Blockchain

Assignment-2 Report

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1 Criteria Determining longest chain

We have used sqlite3 as the databases at each peer node to store the blocks which a particular peer has received, the structure of the databases at a peer looks like this:

prev-block-hash	block-hash	timestamp	height	ip-port
0x0000	0x9e1c	1020100300	0	0.0.0.0:8888
0x9e1c	0x6c72	1607152912	1	192.168.43.57:6665
0x6c72	0x625c	1607152929	2	192.168.43.57:6664
0x625c	0x5a00	1607153079	3	192.168.43.57:6663
0x5a00	0x06d6	1607153131	4	192.168.43.57:6665

block-hash: Each block in the network is identified by a unique block hash.
pre-block-hash: Block represented by "block-hash" is mined on this block.
timestamp: The time at which the block is created.
height: Height of this block in peer's database.
ip-port: Socket address of the peer who created the block.

In the design we maintain two in memory variables "last-block-hash-pointer" and "last-block-hash-pointer-height" which represents the hash of the last block of the main chain (longest chain) and height of the main chain respectively. Whenever a peer received a block it first validates the blocks and check whether the received block is mined on the "last-block-hash-pointer" and if it is mined on the last block of the main chain then the length of the main chain is increased and hence in this case we update the "last-block-hash-pointer" and "last-block-hash-pointer-height".

To get the full main chain from its database, a peer searches for "last-block-hash-pointer" in the **block-hash** column of the database and extract that tuple, after this we can get the previous block of this block from **pre-block-hash** column of that tuple. we can repeat this until we reach up to the genesis block in the database.

2 Graphs

In this section, we'll be showing different plots.

2.1 Mining Power Utilization vs Inter Arrival Time

we run the experiment for around 15 minutes for each inter-arrival time, with all the peers having same hashing power.

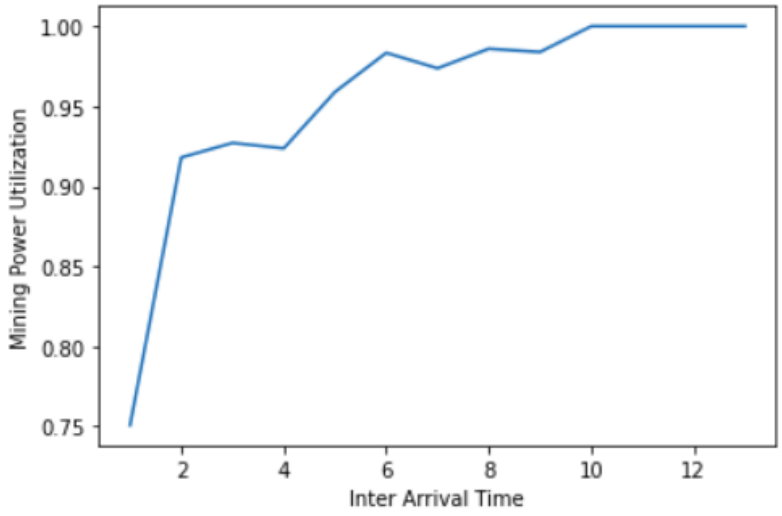

Figure 1: Mining Power Utilization vs Inter Arrival Time.

2.2 Severity Vs Inter Arrival Time

For calculation of severity we run the experiment for around 11 minutes for each inter arrival time, with the adversary node having 33 percent of the total hashing power.
The plot is shown for the configuration when 10, 20 and 30 percent of the total nodes are flooded by adversary.

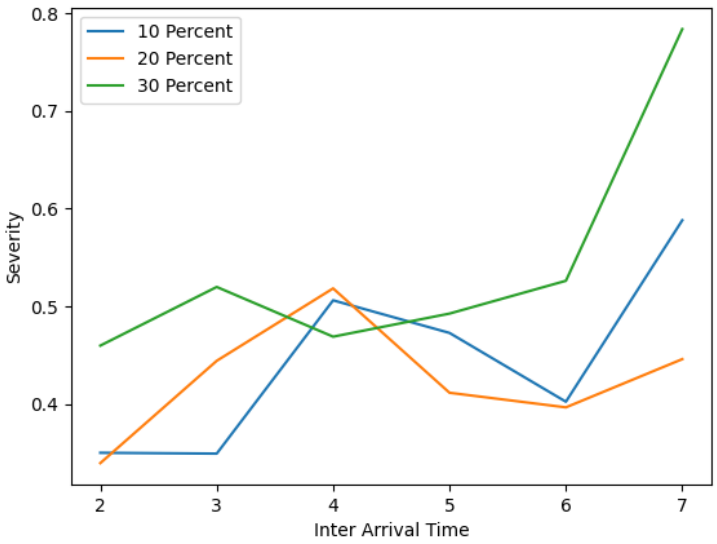

Figure 2: Severity Vs Inter Arrival Time.

3 Screenshot of Blockchain

Below are some of the screenshots of the blockchain created. Each block contains its own hash, the time on which it is created and the previous hash block.

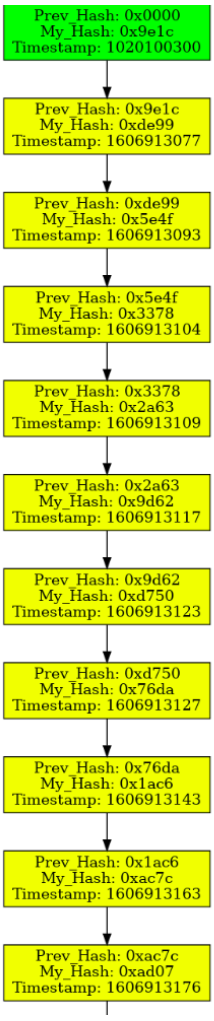

Figure 3: Blockchain shown with Genesis block.

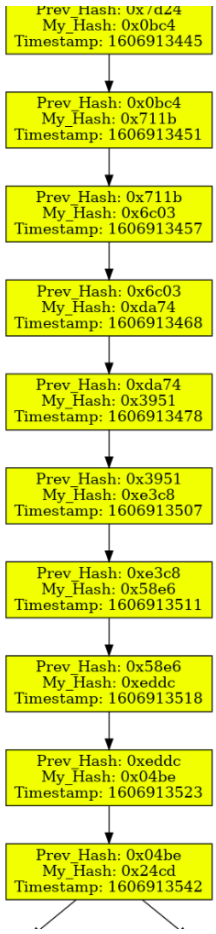

Figure 4: Some part of the blockchain(1).

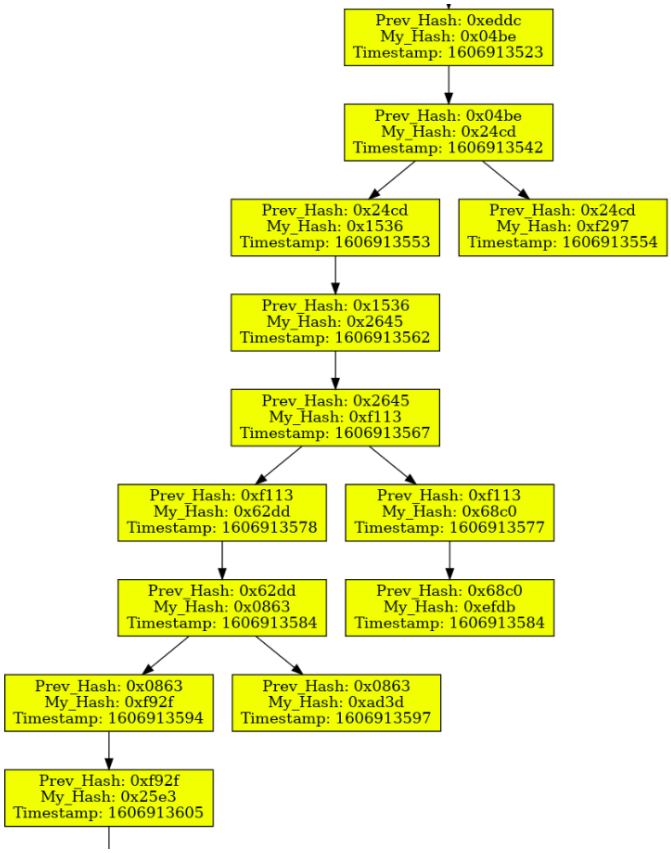

Figure 5: Some part of the blockchain(2).