D-Structure

Now you are about to complete the Data-Structures course (hopefully :P).
Here you have to design a data-structure such that it supports the following operations.
Insert(S, x) => if x is not present in S, Insert x into S
Delete(S, x) => if x is present in S, Delete x from S
K(S) => return the k-th smallest element of S
Count(S, x) => return number of elements smaller than x in S

Constraints:

-10^9 <= x <= 10^9
Time = 2 sec

Input:

Line 1: Q (1 ≤ Q ≤ 200000), the number of operations

In the next Q lines, the first token of each line is a character I, D, K or C meaning that the corresponding operation is Insert, Delete, K or Count, respectively, following by a whitespace and an integer which is the parameter for that operation say x.

Output:

For each query of type K and C output the corresponding answer in a separate line. If k is larger than number of elements in the set output “invalid”.
Sample Input 1:
8
I -1
I -1
I 2
C 0
K 2
D -1
K 1
K 2

Sample Output 1:
1
2
2
invalid