

# Purrfect Tree

## Problem ID: purrfect

Once upon a time in a feline kingdom named Catville, there lived a wise old cat named Whiskers. Whiskers was not just any ordinary cat; he was the guardian of the mystical Data Structure Forest. This forest was home to magical trees that held the secrets of Catville's prosperity.

Each tree was a towering structure with branches that reached out like arms, embracing the land with their knowledge. The leaves of these trees were not green but shimmered in shades of silver and gold, representing the data values they held within.

The cats of Catville often came to Whiskers with questions about the forest's data. Some wanted to know the maximum value within a specific range, Many wanted to know the addition sums of specified ranges, while others sought to update the value of a particular leaf node. Whiskers, being the wise guardian, knew exactly how to handle these queries and updates using his magical tree powers.

Now that Whiskers has become an old and tired cat he needs your help to answer the queries of the cats from Catville. Can you help him?

“ This story was hallucinated by chatGPT and is not based on any real events. Credit goes to OpenAI. ”



Whiskers the cat in the Data Structure Forest (Image by MidJourney)

## Input

The input starts with a line of two integers  $N, O$

$0 < N \leq 100000$

$0 < O \leq 100000$

The next line contains  $N$  integers  $0 \leq a_i < 100$  representing the values of the starting array.

The next  $O$  lines contain operations in the form:

- $U\ p\ v$  where  $0 \leq p < N$  and  $0 \leq v < 100$  representing the update of the value at index  $p$  to  $v$ .
- $S\ l\ r$  where  $0 \leq l < r \leq N$  representing the query of the sum of the values from index  $l$  to  $r$ , being exclusive on  $r$ .
- $M\ l\ r$  where  $0 \leq l < r \leq N$  representing the query of the maximum value from index  $l$  to  $r$ , being exclusive on  $r$ .

The inputs will not have leading 0's so 01 is not a valid input string.

## Output

The output should contain the results of the query operations (Max queries M and Sum queries S) in the order they were given in the input.

### Sample Input 1

```
7 4
5 8 7 2 10 2 2
M 0 3
U 1 3
M 0 4
S 2 6
```

### Sample Output 1

```
8
7
21
```

**Sample Input 2**

```
10 8
8 82 19 10 50 23 78 10 8 99
S 0 10
M 0 10
U 9 25
U 3 10
M 5 10
U 5 8
S 0 4
S 5 9
```

**Sample Output 2**

```
387
99
78
119
104
```