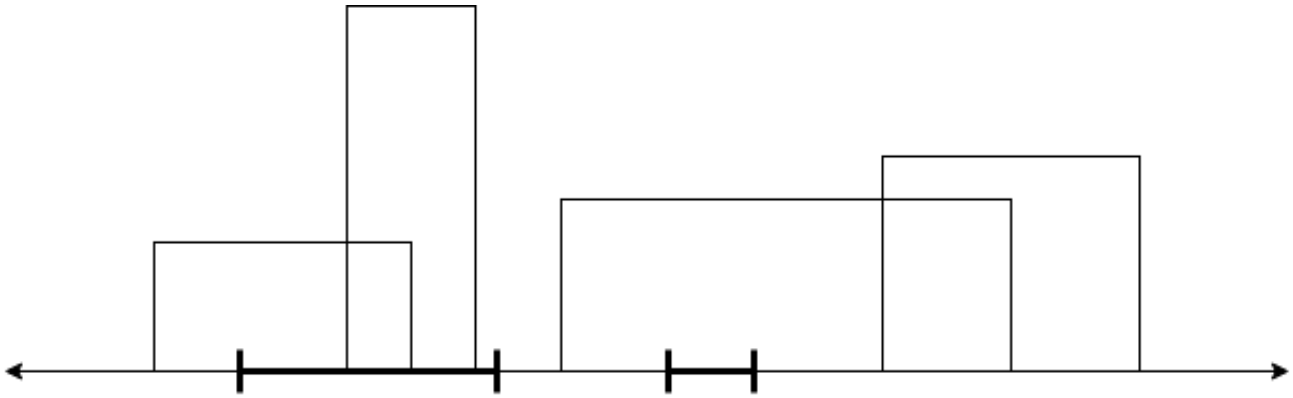
Problem A. Buildings and rockets

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3.5 seconds
Memory limit:	256 megabytes

Throughout history, Russian people have built many buildings in Moscow. Cathedral, theaters, hotels, amazing and expensive buildings which must not be damaged by any means. Their conservation would not be a problem if Russia was not one of the world leaders in rocket technology.

The launch pad is extremely close to the city, and the Russian people are worried about the possibility of collision. To avoid such a tragedy, there is a law which determines the minimum height in which the rockets must be launched. As opposed to most laws, this one is dynamic and changes every time a new building is built.

The city can be seen as a line, with the buildings as rectangles above it. The rocket trajectories can be seen as segments in this line. The safe height for a rocket is defined as the height of the tallest rectangle which intersects its trajectory. Hence, to find the minimum height a rocket must reach, it is enough to find the highest building in the path of the rocket. Note that there may be no buildings in a given path.



As the Russians do not have time for programming, they have trusted you with the task of writing a program that calculates the safe height for every launch, and which adapts itself according to the growth of the city. Good luck!

Input

The first line has an integer n which indicates the amount of events your program must deal with. Each of the following lines describe an event, which can be of two kinds: a new building has been built, or a rocket must be launch. Initially, the city has no buildings at all.

If the event is a new building, the line will be of the form `B` a_s b_s a_t b_t h, indicating that there is a new building which starts at $\frac{a_s \oplus v}{b_s \oplus v}$ (inclusive), ends at $\frac{a_t \oplus v}{b_t \oplus v}$ (inclusive), and has height $h \oplus v$, where v is the last output your program has printed. ($v = 0$ if nothing has been printed).

If the event is a rocket launch, the line will be of the form `S` a_s b_s a_t b_t, indicating there is a rocket whose trajectory starts at $\frac{a_s \oplus v}{b_s \oplus v}$ (inclusive) and ends at $\frac{a_t \oplus v}{b_t \oplus v}$ (inclusive), where v is the last output your program has printed. (Once again, $v = 0$ if nothing has been printed).

Constraints

- $1 \leq n \leq 10^5$
- $1 \leq a_s, b_s, a_t, b_t, h \leq 2^{32}$
- a_s, b_s, a_t, b_t, h are integers
- It is guaranteed that not segment is empty or degenerated

Note: $\oplus$ stands for the bitwise XOR.

Output

For every rocket launch, print in the standard output the safe height for the launch of this rocket, considering the state of the city up until the launch.

Examples

standard input	standard output
6 B 1 2 3 2 4 S 1 2 101 200 S 7 6 297 204 S 5 5 97 96 S 14 5 15 5 S 0 1 1 4	4 4 4 0 0
16 B 17 20 79 23 100 S 4 10 19 21 S 88 119 0 115 B 66 113 75 112 76 S 67 113 73 112 B 66 113 75 112 218 S 67 113 73 112 S 142 170 228 169 S 218 114 130 113 B 70 23 90 22 40 S 80 23 100 1 B 34 60 59 60 164 S 58 60 53 60 S 158 152 164 153 S 173 170 191 191 S 141 141 154 153	100 100 100 190 100 0 40 140 190 140 100