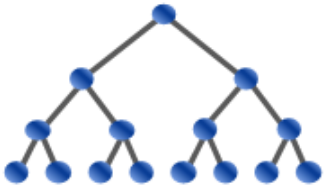

USACO 2020 US Open Contest, Platinum
Problem 1. Sprinklers 2: Return of the Alfalfa

Return to Problem List

Contest has ended.

Log in to allow submissions in analysis mode

English (en)

Farmer John has a small field in the shape of an N by N grid ($1 \le N \le 2000$) where the j-th square from the left of the i-th row from the top is denoted by (i,j) for all $1 \le i,j \le N$. He is interested in planting sweet corn and alfalfa in his field. To do so, he needs to install some special sprinklers.

A sweet corn sprinkler in square (I,J) will sprinkle all squares to the bottom-left: i.e. (i,j) with $I \le i$ and $j \le J$.

An alfalfa sprinkler in square (I,J) will sprinkle all squares to the top-right: i.e. (i,j) with $i \le I$ and $J \le j$.

A square sprinkled by one or multiple sweet corn sprinklers can grow sweet corn; a square sprinkled by one or multiple alfalfa sprinklers can grow alfalfa. But a square sprinkled by both types of sprinklers (or neither type) can grow nothing.

Help FJ determine the number of ways (modulo 10^9+7) to install sprinklers in his field, at most one per square, so that every square is fertile (i.e., sprinkled by exactly one type of sprinkler).

Some of the squares are already occupied by woolly cows; this doesn't prevent these squares from being fertile, but no sprinklers can be installed in such squares.

INPUT FORMAT (file sprinklers2.in):

The first line contains a single integer N.

For each $1 \le i \le N$, the $i+1$-st line contains a string of length N denoting the i-th row of the grid. Each character of the string is one of 'W' (indicating a square occupied by a woolly cow), or '.' (unoccupied).

OUTPUT FORMAT (file sprinklers2.out):

Output the remainder when the number of ways to install sprinklers is divided by 10^9+7.

SAMPLE INPUT:

```
2
..
..
```

SAMPLE OUTPUT:

```
28
```

Here are all fourteen possibilities when sweet corn can grow at $(1,1)$.

```
CC  .C  CA  CC  .C  CA  CA  C.  CA  C.  CC  .C  CC  .C
CC, CC, CC, .C, .C, .C, CA, CA, .A, .A, C., C., .., ..
```

SAMPLE INPUT:

```
4
..W.
..WW
WW..
...W
```

SAMPLE OUTPUT:

```
2304
```

This satisfies the constraints for the first subtask described below.

SCORING:

- Test cases 3-4 satisfy $N \leq 10$ and there are at most ten unoccupied squares.
- Test cases 5-9 satisfy $N \leq 200$.
- Test cases 10-16 satisfy no additional constraints.

Problem credits: Benjamin Qi

Contest has ended. No further submissions allowed.