Problem D
Maximum Weighted Independent Set in Trees

Time limit: 1 second
Memory limit: 2048 megabytes

Problem Description

A tree is an undirected connected graph without cycles. You are given a tree of n vertices, where the vertices are numbered from 1 to n. Each vertex is associated with a weight a_i.

An independent set within a graph is a collection of vertices where none are directly connected. In other words, it's a set S of vertices where no two vertices in S share an edge. The *value* of an independent set refers to the sum of the a_i values associated with the vertices it contains. The task is to determine the maximum achievable *value* of an independent set within the provided tree.

Input Format

The first line of the input contains an integer n. The second line of the input contains n space-separated integers $a_i, a_2, \ldots, a_n$, where a_i is the weight of the i-th vertex. The i-th of the following $n-1$ lines contains two integers u_i and v_i denoting an undirected edge between vertex u_i and v_i.

Output Format

Output the maximum possbile *value* of an independent set in one line.

Technical Specification

- $1 \leq n \leq 2 \times 10^5$
- $1 \leq a_i \leq 10^9$ for $i = 1, 2, \ldots, n$
- $1 \leq u_i, v_i \leq n$ for $i = 1, 2, \ldots, n-1$
- $u_i \neq v_i$ for $i = 1, 2, \ldots, n-1$
- It is guaranteed that the given graph is a tree and has no loops or multiple edges.

Scoring

1. (6 points) $(u_i, v_i) = (i, i+1)$ for $i = 1, 2, \ldots, n-1$. That is, the given tree is a path from 1 to n, containing exactly n vertices.
2. (9 points) No additional constraints.

Sample Input 1

```
6
3 5 9 3 6 2
1 2
1 3
2 4
2 5
5 6
```

Sample Output 1

```
18
```

Sample Input 2

```
6
100 5 9 3 6 2
1 2
1 3
2 4
2 5
5 6
```

Sample Output 2

```
109
```

Sample Input 3

```
7
4 2 7 9 10 4 2
1 2
2 3
3 4
4 5
5 6
6 7
```

Sample Output 3

```
23
```

Sample Input 4

```
5
1000000000 1000000000 1000000000 1000000000 1000000000
1 2
2 3
2 4
2 5
```

Sample Output 4

```
4000000000
```