Assignment on Red Black Tree

A super-computer named TEUB has many running processes. Each process has a priority x. Two active processes in TEUB cannot have equal priorities. When a process finishes its task, it gets terminated. Sometimes, the programmers of TEUB want to know how many running processes have priorities less than y. The programmers hired you to help them using Red-Black tree.

The input has four types of commands.

- Initiation of a program
- Termination of a program
- Searching for a program
- Find the programs with less priority

Input

First line of input shows the total number of commands (N).
Each of the following N commands, has two integers $e_i \; and \; x_i$.

e_i	Meaning
0	Terminate the program with priority x_i.
1	Initiate a program with priority x_i.
2	Search the program with priority x_i.
3	Find the number of programs with priority less than x_i.

Output

First line of input shows the total number of output lines.
For each command, you have to print three integers e_i , $x_i \; and \; r_i$.

r_i signifies the result of the corresponding command.

e_i	r_i
0	1 if successful termination. 0 if there is no program with priority x_i
1	1 if successful initiation 0 if there is already a program with priority x_i
2	1 if found 0 if not found

3	The number of programs with priority $< x_i$.

Sample I/O

Sample Input	Sample Output	Explanation
11 1 1 1 2 1 3 1 1 0 1 0 4 2 3 2 5 1 1 3 3 3 6	11 1 1 1 1 2 1 1 3 1 1 1 0 0 1 1 0 4 0 2 3 1 2 5 0 1 1 1 3 3 2 3 6 3	Line count Successful initiation 1 Successful initiation 2 Successful initiation 3 Same priority (1) exists Successful termination 1 No priority (4) exists Priority 3 found Priority 5 not found Successful initiation 1 2 programs having priority < 3 3 programs having priority < 6

Constraints

$1 \leq N \leq 10^5$

$1 \leq x_i \leq 10^6$

$0 \leq e_i \leq 3$

Each of the commands has to be answered in logarithmic time.

More instructions

- Write the program in such a way to accept input from file
- Write Red-Black tree codes in such a way that it can be reused for other tasks during online evaluation.

Submission

- Include only source files
- Do not include executable binaries, input/output files
- Place your files in a folder named 1905XXX
- Zip the folder
- Submit to Moodle after renaming it to 1905XXX.zip