General presentation guidelines:

1. Explain the problem description clearly with proper language and notations.
2. Design the algorithm with pseudo code and analyze the running time with accurate asymptotic notations.
3. Implement your algorithm using any programming language (Java, C++, Python, etc.) and illustrate the execution with an example input.
4. Document and upload your implementation codes to a public GitHub account.
5. Upload your presentation slides to Moodle.

The presentation is 12 minutes plus 2-3 minutes Q/A. Asking questions will get extra credit.

Problem: An independent set of a graph $G = (V, E)$ is a set $U \subseteq V$ of vertices such that there are no edges between vertices in U. Given a graph with node weights, the maximum-weigh independent set problem asks for the independent set of a given graph with the maximum total weight. In general, this problem is NP-hard. For this programming problem, you need to solve the problem on trees: given a tree with node weights, find the independent set of the tree with the maximum total weight. For example, the maximum-weight independent set of the tree in Figure 1 has weight 47.

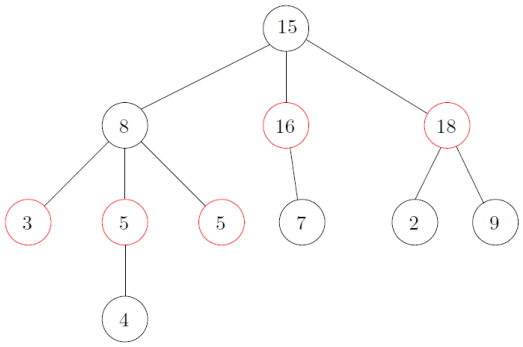

Figure 1: The maximum-weight independent set of the tree has weight 47. The red vertices give the independent set.

We assume that the nodes of the tree are $[n] = \{1, 2, 3, \ldots, n\}$. We root the tree at vertex 1, and for each vertex $i \in [2, n]$, the parent of i is a vertex $j < i$.

Input:

- The input is taken from the standard input (console).
- The first line of input contains one integer n, the number of vertices in the tree.
- The next n lines contain two integers each, where the i-th line contains two integers p_i and w_i, where p_i is the parent of i and w_i is the weight of i. We assume p_1 = 0, which is useless. For all $i \in [2, n]$, we have $1 \leq p_i < i$.

Output:

- The output is printed onto the standard output (console).
- You only need to output one integer, the weight of the maximum-weight independent set.

Example Input:	**Example Input (Continued)**:	**Example Output**:	This is the example from the problem description.
11 0 15 1 8 1 16 1 18 2 3	2 5 2 5 3 7 4 2 4 9 6 4	47	

Constraints:

- $1 \leq n \leq 10^6$.
- $1 \leq n \leq 10^6$ for every $i \in [n]$.
- It is expected that your program will terminate in 10 seconds.