

## 6414 Encyclopaedia of Equality

Edith has planned for her “*Encyclopaedia of Equality*” to have the property that all volumes of the encyclopaedia have exactly the same length. As a result, editing one article occasionally raises the need for shuffling of articles between the volumes to restore the equality of lengths. Edith has found that the shuffling of articles makes it impossible to maintain the article names in alphabetically sequential order through the encyclopaedia. For example, a volume may contain the articles from *Cockroach* to *Demagogue* and from *Ethiopia* to *Finger* and an article on *Oysters*, while another volume may contain an article on *Democracy*.

Edith wants to name each volume with the minimum number of alphabetically sorted sequential article ranges, separated by ‘,␣’. A range is either a single article name, or the first and last article name in the range separated by ‘␣-␣’. The symbol ‘␣’ indicates a single space. Examples of volume names are:

- *Democracy*
- *Cockroach␣-␣Demagogue,␣Ethiopia␣-␣Finger,␣Oyster*

Edith tried to manually update the volume names when she shuffled some articles, but this proved to be too laborious. Your task is to write a program that updates volume names after a reshuffle of articles.

### Input

The first line of input contains two integers  $M$  and  $N$ , separated by a single space, on a line by themselves.  $M$  is the number of articles in the encyclopaedia and  $N$  is the number of test cases, where  $0 \leq M \leq 1000000$  and  $0 \leq N \leq 1000$ .

The second line contains  $M$  words separated by single spaces and sorted in increasing alphabetical order. Each word is the name of an article in Edith’s encyclopaedia and consists of a sequence of alphabetic characters.

The rest of the input contains a series of  $N$  test cases. The first line in each test case begins with the word ‘START’ followed by an initial volume name. Subsequent lines consist of one of the following options:

- A line starting with ‘ADD’ followed by the article ranges, separated by ‘␣’, to be added to the volume. Articles to be added may already exist in the volume name.
- A line starting with ‘REMOVE’ followed by the article ranges, separated by ‘␣’, to be removed from the volume. Articles are not necessarily included in the volume before they are removed.
- A line that contains the single word ‘END’ that indicates the end of the test case.

In each ADD or REMOVE line, there are at most 50,000 ranges. The ranges are not necessarily sorted alphabetically but the second article name in a range will always occur after the first article name in alphabetical order. Also the ranges are not necessarily specified minimally but they do not overlap.

### Output

The output consists of a single line, for each test case, which contains the properly formatted minimum volume name after all the ADD and REMOVE updates have been performed.

**Sample Input**

```
10 2
Cockroach Costume Demagogue Democracy Demonstration Eagle Ethiopia Finger Helicopter Oyster
START Cockroach - Demagogue, Ethiopia - Finger, Oyster
ADD Democracy - Demonstration
REMOVE Oyster
END
START Costume - Eagle
REMOVE Eagle, Costume
END
```

**Sample Output**

```
Cockroach - Demonstration, Ethiopia - Finger
Demagogue - Demonstration
```