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Level 2

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GladOS:

- a small bump in the road that was, for the next part, I'll also tell you a joke.

- meanwhile, tic-toc, the ice is melting...

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The matrix will now also include information about which countries own the land.

Your task is to analyze their borders and calculate **the number of border cells** for each country.

The border of a country is a defined as all the cells that belong to that country and are **adjacent** to **at least** one **cell** from a **different country**. Adjacency is considered in **4 directions**.

The cells located on the **bounds** of the matrix are considered to be **borders** since at least one of their adjacent cells is outside the country.

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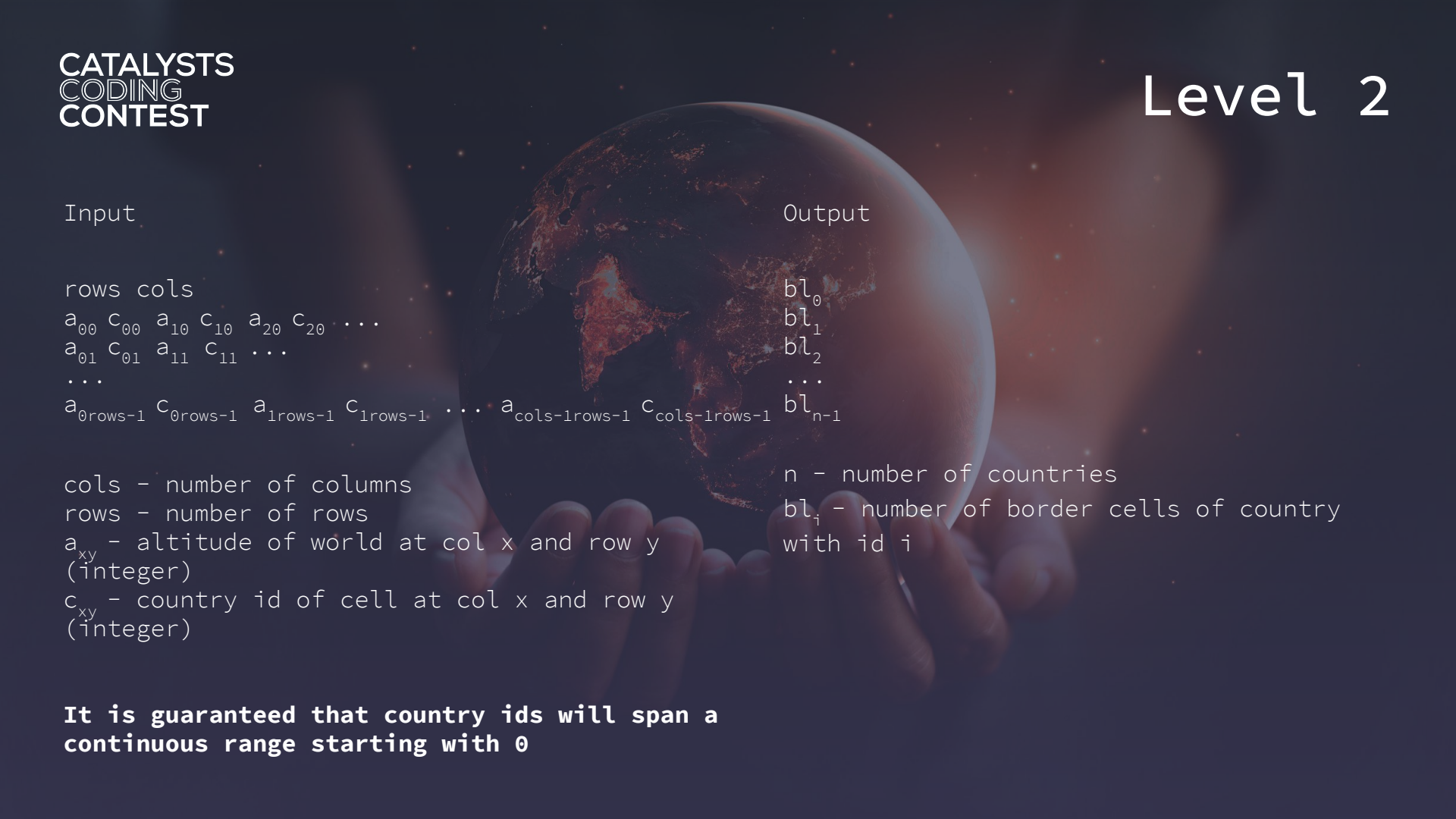

Input

rows cols
a_{00} c_{00} a_{10} c_{10} a_{20} c_{20} ...
a_{01} c_{01} a_{11} c_{11} ...
...
$a_{0rows-1}$ $c_{0rows-1}$ $a_{1rows-1}$ $c_{1rows-1}$ ... $a_{cols-1rows-1}$ $c_{cols-1rows-1}$

cols - number of columns
rows - number of rows
a_{xy} - altitude of world at col x and row y (integer)
c_{xy} - country id of cell at col x and row y (integer)

It is guaranteed that country ids will span a continuous range starting with 0

Output

bl_0
bl_1
bl_2
...
bl_{n-1}

n - number of countries
bl_i - number of border cells of country with id i

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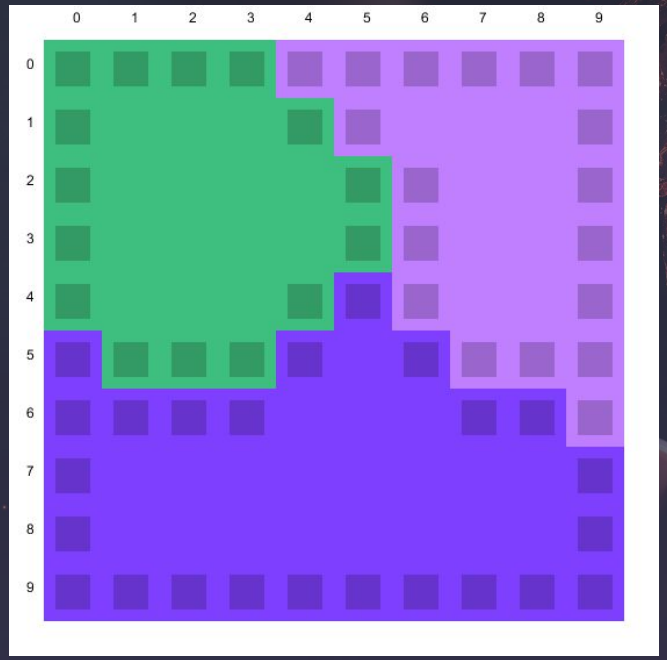
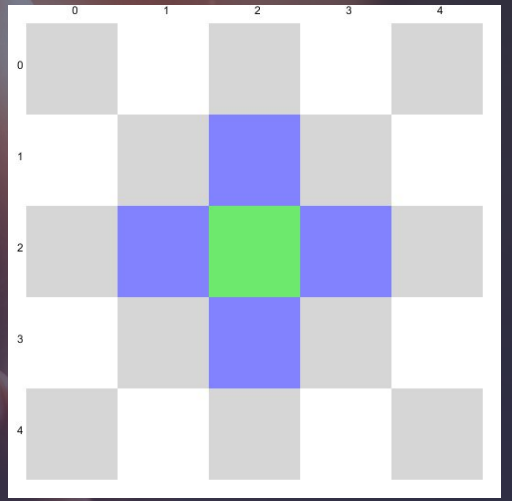


Countries with their borders



Neighbours of (2,2)