTEPE UNIVERSITY
www.hacettepe.edu.tr
To the leading edge... Toward being the best...

Blockchain and Centralized Database Combination BBM419

Project Name	Report Date
Blockchain and Centralized Database Combination	Spring 2018-2019

Student Number(s)	Student Name(s)
21328155 21327929 21426515	Furkan KARAKÖKÇEK Tolgahan DİKMEN Cankat ADİLOĞLU
Supervisor(s)	Company Representative(s)
Adnan Özsoy	-

Project Overview

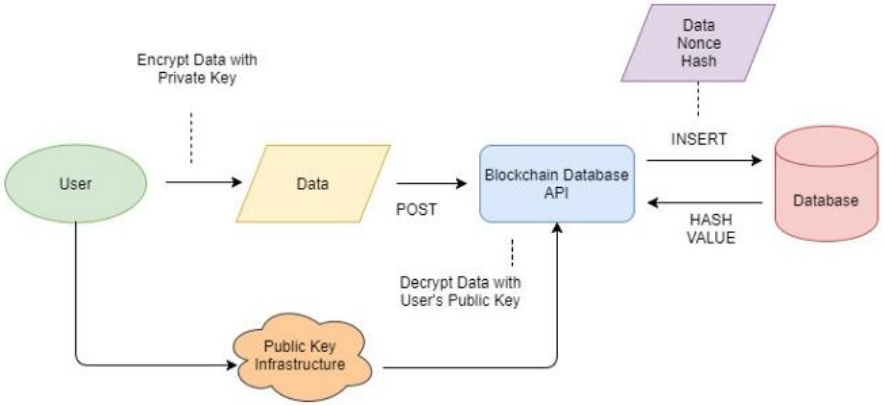
- Goal of the project is managing growth data using a mix of database and blockchain on different scenarios.
  - Hospital – Patient relationship
  - Hash comparing for verification
  - Pointer from blockchain to database

Background

- Blockchain
  - A blockchain is a growing list of records, called blocks, which are linked using cryptography. Each block contains a cryptographic hash of the previous block a timestamp, and transaction data etc.
- Database
  - Database is a systematic collection of data. Databases support storage and manipulation of data. Databases make data management easy.
- Python
  - Python is an object-oriented, high-level programming language with integrated dynamic semantics primarily for web and app development.

Method Followed

- Comparing efficient database reading/writing techniques with blockchain database techniques.
- Try to integrate standart database methods with blockchain database.
- General view of Blockchain



Technical Design

- The plan was to use a centralized database to combine good sides of both technologies. We thought of 3 scenarios that we can apply this combination, which are;
  1. For a block of information, the sensitive/confidential information will be kept in the chain, and others in centralized database
  2. The blocks in the chain will act like a pointer to database.
  3. Comparing hashed information to check if it exists in the chain or the database correctly.

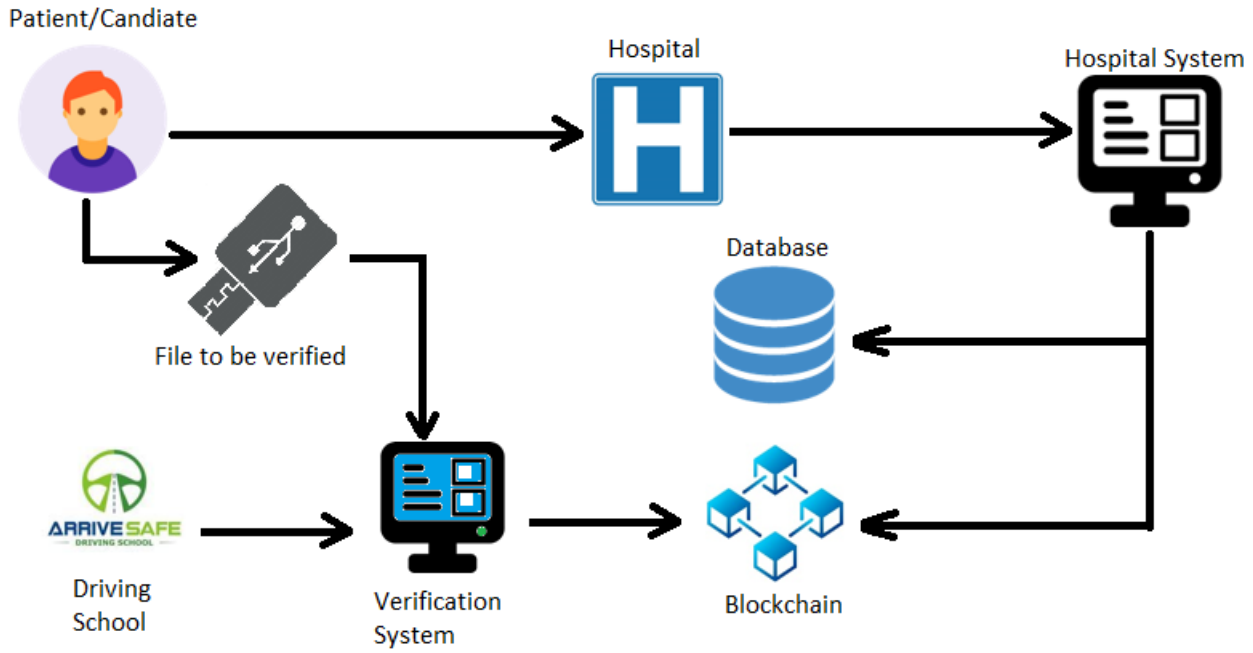
Technical Design

- For a block of information, the sensitive/confidential information will be kept in the chain, and others in centralized database
  - Size of the each registered is 2282 bytes.
  - According to scenario private data of user stored in the blockchain which size is 164 bytes. Then public data of user stored in the database which size is 2118 bytes.

Operational Scenarios

- All hospitals will have this system and people will register the system. Data of people will be used in military service, driving course or marriage office.
  - Test scores of people such as x-ray, tomography, blood test will be stored in databases.
  - This test scores will be accessible by the goverment or private institutions.
  - Documentation, validation will be efficient and secure. Additionally, hospitals can contribute the budget by each query.

Project Workflow



Evaluation of Results

- We aimed to decreasing the size of blockchain. Work of hyperledger was encapsulated system so we couldn’t handle it.
  - Our approach solves the enormous size of blockchain slightly. The achivement was successful.
  - Other scenarios also solve the problem but we applied the most efficient scenario in this project.

Work Done By Team Member:

21426515-Cankat Adiloğlu

- General background of the project was developed. Descriptions of the work done;
  - Database connection with python extension
  - Managing blocks of blockchain
  - Research on blockchain

Work Done By Team Member:

21327929-Tolgahan Dikmen

- Full-stack of the project was developed. Descriptions of the work done;
  - User interfaces of python extension
  - Database efficiency with big data
  - Research on blockchain

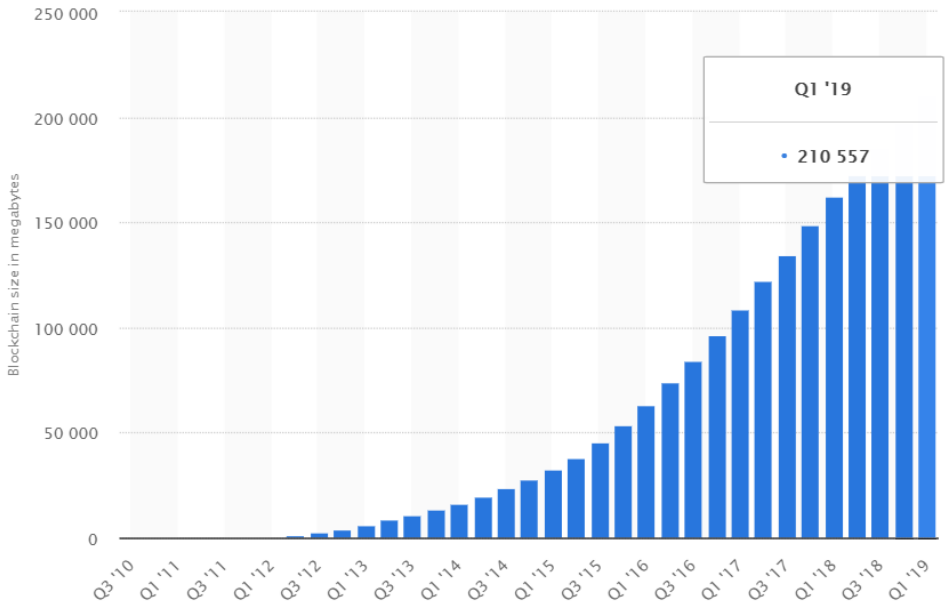
Work Done By Team Member:

21328155-Furkan Karakökçek

- General flow of the project and Hyperledger. Descriptions of the work done;
  - Design of the project workflow
  - Research on blockchain and Hyperledger
  - Testing the application

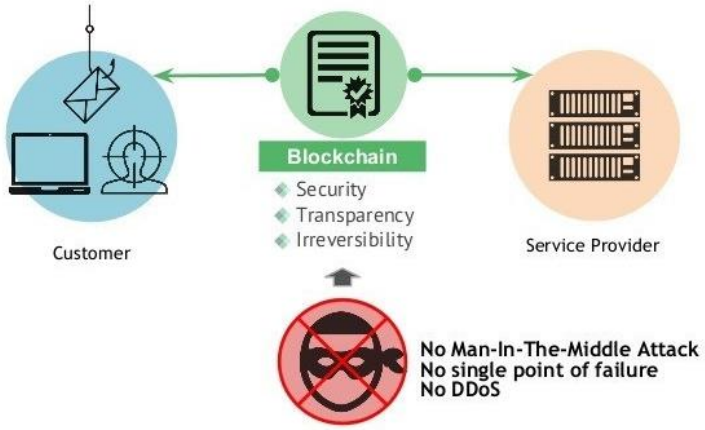
Contributions to Industry and Economy

- Most important contributions of the project is decreasing the size of the all blockchain data.
  - An example, size of the bitcoin blockchain is 205.62 GB in Q1 of 2019.
  - It increases about 46 GB each year.



Contributions to Industry and Economy

- Security of system
  - The system is more secure than centralized database systems because of blockchain structure.
  - For public data of blockchain, we preferred traditional centralized database. This compromises security but still more secure.
  - Any attack of database will be less damaged the system because important and private data were stored in blockchain blocks.



Innovative Aspects

- Innovative aspects are mostly reducing the size and make blockchain more usable in ordinary operations.
  - According to this scenarios, if somebody wants to get health report for driving license, driving course will access the health report and trust the report not changed.

Self-Evaluation of Project Work

- According to goal of the Project, all steps were succesfull and found our personel development
  - Blockchain is new trend of world so, it forced us about finding resources and examples.
  - Our project was about hospital system but blockchain can be integrated different areas such as real estate, notary, banking etc.

Project Demo

- https://github.com/cadiloglu/Blockchain-PDF-Verification

...

Thank You!

- Any questions..?

References

- https://blockgeeks.com/guides/big-data-and-blockchain/
- https://www.quora.com/What-is-a-block-in-blockchain-Where-to-store-the-blocks
- https://medium.com/coinmonks/understanding-and-creating-blockchains-86662c8e7516
- https://medium.com/coinmonks/understanding-and-creating-blockchains-86662c8e7516
- https://www.forbes.com/sites/bernardmarr/2018/05/14/30-real-examples-of-blockchain-technology-in-practice/#4e5f6597740d