Solar Wall-E **X76804_en**

Control 4, GRAU-PRO1, FIB (2014-12)

The new generation of Wall-E robots (garbage collectors) incorporates solar panels that take profit of the solar energy to recharge its batteries. This makes them much more autonomous and sustainable than their predecessors.

Make a program that simulates the behavior of Wall-E in a closed field. Wall-E moves towards north (N), south (S), east (E) or west (W) according to the orders it receives. If the robot visits a position with garbage, it picks them up and stores them in its stomach. When visiting again the same position, no more garbage is remains. For collecting the garbage laying in a position, it consumes 1 unity of energy. After visiting a position of the field and collecting the garbage (if any), Wall-E turns its solar panels towards the sun and gets extra energy (which might be null). However, this technology still needs to be improved since the robot can only get that extra energy the first time visiting the position. Obviously, Wall-E can neither move nor collect garbage without energy.

Wall-E starts its work in an initial position and with an initial energy level. The initial position is not a wall, it has no garbage and no sun shines on it (and thus, does not provide any extra energy). For every received order, Wall-E moves as many positions as possible in that direction until reaching a wall, or until no energy is left in it. When Wall-E runs out of energy after visiting a position, it will stop and remain there.

Your program must describe the closed field of garbage using the following type:

```
struct Info {
    char contents;          // Wall ('X'), empty ('.') o garbage (digit)
    int  energy;            // Extra energy provided by the position
};

typedef vector< vector<Info> > Field;
```

Input

The input is composed by:

- two natural numbers, f and c, indicating the number of rows and columns of the field. Assume $f \geq 3$ i $c \geq 3$.
- f rows with c characters each. A `'X'` represents a wall. A dot represents an empty position. A digit indicates an amount of garbage. The first and last row, together with the first and last column, have only walls.
- f rows with c digits each. Each digit indicates the amount of solar energy to be received in that position of the field. The positions with wall do not provide any energy and, obviously, the position of the walls coincide with their position on the field of garbage.
- the initial position of the robot (row and column, both starting at 0), and its initial energy level.

- a non-empty word containing the orders for the robot: `'N'` for going north, `'S'` for going south, `'E'` for going east, and `'O'` for going west.

Output

The output of the program must be the amount of garbage collected by Wall-E after processing the given orders or until running out of energy. Following, the program must output the energy level at the end of the garbage collection and the position where the collection is finished. Follow the format described on the examples.

Observation

Wall-E spends energy only on collecting garbage. However, it can get extra energy on every visited position of the field. The recharge takes always place after collecting the garbage of the position (if any). Obviously, the extra energy is never negative. Wall-E does not visit any wall.
Your code must accomplish with a good programming style. It is up to you to include convenient comments on it. The clarity of the design, the good use of procedures and the style programming will assessed.

Sample input 1

```
5 6
XXXXXX
X.X21X
X37X5X
X9138X
XXXXXX

000000
000110
011010
011110
000000
1 1 10 SESENW
```

Sample output 1

```
garbage: 32
energy: 10
position: (1,3)
```

Sample input 2

```
5 6
XXXXXX
X.X21X
X37X5X
X9138X
XXXXXX

000000
000110
001010
010100
000000
1 1 3 SESENW
```

Sample output 2

```
garbage: 24
energy: 0
position: (3,4)
```

Sample input 3

```
5 5
XXXXX
X1X3X
XX.XX
X7X4X
XXXXX

00000
```

```
05030
00000
07040
00000
2 2 1000 NSEW
```

Sample output 3

```
garbage: 0
energy: 1000
position: (2,2)
```

Problem information

Author : Professorat de PRO1
Translator : Maria Blesa
Generation : 2014-12-16 22:23:40

© *Jutge.org*, 2006–2014.
http://www.jutge.org