NOI '17 P4 - Game

Time limit: 2.0s **Memory limit:** 128M

Background

Asphalt is Little L's favorite game. Different from other amateur players, Little L is good at studying game design while playing games, so he has a unique game strategy.

Title Description

Little L plans to play n games, each game uses a map, and Little L will choose a car to complete the game on this map.

Little L has three racing cars, represented by capital letters A, B, and C. There are four types of maps, represented by lowercase letters x, a, b, and c.

Among them, car A is not suitable for use on map a, car B is not suitable for use on map b, car C is not suitable for use on map c, and map x is suitable for all cars to participate in.

There aren't many maps available for all racers, only d maps at most.

n The map of the game can be described by a string composed of lowercase letters. For example: $S =$ `xaabxcbc` means that little L plans to play 8 games, in which the map type of the 1 and 5 games is x, suitable for all racing cars, the 2 and 3 maps are a, not suitable for racing cars A, and the 4 and 7 games are b, not suitable for racing cars B, 6 and 8 maps are c, not suitable for racing C.

Little L has some special requirements for the game. These requirements can be described by the 4-tuple (i, h_i, j, h_j), which means that if the car with the model h_i is used in the i game, then the car with the model h_j should be used in the j game.

Can you help little L choose the car to use for each game? If there are multiple schemes, output any one of them.

If there is no solution, output `-1`.

Input Specification

The first line of input contains two non-negative integers n, d.

Enter the second line as a string S.

The meanings of n, d, S are described in the title, where S contains n characters, and exactly d of them are lowercase letters x.

Enter a positive integer m in the third line, indicating that there are m car rules.

The next m lines, each line contains a quaternion i, h_i, j, h_j , where i, j are integers, and h_i, h_j are characters A , B or C, see the title description for the meaning.

Output Specification

Output one line.

Output `-1` if there is no solution.

If there is a solution, it contains a string of length n containing only capital letters A, B, and C, indicating how the little L arranges the use of the car in this n game. If there are multiple sets of solutions, just output any one of them.

Sample Input 1

```
3 1
xcc
1
1 A 2 B
```

Sample Output 1

```
ABA
```

Explanation for Sample Output 1

Little L plans to play 3 games, where 1 map type is x, which is suitable for all cars, and 2 and 3 maps are c, which is not suitable for car racing C.

Little L Wish: If 1 game uses car A, then 2 game uses car B.

Then arranging cars A, B, A for the 3 games respectively would satisfy all the conditions.

All conditions are also met and considered correct if the car is assigned BBB or BAA for 3 games in turn.

However, when the car is arranged sequentially as AAB or ABC, it is not considered the correct answer because all conditions cannot be met.

Sample Input / Output 2

See attached file for details.

Constraints

Test case	n	d	m	other properties
1	≤ 2	0	≤ 4	None
2	≤ 2	$\leq n$	≤ 4	None
3	≤ 5	0	≤ 10	None
4	≤ 5	$\leq n$	≤ 10	None
5	≤ 10	0	≤ 20	None
6	≤ 10	≤ 8	≤ 20	None
7	≤ 20	0	≤ 40	S contains only c
8	≤ 20	0	≤ 40	None
9	≤ 20	≤ 8	≤ 40	S contains only x or c
10	≤ 20	≤ 8	≤ 40	None
11	≤ 100	0	≤ 200	S contains only c
12	≤ 100	0	≤ 200	None
13	≤ 100	≤ 8	≤ 200	S contains only x or c
14	≤ 100	≤ 8	≤ 200	None
15	$\leq 5 \times 10^3$	0	$\leq 10^4$	None
16	$\leq 5 \times 10^3$	≤ 8	$\leq 10^4$	S contains only x or c
17	$\leq 5 \times 10^3$	≤ 8	$\leq 10^4$	None
18	$\leq 5 \times 10^4$	0	$\leq 10^5$	None
19	$\leq 5 \times 10^4$	≤ 8	$\leq 10^5$	S contains only x or c
20	$\leq 5 \times 10^4$	≤ 8	$\leq 10^5$	None