Shortest Path Revisited

Problem Statement

You are given a weighted, undirected graph G. The nodes of G are enumerated by integer numbers from 1 to N, inclusively. Find the length of the shortest path from the node numbered 1 to the node numbered N.

Piece of cake, isn't it? So, let's apply one more condition.

Each edge in the graph has its own **tag** - a lowercase Latin letter. Now, a string obtained by writing out the tags of the edges of the path should be a substring of the given string S.

Whenever you move by the edge, the weight of this edge gets multiplied by the number of occurrences of the string formed by the tags of already travelled edges (including the new one) in the string S.

Could you now find the length of the shortest path from the 1^{st} node to the N^{th}?

Input Format

The first line contains two space separated integers N and M, denoting the number of nodes and the number of edges in the graph G, respectively.

The following M lines contain three integers X_i Y_i Z_i, followed by a single space, and a lowercase English letter C_i. This denotes that there is a bidirectional edge between the ${X_i}^{\text{th}}$ node and the ${Y_i}^{\text{th}}$ node with a weight of Z_i and a tag C_i.

The next line contains a lowercase English letter string S.

Constraints

- $2 \le N \le 1000$
- $1 \le M \le 6 \times 1000$
- $1 \le X_i, Y_i \le N$
- $1 \le Z_i \le 10^3$
- $1 \le |S| \le 1000$
- S consists only of lowercase Latin letters.
- There is at least one path from the 1^{st} node to the N^{th}, satisfying the given constraints.

Output Format

Output a single line: The length of the shortest path under the given conditions.

Sample Input

```
3 3
1 2 3 a
2 3 4 b
1 3 5 c
aabb
```

Sample Output

```
10
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Explanation

The shortest path is $1 \to 2 \to 3$. It uses the first and the second edge, so the length of this path is 10. The string obtained by concatenation of the edges' tags is ab, and it's a substring of the string S=$aabb$.

There is also a direct path $1 \to 3$, which uses the third edge, and has the length of 5. However, the string obtained by the concatenation of edges' tags for this path is c, which is not a substring of S=$aabb$.

Now, let's explain how we got 10:

- When we moved by the first edge from the 1^{st} node to the 2^{nd}, the string formed by concatenation of the travelled edges' tags (including this edge) was a. It occurred 2 times in the string S=$aabb$, thus the edge's length got multiplied by 2. So, the length of this edge was $3 \times 2 = 6$.
- Then, we moved by the second edge from the 2^{nd} node to the 3^{rd}. The string formed by concatenation of the travelled edges' tags (including this edge) was ab. It occurs 1 time in the string S=$aabb$, thus the edge's length got multiplied by 1. So, the length of this edge was $4 \times 1 = 4$.
- We've reached the N^{th} node. The total travelled distance is $6 + 4 = 10$.

Thus, the answer to the problem is 10.