LeetCode Challenge: ddakji

Problem Description

A *ddakji* is a grid with four symbols drawn on its top face, arranged as follows:

$$A \quad B$$
$$C \quad D$$

The bottom face of the ddakji is blank. The ddakji can be flipped **vertically** or **horizontally**, as described below:

- A **vertical flip** (V) is peformed as shown:

$$\begin{matrix} A & B \\ C & D \end{matrix} \overset{\text{V}}{\to} \begin{matrix} C & D \\ A & B \end{matrix}$$

- A **horizontal flip** (H) is performed as shown:

$$\begin{matrix} A & B \\ C & D \end{matrix} \overset{\text{H}}{\to} \begin{matrix} B & A \\ D & C \end{matrix}$$

The ddakji starts in its original orientation:

$$A \quad B$$
$$C \quad D$$

You are given a string of flips, consisting of the characters V (vertical flip) and H (horizontal flip), such as VVHVVHHHHHVVVVV.

1. Determine the number of times the ddakji returns to its original orientation, including the starting position.

2. Output the final orientation of the ddakji after all the flips.

Input Format

A single string S of length $1 \leq |S| \leq 10^5$, consisting only of the characters V and H.

Output Format

1. An integer N, the number of times the ddakji is in its original orientation.

2. The final orientation of the ddakji in a 2×2 grid format.

Sample Input

VVHVVHHHHHVVVVV

Sample Output

```
6
C D
A B
```

Explanation

The sequence of flips alternates the orientation of the ddakji. After every flip, the state is checked to see if it matches the original orientation:

$$A \quad B$$
$$C \quad D$$

By the end of the sequence, the ddakji has returned to its original orientation a total of 6 times (including the initial position). The final orientation after all flips is:

$$C \quad D$$
$$A \quad B$$

Constraints

- The input string contains only `V` and `H`.

- The grid always starts in the orientation shown above.

- The function must execute efficiently for large inputs.

Notes

This problem tests your ability to simulate operations on a grid and recognize cyclical patterns.