C. Bank Hacking

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Although Inzane successfully found his beloved bone, Zane, his owner, has yet to return. To search for Zane, he would need a lot of money, of which he sadly has none. To deal with the problem, he has decided to hack the banks.

There are n banks, numbered from 1 to n. There are also n - 1 wires connecting the banks. All banks are initially *online*. Each bank also has its initial strength: bank i has initial strength a_i.

Let us define some keywords before we proceed. Bank i and bank j are *neighboring* if and only if there exists a wire directly connecting them. Bank i and bank j are *semi-neighboring* if and only if there exists an ***online*** bank k such that bank i and bank k are *neighboring* and bank k and bank j are *neighboring*.

When a bank is hacked, it becomes *offline* (and no longer *online*), and other banks that are *neighboring* or *semi-neighboring* to it have their strengths increased by 1.

To start his plan, Inzane will choose a bank to hack first. Indeed, the strength of such bank must not exceed the strength of his computer. After this, he will repeatedly choose some bank to hack next until all the banks are hacked, but he can continue to hack bank x if and only if all these conditions are met:

1. Bank x is *online*. That is, bank x is not hacked yet.
2. Bank x is *neighboring* to some *offline* bank.
3. The strength of bank x is less than or equal to the strength of Inzane's computer.

Determine the minimum strength of the computer Inzane needs to hack all the banks.

Input

The first line contains one integer n ($1 \le n \le 3 \cdot 10^5$) — the total number of banks.

The second line contains n integers $a_1, a_2, ..., a_n$ ($-10^9 \le a_i \le 10^9$) — the strengths of the banks.

Each of the next n - 1 lines contains two integers u_i and v_i ($1 \le u_i, v_i \le n, u_i \ne v_i$) — meaning that there is a wire directly connecting banks u_i and v_i.

It is guaranteed that the wires connect the banks in such a way that Inzane can somehow hack all the banks using a computer with appropriate strength.

Output

Print one integer — the minimum strength of the computer Inzane needs to accomplish the goal.

Examples

input
5 1 2 3 4 5 1 2 2 3 3 4 4 5

output
5

input

```
7
38 -29 87 93 39 28 -55
1 2
2 5
3 2
2 4
1 7
7 6
```

output

```
93
```

input

```
5
1 2 7 6 7
1 5
5 3
3 4
2 4
```

output

```
8
```

Note

In the first sample, Inzane can hack all banks using a computer with strength 5. Here is how:

- Initially, strengths of the banks are $[1, 2, 3, 4, 5]$.
- He hacks bank 5, then strengths of the banks become $[1, 2, 4, 5, -]$.
- He hacks bank 4, then strengths of the banks become $[1, 3, 5, -, -]$.
- He hacks bank 3, then strengths of the banks become $[2, 4, -, -, -]$.
- He hacks bank 2, then strengths of the banks become $[3, -, -, -, -]$.
- He completes his goal by hacking bank 1.

In the second sample, Inzane can hack banks 4, 2, 3, 1, 5, 7, and 6, in this order. This way, he can hack all banks using a computer with strength 93.