Croatian Open Competition in Informatics
Task Klasika
Round 4, January $18^{\text {th }} 2020$

## Task Klasika

In the beginning there was a node denoted as 1 and it represented the root of a tree. Your task is to support $Q$ queries of the form:

- Add x y - Adds a new node to the tree as a child of node $x$. The newly added node and node $x$ are connected with an edge of weight $y$. The newly added node is denoted by a number equal to the number of nodes that the tree consists of after its addition.
- Query a b-Finds the longest path in a tree which starts in node $a$ and ends in some node from the subtree of node $b$ (which itself is considered to be in its own subtree). The length of the path is defined as exclusive or (xor) of weights of all edges that the path consists of.


## Input

The first line contains an integer $Q(1 \leq Q \leq 200000)$ from the task description.
The $i$-th of the next $Q$ lines contains the $i$-th query whose format corresponds to one of the queries from the task description. Values $x, a$ and $b$ will refer to an existing node at that moment and value $y$ will not be greater than $2^{30}$.

## Output

You should output an answer to each query of type Query. Each answer should be printed in a separate line in the order in which corresponding queries appear in the input.

## Scoring

| Subtask | Score | Constraints |
| :---: | :---: | :--- |
| 1 | 11 | $Q \leq 200$ |
| 2 | 22 | $Q \leq 2000$ |
| 3 | 33 | In all queries of type Query it holds $b=1$ |
| 4 | 44 | No additional constraints. |

## Examples

| input | input | input |
| :---: | :---: | :---: |
| 4 | 6 | 10 |
| Add 15 | Add 15 | Add 14 |
| Query 11 | Add 27 | Add 19 |
| Add 17 | Add 14 | Add 110 |
| Query 11 | Add 43 | Add 22 |
|  | Query 11 | Add 33 |
| output | Query 24 | Add 44 |
| 5 |  | Query 42 |
| 7 | output | Query 13 |
|  | 7 | Add 67 |
|  | 2 | Query 13 |
|  |  | output |
|  |  | 14 |
|  |  | 10 |
|  |  | 13 |

