

# Assignment 2

APRG TAs

February 2023

## Question 1

The first line of the input will contain a single integer  $Q$ . You have to handle  $Q$  queries.

For the queries, you will have to maintain a multiset  $S$  of lower case strings and answer queries on it. Initially  $S = \emptyset$

Each query can be of two types:

1. ADD  $s$  - set  $S = S \cup s$
2. ANS  $s$  - output the number of strings in  $S$  that contain  $s$  as a prefix.

Sample Input:

```
6
ADD abcdef
ADD bde
ANS ab
ADD abra
ANS ab
ANS b
```

Sample Output:

```
1
2
1
```

NOTE: For this problem, we are expecting a solution with time complexity  $O(n)$  where  $n$  is the total length of strings in queries; However, partial marks may be awarded for suboptimal solutions.

You may want to read about the Trie data structure for this problem:  
<https://en.wikipedia.org/wiki/Trie>

## Question 2

You are given the details of a football match.

The first line contains a single integer  $N$  denoting the number of lines of input.

Each line contains is in one of the following formats:

1.  $X$  passed to  $Y$
2.  $X$  took a shot at goal
3.  $X$  tackled  $Y$
4.  $X$  intercepted the pass
5. Shot missed
6. Goal!

For each player, output the following 6 numbers on the same line, separated by spaces:

1. The number of goals scored by  $X$ . A player  $X$  is said to have scored the goal if, on consecutive lines, " $X$  took a shot at goal" and "Goal!".
2. The number of assists by  $X$ . A player  $X$  is said to have assisted the goal if, on consecutive lines, " $X$  passed to  $Y$ ", " $Y$  took a shot at goal", and "Goal!".
3. The number of passes completed by  $X$ . A player  $X$  is said to have completed the pass if " $X$  passed to  $Y$ " and the next line is not of type 4.
4. The number of passes failed by  $X$ . A player  $X$  is said to have failed a pass if " $X$  passed to  $Y$ " and " $Z$  intercepted the pass" on the next line.
5. The number of times possession was lost by  $X$ . A player  $X$  is said to have lost possession if " $Y$  tackled  $X$ ".
6. The number of tackles completed by  $X$ . A player  $X$  is said to have completed a tackle if " $X$  tackled  $Y$ ".

Do this in alphabetical order of player names.

Sample Input:

```
11
Rashford passed to Fernandes
Fernandes passed to Antony
Antony passed to Weghorst
```

Walker intercepted the pass  
Walker passed to Mahrez  
Mahrez passed to Haaland  
Martinez tackled Haaland  
Martinez passed to Shaw  
Shaw passed to Rashford  
Rashford took a shot at goal  
Goal!

Sample Output:

```
0 0 0 1 0 0
0 0 1 0 0 0
0 0 0 0 1 0
0 0 1 0 0 0
0 0 1 0 0 1
1 0 1 0 0 0
0 1 1 0 0 0
0 0 1 0 0 0
0 0 0 0 0 0
```

Explanation:

The sorted order of player names is:

Antony  
Fernandes  
Haaland  
Mahrez  
Martinez  
Rashford  
Shaw  
Walker  
Weghorst

You can verify these stats.

NOTE: For this problem, we are expecting a solution with time complexity  $O(n)$  or  $O(n \log n)$  where  $n$  is the total length of strings in queries; However, partial marks may be awarded for suboptimal solutions.