COP5615: Dist Oper Sys Princ, Fall 2018

Project 4.2

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**Team Members**

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**Coding environment**

Erlang/OTP 21

IEx 1.7.2

**Linux Ubuntu 18.04** machine with 6 cores

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**Part 1**

**Instructions**

The code is in directory project4 under proj4.2

cd project4

mix phx.server

It will ask to install dependencies which needs to be accepted.

**Functionalities implemented**

The implementation simulated a bitcoin network with 100 nodes. There are two parts to this as mentioned below and each one of them is explained in detail in the coming sections.

1. Simulator backend for bitcoin algorithms
2. Phoenix frontend for dashboard
3. **Simulator backend for bitcoin algorithms**

The key features of the simulator are as follows

1. This creates a bitcoin network of 100 nodes. The number 100 is chosen for simplicity, it can be increased as required to simulate large networks. It creates two types of nodes, miners and users. Miners participate in mining a new block to be added in the blockchain. Users just use bitcoin in day to day activities which include transaction of money from one person to another.
2. Every 2 seconds a transaction is initiated between two random nodes (can be miner or user) of value ranging from 1 to 5 bitcoins. The values are kept integers to make debugging easier. These can easily be fractions are the program will handle them without any change. Since not all nodes will have bitcoins in the beginning, a list of potential nodes with bitcoins is maintained for simulation. Nodes are added to this list whenever some node mines a block or receives bitcoins from other nodes.
3. Every 10 seconds a new block is added. A random miner starts mining a new block which includes all the transactions since the last block was mined. The miner receives a reward of 50 bitcoins on adding a new block to the blockchain.
4. **Phoenix frontend for dashboard**

The key features of the Phoenix dashboard are as follows

* 1. **Log section:** This section shows all the logs that are generated by the bitcoin simulator. It shows which miner mined a block or which node transferred how many bitcoins to which node. This is present for verification purpose by looking into the simulation to understand what is happening.
  2. **Bitcoins sum:** It shows the number of bitcoins at in increased every time a new block is mined. It can be seen that there is a linear rise in the total number of bitcoins which is aligns with the implementation strategy.
  3. **Users:** Thetableshows all the nodes present in the bitcoin network. It shows the hash of public address of the nodes and whether the node is acting as a user or as a miner.
  4. **Search:** We can search by the public address of the nodes to get more details about the node. Currently is shows the balance for that node and the changes which add up to that balance, but more details can be added easily.