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Box Assignment

METU CENG316 Spring 2021-2022
Practice of Algorithms

Start Date: March 24th, 2022
Due Date: April 6th, 2022
Due Time: 23:59

1 Problem

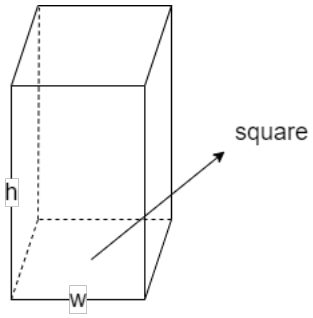
Claire loves collecting square-bottomed boxes and she creates a collection out of them. However, her mother complains a lot about Claire's hobby. She blames Claire for the boxes piling up and taking up too much space in the house. After her mother ran out of patience, she immediately asked her to get rid of the boxes, and Claire had no choice but to agree. Claire made only one tiny request from her mother, and she accepted it. The request was to keep one (1) box at home. Actually, Claire had another thought in mind. To save the boxes from being thrown as much as possible by putting a box inside of another box. Can you find the maximum number of boxes Claire can save?

2 Input

2.1 Template

$\mathtt{N}$
$\mathtt{W}^1$ $\mathtt{H}^1$
$\mathtt{W}^2$ $\mathtt{H}^2$
$\vdots$
$\mathtt{W}^N$ $\mathtt{H}^N$

$\mathtt{N}$ = Number of boxes
$\mathtt{W}^i$ = Width of a box
$\mathtt{H}^i$ = Height of a box



2.2 Limitations

$1 \leq \mathtt{N} \leq 500000$
$1 \leq \mathtt{W}^i \leq 2000000000$
$1 \leq \mathtt{H}^i \leq 2000000000$

3 Clarifications

- A box will fit into another box only if both its width and height is strictly smaller.
- When you open a box only one box should be seen inside. Claire cannot put two boxes directly inside another box.
- All inputs are integers.
- There can be many boxes with the same dimensions.
- The boxes can be given in any order.
- You cannot rotate a box for fitting inside of another box.

- Time limit: 1 seconds
- A solution with $O(N \log N)$ time is expected to get full points in this assignment. However, you can get partial points for a suboptimal solution. If you are unable to code the expected solution, please code a suboptimal one.
- Your solution is expected as a C++ program source that reads from the standard input and writes to the standard output.

4 Output

A positive integer number for the maximum number of boxes Claire can save.

4.1 Limitations

$1 \leq \texttt{Out} \leq \texttt{N}$

5 Samples

5.1 Sample1.in

```
3
10 5
5 4
12 4
```

5.2 Sample1.out

```
2 # Second box -> First box
```

5.3 Sample2.in

```
4
10 10
5 5
14 15
15 15
```

5.4 Sample2.out

```
3 # More than one solution. For Example; Second box -> First box ->
   Third box
```