NoodleCable Network Troubleshooting

In the labyrinthine corridors of the Computer Engineering Department of University of Peradeniya, data flows through the whimsical **"NoodleCable"** network, an intricate tree structure that keeps the department's digital infrastructure humming like a well-tuned algorithm.

This network is the brainchild of Dr. Asitha Bandaranayake, who is the head of the department's network administration team. With his knack for solving network enigmas, Dr. Bandaranayake is determined to keep the NoodleCable network in tip-top shape.

Lately, the NoodleCable network has been experiencing some peculiar hiccups. Dr. Bandaranayake believes that identifying the kth upstream device from a given device could be the key to resolving these issues with a touch of whimsy.

Your task is to create a program that assists Dr. Bandaranayake in his quest for network optimization. Given the NoodleCable network's unique topology and a set of queries, you must find the kth upstream device for each specified network device.

Input Format

The first line contains an integer n, denoting the number of nodes in the NoodleCable network. n lines follows each containing a pair of strings N_1, N_2 separated by spaces, denoting node names, describing which nodes have a direct connection between them. N_2 is the immediate upstream device of N_1. If N_2 is "**ROOT**", it is the root node of the NoodleCable network. The next line contains an integer q, the number of queries. q lines follow will contain a query. There are three types of queries you need to handle:

- **N X Y**: This query signifies a new leaf node **Y** added as a child of node **X**.
- **R X**: This query means leaf node **X** has been disconnected from the network.
- **F X K**: Dr. Asitha wants you to find the kth upstream device for device **X**.

You'll receive notifications whenever there's a change in the network structure due to experiments conducted by Akila and the network maintenance team.

NOTE: The name "**ROOT**" will only be used as a symbolic notation to denote the root node of the NoodleCable network and there'll be no real network device named as such in the network.

Constraints

$1 \leq n, q, K \leq 10^5$

Output Format

For each query type '**F**', you should output the K^{th} upstream device name of X. If there's no such device, output "**None**".

Sample Input 0

```
5
SpaghettiSwitch ROOT
MacaroniRouter SpaghettiSwitch
FusilliFirewall SpaghettiSwitch
RavioliServer FusilliFirewall
PennePrinter FusilliFirewall
7
N MacaroniRouter RotiniRouter
R RavioliServer
F RotiniRouter 2
N PennePrinter AngelHairRouter
N AngelHairRouter LinguiniLink
F LinguiniLink 3
F RavioliServer 10
```

Sample Output 0

```
SpaghettiSwitch
FusilliFirewall
None
```