Assignment 2

(60 marks)

Problem Statement:

There has been a bank robbery of epic proportions. We would like to check if the getaway vehicle used by the bank robbers passed through the intersection that we are monitoring.

We know the numberplate of the vehicle that was used. However, it is very likely that the robbers switched the vehicle before they reached our intersection. Intelligence reports tell us that the robbers purchased several vehicles from a single showroom at the same time, and hence they all have sequential numberplates.

We would like to find the number that is immediately higher (successor) or immediately lower (predecessor) than the getaway vehicle's number to try and catch one of their other vehicles too.

Input Format:

- The first line of the input will give a list of distinct numberplates $a_1, a_2, \ldots, a_n$ with each a_i separated by space. This line ends with a `\n` character.
- Every line that follows either starts with an `S`, `<` or `>` and is followed by a space and a number m. Each such line ends with a `\n` character.
- End of input is indicated by EOF character.

Output:

No output on receiving the first line. Insert $a_1, a_2, \ldots, a_n$ into an empty BST in the order given.

If input line is `S m`, then output according to previous assignment document.

If input line is `< m`, then:

- Output the predecessor of m in the set followed by `\n`. If predecessor does not exist, then output "0" followed by `\n`.

If input line is `> m`, then:

- Output the successor of m in the set followed by `\n`. If successor does not exist, then output "0" followed by `\n`.

Your program should terminate only after reading EOF.

Implementation Rules:

- All operations have to be done on the BST.
- Your successor and predecessor functions should use the algorithms discussed for them.
- When asked to find the predecessor (or successor) of m, the element m itself might not be in the set! You still need to find the immediate smaller or higher element.
- Start with your own submission from previous assignment and add to it/modify it suitably to solve this assignment.