



BLOCKCHAIN CONSENSUS SIMULATOR



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Abstract

Blockchain is a concept that has gained popularity thanks to bitcoin. The most important reason for this system to come forward is that it is fast and reliable. In short, the blockchain is described by the hash functions that combine the structures of the data block.

This block chain is kept in an independent database that makes the system faster and safer. It has a network that uses and uses computers to access the database. The name of this network is P2P (Peer to Peer) network. This is not a network server. In addition, consensus algorithms (POW and POS) are used to secure networks.

Keywords: Blockchain, P2P(Peer to Peer), Consensus Mechanism, POW Algorithm, Transaction.

Introduction

A pseudonymous software developer going by the name of Satoshi Nakamoto proposed bitcoin in 2008, as an electronic payment system based on mathematical proof. The aim here is to create a virtual currency that is not connected to any central authority through the internet. With this virtual currency, we can make all the monetary transactions that we perform with the currencies we use. Therefore, crypto coins are widely used today in many different areas.

Another popular virtual currency is the ethereum. Ethereum is an open platform that enables developers to build and deploy decentralized applications such as smart contracts and other complex legal and financial applications.

The blockchain can be thought of as an electronic mail system that enables the transfer of digital coins. There are blocks where data is held, and the first block is called "Genesis Block". This block is considered the beginning of the blockchain.

Each block in the block chain is connected cryptographically. They also use hash functions to provide this connection. Hash functions work as an inter-block validation mechanism. The Hash functions encrypt data in a way that's hard to predict, thus providing data security.

The blockchain has a scattered database. The communication between the nodes connected to this database is provided by the P2P (peer to peer) network. Blockchain operations are seen by everyone. This also makes the network vulnerable to attacks.

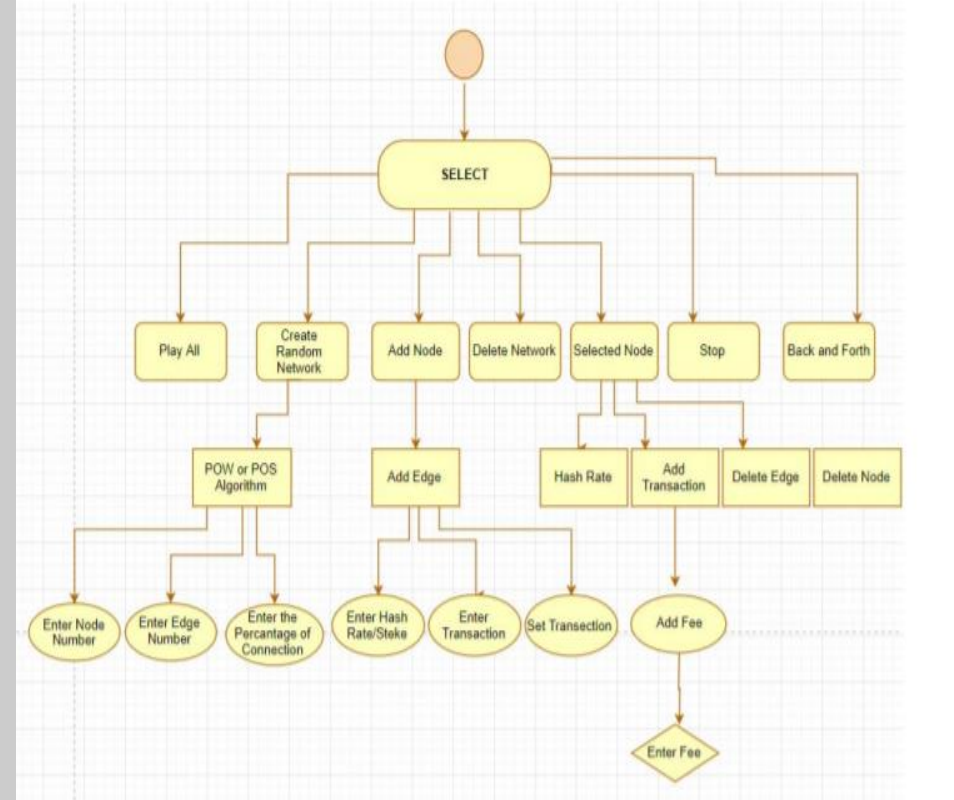


Figure 1 – Activity Diagram

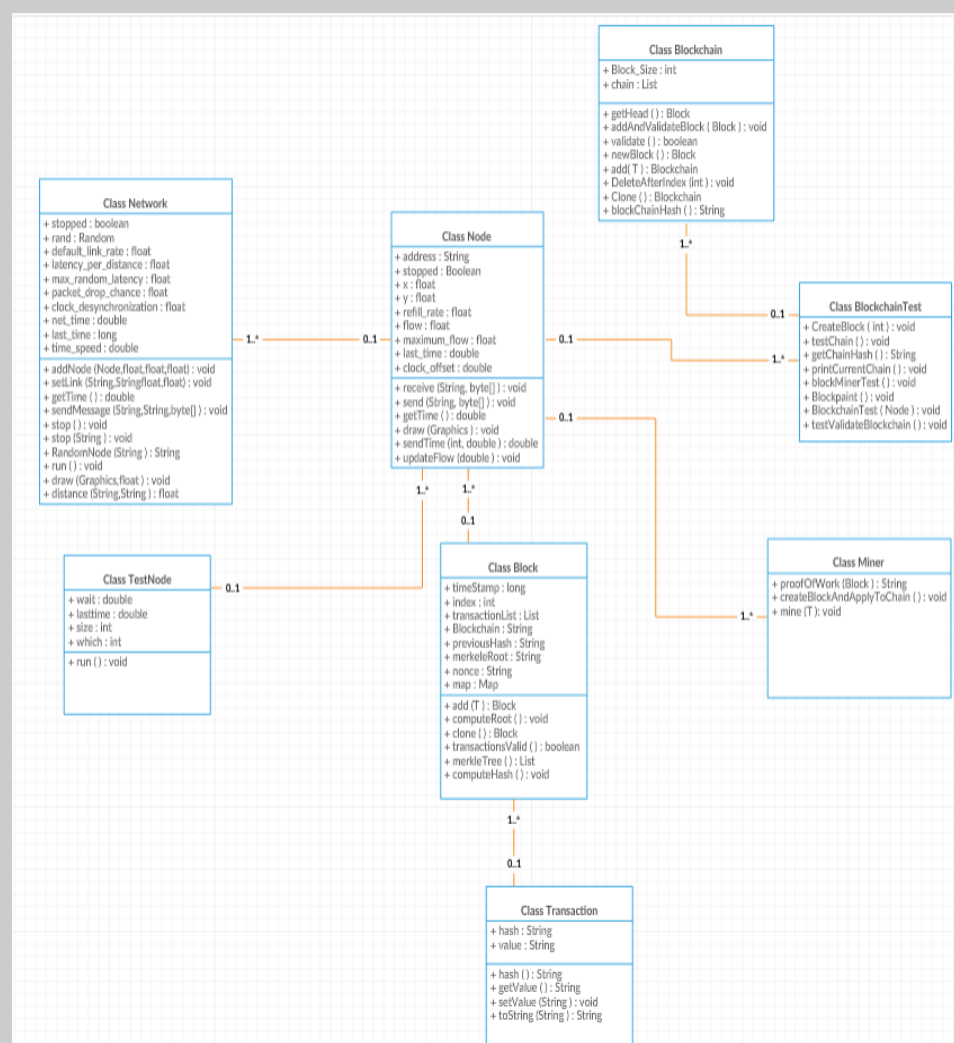


Figure 2 – Class Diagram

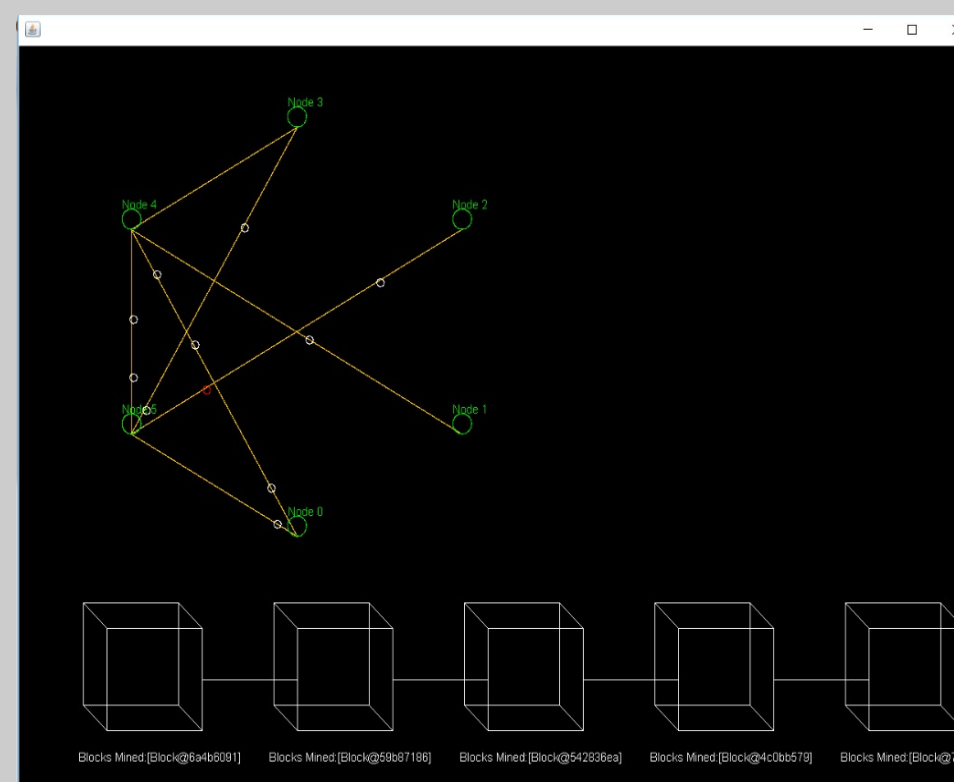


Figure 3 – Finished Product

Solution

Our project aim is to model and simulate Blockchain for a real process or system to work within a certain period of time. We will examine how we connect the network. We will determine the connection of the nodes, the number of nodes and how much they are connected. We will determine which algorithms will work in network. We will check the transaction fee range. The user will have features such as speeding up and stopping the simulation and slowing backwards or going backwards or forwards

Results & Conclusion

In this CENG 407-408 project, we talk about the blockchain consensus simulator. Based on the preliminary findings within Literature review, our aim is to model and simulate Blockchain to work within a certain time period of a real process or system. Blockchain is a shared, trusted, public ledger of transactions, that everyone can inspect but which no single user controls. Blockchain, also known as the distributed book, is used in many different fields such as banking, real estate and education. A blockchain consensus mechanism is a fault-tolerant mechanism that is used in computer and blockchain systems to achieve the necessary agreement on a single data value or a single state of the network among distributed processes or multi-agent systems. We have examined the most popular consensus mechanisms POW and POS algorithms and we find out that none of them is absolutely perfect but they each have their strengths. That's why algorithms are being continuously updated and complemented. Sometimes the approaches from even different consensus mix together forming hybrids.

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