COMP 6651: Algorithm Design Techniques
Winter 2016: Programming Assignment 2

1   Problem

You are given an array of N elements which are initialized to 0. You are given a sequence of M operations of the sort (p, q, r). The operation (p, q, r) signifies that the integer r should be added to all array elements $A[p], A[p+1], \ldots, A[q]$. You are to output the maximum element in the array that would result from performing all M operations. There is a naive solution that simply performs all operations and then returns the maximum value, that takes $O(MN)$ time. We are looking for a more efficient algorithm.

2   Input

The first line will have two integers N and M separated by a space. The next M lines each have 3 integers separated by spaces. The input can be assumed to obey the following constraints:

$3 \leq N \leq 10^7$
$1 \leq M \leq 2 * 10^5$
$1 \leq p \leq q \leq N$
$0 \leq r \leq 10^9$

3   Output

The output should be a single line containing the required maximum value.

4   Example

Sample Input
6 3
1 3 200
2 5 50
3 6 100

Sample Output

350

Explanation

The array has 6 elements initialized to 0, and there will be 3 operations.
After the first operation, the array would be $[200, 200, 200, 0, 0, 0]$.
After the second operation, the array would be $[200, 250, 250, 50, 50, 0]$.
After the third operation, the array would be $[200, 250, 350, 150, 150, 100]$.
So the required answer is the maximum value in the array, which is 350.

5   Requirements

For the constraints given above, your program should run in 1 second. You must submit source code for a program written in C/C++/Java on the Electronic Assignment System. Some test cases will be provided on the course website. You can verify if your program works on the test cases before submitting.

6   Programmer-on-duty

There will be a programmer-on-duty, Tejas Puranik, available to help you with the assignment on Wednesdays 6pm to 9pm in H841.