Similar weighted binary rooted trees

First, let us introduce some simple notation.
Let x be a node in a binary rooted tree.
We denote the left child of x by the symbol $x.L$ and the right child of x by the symbol $x.R$.
If $x.L$ exists then by the symbol $x.wL$ we denote the weight of the edge $(x, x.L)$.
If $x.L$ does not exist then by the symbol $x.wL$ we denote the positive infinity $+\infty$.
If $x.R$ exists then by the symbol $x.wR$ we denote the weight of the edge $(x, x.R)$.
If $x.R$ does not exist then by the symbol $x.wR$ we denote the positive infinity $+\infty$.
Let us also denote the left subtree of x by the symbol x.LST and the right subtree of x by the symbol x.RST.
We remind you that any unempty subtree of a tree T consists of a node y in T and all descendants of y in T.

Let $T1$ and $T2$ be two edge-weighted binary rooted trees. Let us denote their respective roots by the symbols $R1$ and $R2$.
We say that $T1$ and $T2$ are **similar** and denote this fact by the symbol $T1 \sim T2$ if and only if one of the following conditions holds:
1. Both $T1$ and $T2$ are empty trees.
2. Both $T1$ and $T2$ are unempty and it holds that
   $(R1.\text{LST} \sim R2.\text{LST}) \ \&\ (R1.\text{RST} \sim R2.\text{RST}) \ \&\ (R1.wL = R2.wL) \ \&\ (R1.wR = R2.wR)$) OR
   $(R1.\text{LST} \sim R2.\text{RST}) \ \&\ (R1.\text{RST} \sim R2.\text{LST}) \ \&\ (R1.wL = R2.wR) \ \&\ (R1.wR = R2.wL)$).

If two edge-weighted binary rooted trees $T1$ and $T2$ are not similar we say that $T1$ and $T2$ are dissimilar.

The task
We are given an unempty edge-weighted binary rooted tree T. We have to find how many mutually dissimilar subtrees are there in T. We remind you that each tree is a subtree of itself and also that the empty tree is a subtree of any tree.

Input
There are more lines of input specifying an unempty edge/weighted binary rooted tree.
The first line contains an integer N representing the number of nodes in the tree, $1 \le N \le 10^6$. It is supposed that the nodes of the tree are labeled by integers from 0 to $N - 1$.
Next there are $N - 1$ lines of input, each line specifies one edge of the tree. Each line contains four integer values $N1$, D, $N2$, V in this order separated by spaces. Node with label $N1$ is the parent of the node with label $N2$, V is the weight of the edge $(N1, N2)$. Values of D can be only 0 or 1, if $D = 0$ then $N2 = N1.L$, if $D = 1$ then $N2 = N1.R$. All edge weights are positive integers not exceeding 10^9. The label of the root is not explicitly specified in the input, nevertheless, the label can be derived from the input list of edges.

Output
Output is a single text line containing one number which represents the number of mutually dissimilar subtrees of the input tree.

Example 1
Input
```
1
```

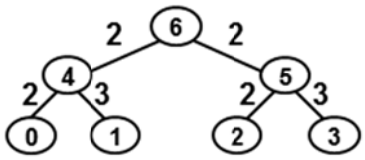
Output
```
2
```

Example 2
Input
```
5
0 1 1 20
1 1 2 30
2 1 3 40
3 1 4 50
```

Output
```
6
```

Example 3

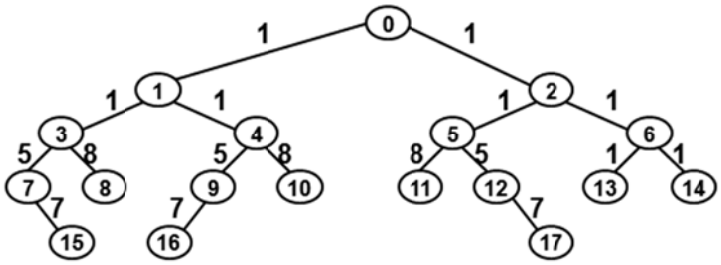
Input
```
7
6 0 4 2
4 0 0 2
4 1 1 3
6 1 5 2
5 0 2 2
5 1 3 3
```



Output
```
4
```

Example 4

Input
```
18
0 0 1 1
1 0 3 1
3 0 7 5
7 1 15 7
3 1 8 8
1 1 4 1
4 0 9 5
9 0 16 7
4 1 10 8
0 1 2 1
2 0 5 1
5 0 11 8
5 1 12 5
12 1 17 7
2 1 6 1
6 0 13 1
6 1 14 1
```



Output
```
8
```