

Sightseeing

SEASON 7 – SECOND ROUND



Lora enjoys travelling and sightseeing. Currently she happens to be in a city that has N landmarks, with some of them connected through bidirectional roads. The total amount of bidirectional roads is exactly $N-1$, and they are chosen in such a way, so that you can reach every landmark from any other, possibly by following multiple roads. Travelling through a road can take different time for different roads.

Every day Lora chooses a few landmarks that she likes. She then wants to pick two of them and move from one of the two to the other. Since she loves travelling, among the chosen landmarks she picks such pair, so that travelling from one to the other takes as long as possible.

Due to weather changes, traffic jams, etc, the time it takes for Lora to go through one road may change. Your task is to write a program that helps Lora by supporting the following two types of queries:

- 1) “Q K $V_1 V_2 V_3 \dots V_K$ ” – Lora has chosen K different landmarks with number $V_1, V_2 \dots V_K$. You should print the longest time it would take to go from one landmark to another, assuming the pair is chosen optimally.
- 2) “U A B T” – Going through the road that is between A and B now takes time T.

Note: We consider all type-1 queries to be independent. That is, it doesn't matter where Lora has been before, we just assume she can always start from one of the two landmarks that she finally chooses.

Input

On the first line of the file `sightseeing.in` is a single number N – the amount of landmarks in the city. The following N lines describe the city. The i -th of them has three numbers - a_i, b_i and t_i , indicating that there is a bidirectional road between a_i and b_i and going through it takes time t_i .

Output

In the output file `sightseeing.out` print one line corresponding to each query of type-1 – the time it takes to take the longest route between two chosen landmarks.

Constraints

$$1 \leq N \leq 100\,000$$

$$1 \leq Q \leq 100\,000$$

$$1 \leq T, t_i \leq 1\,000$$

$$2 \leq K \leq N$$

$$1 \leq A, B, a_i, b_i \leq N$$

$$1 \leq \text{the sum of all } K \text{ in a single test} \leq 100\,000$$

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Time limit: 2.0 sec

Memory limit: 256 MB

Example test

Input (sightseeing.in)	Output (sightseeing.out)
6	6
1 2 1	14
1 3 2	100
2 4 1	
3 5 2	
1 6 1	
5	
Q 4 4 1 5 6	
U 6 1 10	
Q 4 4 1 5 6	
U 1 2 100	
Q 2 1 2	

Clarifications

In the first type-1 query, it takes the longest to move from landmark 4 to landmark 5.

In the second type-1 query, it takes the longest to move from landmark 6 to landmark 5.

In the final type-1 query, we have only a single choice for a pair, and that's the pair from landmark 1 to landmark 2.