CS1020E | Lab 8 | Exercise 1

Cake

Objectives

The objectives of this exercise are to test the understanding of **time complexity** and to practice how to use a **queue** to solve some problems more efficiently.

Problem Description

Good news: your friend has a big chocolate cake.
Bad news: some parts of the cake have raisins, and you hate raisins.

The cake is of size 1 x *N*, and can be viewed as *N* pieces, each of size 1 x 1. Each piece has a certain amount of chocolate, and each piece may have raisins.

Your friend has told you to cut out a **contiguous** part of the cake, and you want to maximize the amount of chocolate that you bring home. However, since you don't like raisins, there is a limit on the number of pieces with raisins that you want to bring home.

So, what is the maximum amount of chocolate that you can take home? Write a program to answer that for you.

Add your code only to the parts of the file indicated. Do not modify any other part of the given code, and do not add new files.

Inputs

The first line contains *N* (where $0 < N <= 100000$) and *C* (where $C >= 1$), the total number of pieces of cake and the maximum number of pieces with raisins that you are willing to take.

Next, *N* lines follow, and each line contains a character *T* and an integer *X*, where *T* is 'R' (for raisins) if the piece has raisins on it, or 'C' (for chocolate-only) if it does not. *X* denotes the amount of chocolate on that piece.

Outputs

The maximum amount of chocolate that you can take home.

Sample Input 1

```
5 2
R 10
C 2
R 3
C 4
R 5
```

Sample Output 1

```
19
```

Sample Input 2

```
5 3
R 10
C 2
R 3
C 4
R 5
```

Sample Output 2

```
24
```

Explanation

In the first sample, you can take at most two pieces that have raisins. Taking the first to fourth pieces will give you 19 units of chocolate, while taking the second to fifth will give you 14. Taking all five pieces is not an option since you will take 3 pieces that have raisins.

In the second sample, you can take the whole cake since you can take 3 pieces of cake with raisins.

Additional Requirements

- For every given test case, the output integer is guaranteed to be less than 2^{31}.

- An efficient program is required. Specifically, the time complexity should be O(N). You would get **at most 50% of the marks** if your program's time complexity is worse than O(N).

Submission

You need to submit your completed **Cake.cpp** to CodeCrunch (https://codecrunch.comp.nus.edu.sg/) before the specified deadline. We will take only your latest submission.

Late submissions will not be accepted. The submission system in CodeCrunch will automatically close at the deadline.