E - Sort Arrays

Editorial (/contests/abc437/tasks/abc437_e/editorial)   ● / 🇬🇧

Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 450 points

Problem Statement

There are $N + 1$ sequences $A_0, A_1, \ldots, A_N$. A_i is defined as follows:

- A_0 is an empty sequence.
- A_i $(1 \le i \le N)$ is a sequence obtained by appending an integer y_i to the end of the sequence A_{x_i} $(0 \le x_i < i)$.

Find the permutation $P = (P_1, P_2, \ldots, P_N)$ of $(1, 2, \ldots, N)$ that satisfies the following condition:

- For $i = 1, 2, \ldots, N - 1$, one of the following holds:
  - A_{P_i} is lexicographically smaller than $A_{P_{i+1}}$.
  - $A_{P_i} = A_{P_{i+1}}$ and $P_i < P_{i+1}$

In other words, when $A_1, A_2, \ldots, A_N$ are arranged in lexicographical order (when there are multiple equal sequences, arrange those with smaller indices first), P is the sequence of indices that appears in that arrangement.

▶ What is the lexicographical order of sequences?

Constraints

- $1 \le N \le 3 \times 10^5$

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- $0 \le x_i < i$
- $1 \le y_i \le 10^9$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{array}{ll}
N & \\
x_1 & y_1 \\
x_2 & y_2 \\
\vdots & \\
x_N & y_N
\end{array}
$$

Output

Output $P_1, P_2, \ldots, P_N$ in one line, separated by spaces.

Sample Input 1   Copy

```
4
0 2
0 1
2 2
0 1
```

Sample Output 1   Copy

```
2 4 3 1
```

$A_1 = (2), A_2 = (1), A_3 = (1, 2), A_4 = (1)$, so $P = (2, 4, 3, 1)$.

Sample Input 2   Copy

```
5
0 1
0 1
0 1
0 1
0 1
```

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Sample Output 2

Copy

```
1 2 3 4 5
```

$A_1 = A_2 = A_3 = A_4 = A_5 = (1).$

Sample Input 3

Copy

```
10
0 305186313
1 915059758
0 105282054
1 696409999
3 185928366
3 573289179
6 254538849
3 105282054
5 696409999
8 168629803
```

Sample Output 3

Copy

```
3 8 10 5 9 6 7 1 4 2
```

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