Problem B: Bacteria

Advanced Algorithms for Programming Contests

Restrictions

Time: 2 seconds
Memory: 512 MB

Problem description

An old friend of you is currently doing research on the real time evolution of a certain species of bacteria for his PhD. As bacteria are generally very fast evolving, he is having trouble to keep track of their phylogenetic relationships. Since he can't really code himself, he asked you to write him a little program that would help with that.

To make the task a little easier, he decided to numerate the newly evolving species himself, so that the program only needs to work with integer identifiers of species, not the cryptic names they would receive by the conventional naming procedure.

Initially there is only the species he starts with, s.t. at this point the phylogenetic tree consists only of its root, vertex 1. In the following, all its descending species are added to the tree.

The program should be able to process the following kinds of queries:

- ADD a b

  denoting that species b has evolved from species a, i.e. the program needs to suspend a vertex b on vertex a (it is guaranteed that a already exists in the tree).

- GET a b

  requesting the index of the latest evolved species of which both a and b descended

The species will be numerated from 1 to N.

Input

The input consists of

- one line containing K $(0 \leq K \leq 10^6)$ – the amount of queries

- K lines each containing a query of one of the types described above.

Output

For every `GET` query output the correct response on a separate line.

Sample input and output

Input	Output
9	1
ADD 1 2	1
ADD 1 3	1
ADD 2 4	2
GET 1 3	5
GET 2 3	
GET 3 4	
ADD 2 5	
GET 4 5	
GET 5 5	