Graph Connectivity

Time Limit: 8000MS Memory Limit: 131072K

Case Time Limit: 3000MS

Description

Let us consider an **undirected** graph G = < V, E >. At first there is no edge in the graph. You are to write a program to calculate the connectivity of two different vertices. Your program should maintain the functions inserting or deleting an edge.

Input

The first line of the input contains an integer numbers N (2 <= N <= 1000) -- the number of vertices in G. The second line contains the number of commands Q (1 <= Q <= 20000). Then the following Q lines describe each command, and there are three kinds of commands:

I u v: Insert an edge (u, v). And we guarantee that there is no edge between nodes u and v, when you face this command.
D u v: Delete an existed edge (u, v). And we guarantee that there is an edge between nodes u and v, when you face this command.
Q u v: A querying command to ask the connectivity between nodes u and v.

You should notice that the nodes are numbered from 1 to N.

Output

Output one line for each querying command. Print "Y" if two vertices are connected or print "N" otherwise.

Sample Input

```
3
7
Q 1 2
I 1 2
I 2 3
Q 1 3
```

```
D 1 2
Q 1 3
Q 1 1
```

Sample Output

```
N
Y
N
Y
```