

8-th Bulgarian National Olympiad in Informatics

May, 1992

Selection round

Second day

Endless white flat strip of a conveyer transports dark flat machine parts. The parts are of different shapes and sizes. The conveyer moves in a stepwise manner. At each step, an optical device scans all the 10 adjacent positions crosswise of the conveyer strip. As a result, a 10 bit binary vector is obtained representing an image of the strip with the mashine parts. Each white point is encoded by 0, whereas each black one by 1. The mashine parts are placed on the strip without touching each other. They can occupy arbitrary locations, but two identical parts are appeared always in the same orientation. A particular type of a mashine part differs from another type by 3 parameters L, W and S:

L is a visible length of the part in the lengthwise direction, $L < 21$;

W is a visible width of the part in the crosswise direction, $W < 11$;

S is a visible area, $S < 101$.

Two machine parts are considered to be of the same type, if their parameters L, W and S are respectively equal. A unit measure for length is the scanning step. This unit is the same in both lengthwise and crosswise directions. A unit measure for area is the area of one scanned possition.

An example:

```
-----0-xxxxxxxxxxxxxxxxxxxxx-----
-----xxx-----0-x--xxxx-----
-----xxxxxx-----0-xxxxxxx-----xxxxxxxxxx--xxxxxxxxxx--
-----x--xx-----0-xxxxxxx-----xxxxxxxxxx-----x--
-----xxxxx-----0-----xxxxx-----x--
-----0-----xxxxxxxxxx-----xxxxx-----x--
-----0-----xxxxxxxxxx-----xxxxx-----x--
-----0-----xx-----xxx-----xxxxx-----x--
-----0-----xxxx--xxxx-----xxxxx-----x--
-----0-----xxxxxxxxxx-----x--
      scanning      <- direction of movement
      line
```

Write a program, that solves the following problems:

Problem 1.

Simulate actions of the optical scanning device at each step of the conveyer movement. Use TEST.TXT as an input file. This file contains 10 character rows with "-" and "x" signs, like those given at the above example. Display on the computer screen each newly inputted row.

Problem 2.

At each step of the conveyer movement, update the current values of the parameters L, W and S for each mashine part passing under the scanning line and ouput these values on the computer screen.

Problem 3.

At each step of the conveyer movement, output the count of parts by types distinguished up to the current step.

Problem 4.

Determine how many parts passed under the scanning line have internal cuts.

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