E - Hit and Away

Editorial (/contests/abc429/tasks/abc429_e/editorial)

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Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 450 points

Problem Statement

You are given a simple connected undirected graph G with N vertices and M edges.
The vertices and edges of G are numbered as vertices $1, 2, \ldots, N$ and edges $1, 2, \ldots, M$, respectively, and edge i connects vertices U_i and V_i.
You can move bidirectionally between vertices connected by an edge in time 1.

Additionally, each vertex is either safe or dangerous, and this state is given by a string S of length N consisting of S and D.
Specifically, vertex i is safe when the i-th character $(1 \leq i \leq N)$ of S is S, and vertex i is dangerous when it is D.
It is guaranteed that there are at least two safe vertices and at least one dangerous vertex.

For each dangerous vertex v, find the following value:

> The minimum possible time to start from some safe vertex, pass through v, and move to a safe vertex **different from the starting vertex**.

Constraints

- $3 \leq N \leq 2 \times 10^5$
- $N - 1 \leq M \leq 2 \times 10^5$

- $1 \leq U_i, V_i \leq N$
- $U_i \neq V_i$
- If $i \neq j$, then $\{U_i, V_i\} \neq \{U_j, V_j\}$.
- S is a string of length N consisting of S and D.
- N, M, U_i, V_i are all integers.
- G is connected.
- There are at least two safe vertices.
- There is at least one dangerous vertex.

Input

The input is given from Standard Input in the following format:

$$
\begin{array}{ll}
N & M \\
U_1 & V_1 \\
U_2 & V_2 \\
\vdots & \\
U_M & V_M \\
S &
\end{array}
$$

Output

Let K be the number of dangerous vertices in G, and print K lines.
On the i-th line $(1 \leq i \leq K)$, print the answer for the i-th dangerous vertex when the dangerous vertices are arranged in ascending order of vertex number.

Sample Input 1 Copy

Copy

```
5 5
1 2
1 3
2 3
3 4
4 5
SSDDS
```

Sample Output 1 Copy

Copy

```
2
3
```

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The dangerous vertices are (in ascending order of vertex number) vertices 3 and 4.

For vertex 3, moving from vertex $1 \rightarrow$ vertex $3 \rightarrow$ vertex 2 (for example) satisfies the condition.
The time required for this movement is 2, and this is the minimum.
Therefore, print 2 on the 1st line.

For vertex 4, moving from vertex $1 \rightarrow$ vertex $3 \rightarrow$ vertex $4 \rightarrow$ vertex 5 (for example) satisfies the condition.
The time required for this movement is 3, and there is no way to move that satisfies the condition with time 2 or less, so this is the minimum.
Therefore, print 3 on the 2nd line.

Sample Input 2 Copy

Copy

```
3 2
1 2
2 3
SSD
```

Sample Output 2 Copy

Copy

```
3
```

The dangerous vertex is vertex 3.

Moving from vertex $1 \rightarrow$ vertex $2 \rightarrow$ vertex $3 \rightarrow$ vertex 2 (for example) satisfies the condition.
The time required for this movement is 3, and this is the minimum.
Note that movements such as vertex $2 \rightarrow$ vertex $3 \rightarrow$ vertex 2 do not satisfy the condition that the destination is "different from the starting vertex".

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