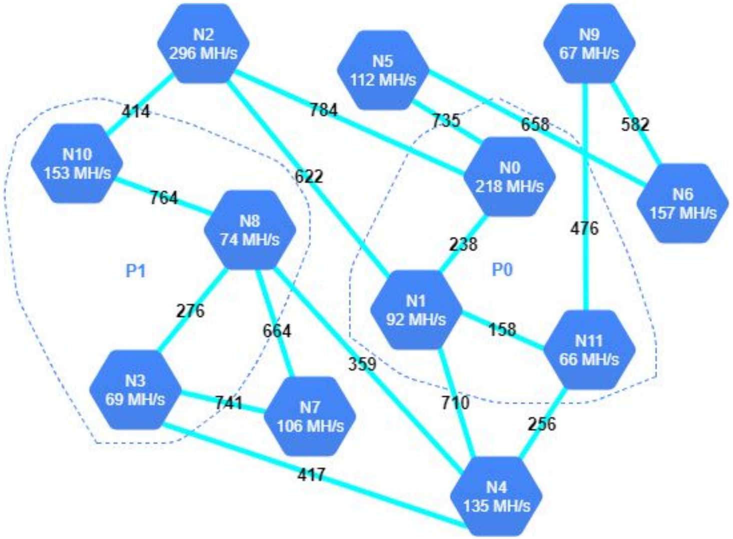
Level 3 - Information spreading

Definitions

- Nodes may have **connections** with other nodes, where each connection has a certain **latency**.
- To achieve a certain hashrate, the information has to be shared between the nodes and here the latency plays an important role.

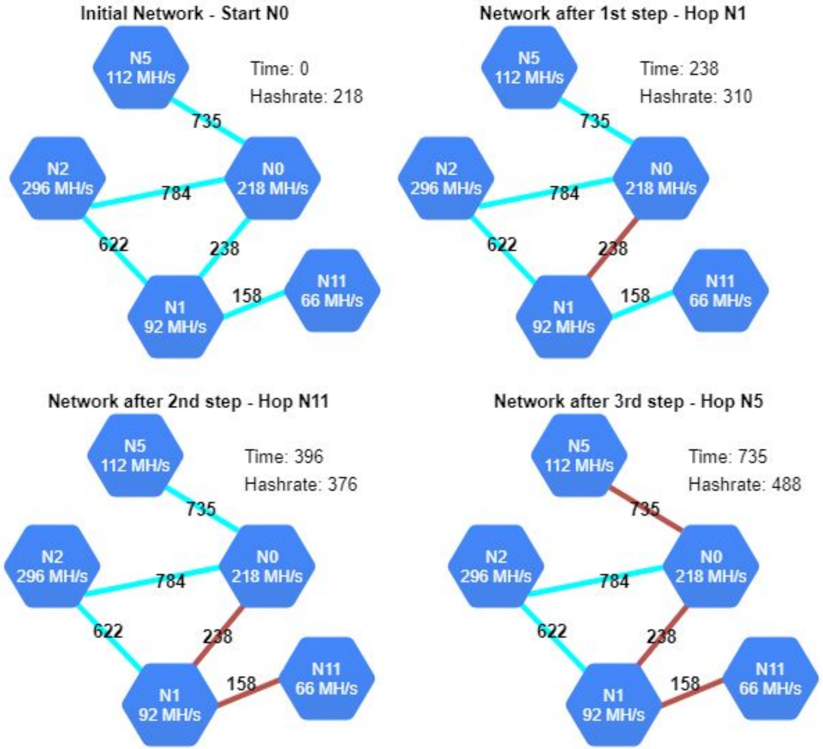
Task

- For each node in the network, you should find out how fast it can reach a HashRate > 50% of the overall hashrate.
- For each node of the network output the node-ID and the necessary time the node needs to reach > 50%.
- The output of the nodes with their hashrate has to be in ascending order (see Example slide).



Hint

- All nodes in a network can be reached so there exists no node which has no connections to other nodes.
- Information spreading happens in parallel
  - Selecting N5 as the first hop would mean a latency of 735
  - With latency 735 you also already reached N1 and N11
- Think about a suitable graph algorithm



Initial Network - Start N0

Time: 0
Hashrate: 218

Network after 1st step - Hop N1

Time: 238
Hashrate: 310

Network after 2nd step - Hop N11

Time: 396
Hashrate: 376

Network after 3rd step - Hop N5

Time: 735
Hashrate: 488

Data format

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>`

`<NumberOfConnections>` the number of connections the network has

NumberOfConnections lines: `<NodeID> <NodeID> <Latency>`

Output

`<NumberOfNodes <Node> space separated>`

Node: `<NodeId> <TimeToReachTheHashrate>`

Example (see level3-eg.txt)

Input

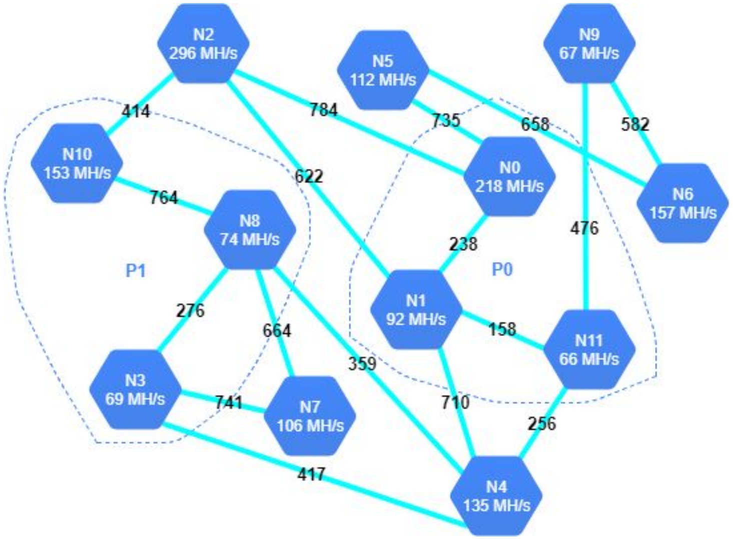
```
12
N0 218
N1 92
N2 296
N3 69
N4 135
N5 112
N6 157
N7 106
N8 74
N9 67
N10 153
N11 66
2
P0 N0 N11 N1
P1 N8 N3 N10
```

Input continued

```
17
N0 N1 238
N0 N5 735
N0 N2 784
N1 N4 710
N1 N2 622
N1 N11 158
N2 N10 414
N3 N4 417
N3 N7 741
N3 N8 276
N4 N11 256
N4 N8 359
N5 N6 658
N6 N9 582
N7 N8 664
N8 N10 764
N9 N11 476
```

Output

```
N0 784 N1 622 N2
784 N3 1069 N4
1023 N5 1387 N6
1393 N7 1675 N8
1011 N9 1091 N10
1123 N11 780
```


N2
296 MH/s
N5
112 MH/s
N9
67 MH/s
414
784
735
658
582
N10
153 MH/s
622
N0
218 MH/s
N6
157 MH/s
764
N8
74 MH/s
476
238
P1
P0
N1
92 MH/s
276
664
158
N11
66 MH/s
359
N3
69 MH/s
741
N7
106 MH/s
710
256
417
N4
135 MH/s