# Hash Me Out

## Assignment 5
### Data Structures and Algorithms

**Problem Statement:**   You have a container C, which is initially empty. You have to perform 3 types of operations :

1. Add number x to the container C

2. Delete number exactly one occurrence of x from the container C if it there in the container, otherwise do not do anything

3. Compute the hash of the container C

Hash function is defined as :
$$hash = \sum a * P^{rank(a)}$$

where sum iterates over all elements of the container and $rank(a)$ is defined as the number of elements from the container which are not greater than $a$.

**Input**
First line of input contains two integers denoting the number of operations $Q$ and the value $P$.
$(1 \leq Q, P \leq 10^6)$.
$Q$ lines will be followed, each one containing one of the following three operations :
$A\ x$ : Add element $x$ to the container $(0 \leq x \leq 10^9)$
$D\ x$ : Delete element $x$ from the container
$H$ : Compute the hash of the container
**Output**
For each operation of type $H$, output the hash of the container in new line. Since this value can be large, print its modulus $10^9 + 7$.
**Constraints**
$1 \leq Q, P \leq 10^6$
$0 \leq x \leq 10^9$
**Time Limit**: 4 seconds
**Memory Limit**: 256 MB

**Sample Test Case**

| Input | Output |
|---|---|
| 6 2<br>A 1<br>A 2<br>H<br>A 3<br>D 2<br>H | 10<br>14 |
| 11 2<br>A 3<br>A 2<br>A 3<br>A 2<br>H<br>D 2<br>D 3<br>H<br>D 2<br>A 1<br>H | 112<br>16<br>14 |

**Explanation**

For first test case :

Third operation will compute hash as following:

$1 * P^{rank(1)} + 2 * P^{rank(2)} = 1 * 2^1 + 2 * 2^2 = 10$

Sixth operation will compute hash as following:

$1 * P^{rank(1)} + 3 * P^{rank(3)} = 1 * 2^1 + 3 * 2^2 = 14$