Mining Syndicate

Catalysts School Coding Contest

International October 2017

Blockchain - Proof of Work

CODING CONTEST

We hear plenty of talk of how public blockchains are going to change the world, but to function on a global scale, a shared public ledger needs a functional, efficient and secure consensus algorithm.

A consensus algorithm, like bitcoin's proof of work (the one we hear about most often), does two things: it ensures that the next block in a blockchain is the one and only version of the truth, and it keeps powerful adversaries from derailing the system and successfully forking the chain.

In proof of work, miners compete to add the next block (a set of transactions) in the chain by racing to solve a extremely difficult cryptographic puzzle. The first to solve the puzzle, wins the lottery. As a reward for his or her efforts, the miner receives 12.5 newly minted bitcoins – and a small transaction fee.

To solve the puzzles miners often work together in a pool and share the reward.

Text source: Coindesk
Image source: Blockgeeks

Level 1

Level 1 - Hashing power

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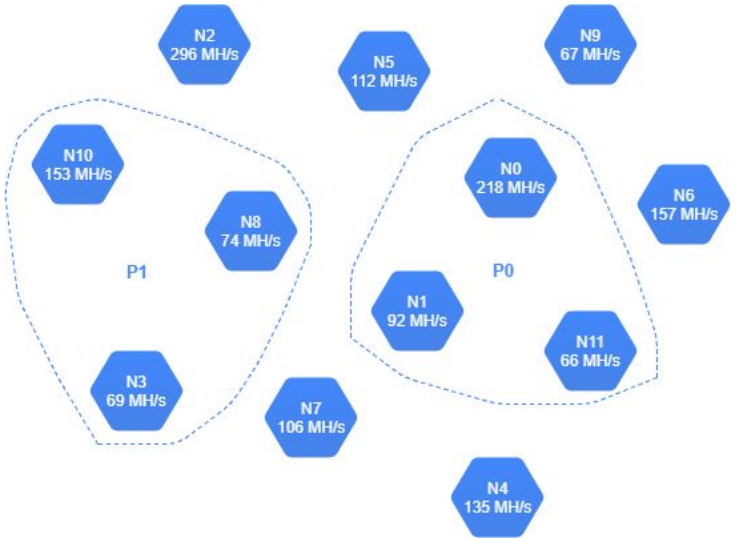
Definition

- A **network** consists of a set of **nodes**.
- Every node has an **identifier** and a **hashrate** in mega-hashes per second.
- In a network, nodes can form a **pool**.
- Every pool has an **identifier** and contains **some nodes**.
- Each node can be assigned to one pool at most.

Task

- First, the entire hashrate of the network has to be calculated.
- Then the hashrate of each pool has to be calculated. In the output the pool-ID has to be in ascending order (see Example slide).



Data format

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Input

`<NumberOfNodes>` the number of nodes the network consists of
NumberOfNodes lines: `<NodeId> <HashRate>`
`<NumberOfPools>` the number of pools in the network
NumberOfPools lines: `<PoolId> <NodeIDs space separated>`

Output

`<OverallHashRate> <NumberOfPools <Pool> space separated>`
Pool: `<PoolId> <Hashrate>`

Example (see level1-eg.txt)

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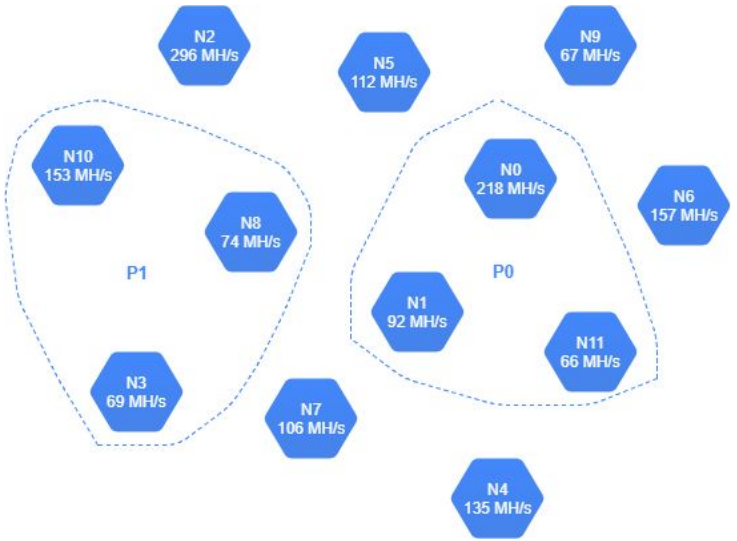
Input

```
12
N0 218
N1 92
N2 296
N3 69
N4 135
N5 112
N6 157
N7 106
N8 74
N9 67
N10 153
N11 66
2
P0 N0 N11 N1
P1 N8 N3 N10
```

Output

```
1545 P0 376 P1 296
```



Level 1