C++ Programming

Multidimensional Arrays

Homework 2

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Teaching, Training and Coaching since more than a decade!

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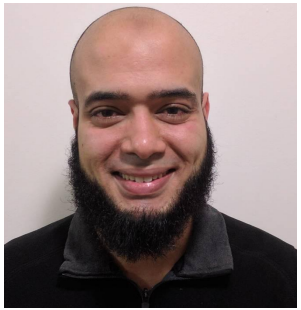


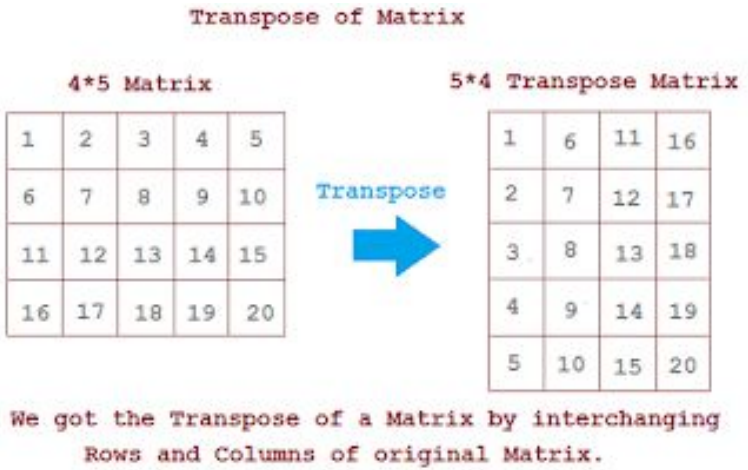
Homework 5: Flatten 3D Array

- Read 3 numbers: DEPTH, ROWS, COLS the dimensions of 3D array
- Then read integer either 1 (convert 3D to 1D) or 2 (1D to 3D)
- If input was 1, then read 3 integers d, r, c then convert to position in 1D array
- If input was 2, then read 1 integer position, then convert to 3D array position
- Try to generalize if we have e.g. 6D array
- Input ⇒ Outputs
  - 3 4 5 1 1 0 0 ⇒ 20
  - 3 4 5 2 20 ⇒ 1 0 0
  - 3 4 5 1 1 1 1 ⇒ 26
  - 3 4 5 1 2 3 2 ⇒ 57
  - 3 4 5 1 2 0 0 ⇒ 40
  - 3 4 5 2 59 ⇒ 2 3 4

```
int idx = 0;
for (int dep = 0; dep < 3; ++dep)
    for (int row = 0; row < 4; ++row)
        for (int col = 0; col < 5; ++col)
            cout<<idx++ << " = "
                <<dep << " " << row << " " << col<< "\n";
```

Homework 6: Transpose

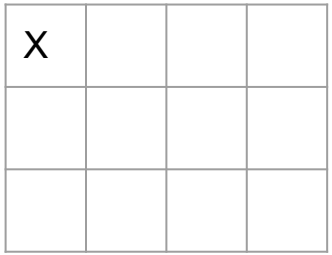
- Read integers N, M, then Read **matrix** NxM. Compute another array, the transpose
- Input/output as in image



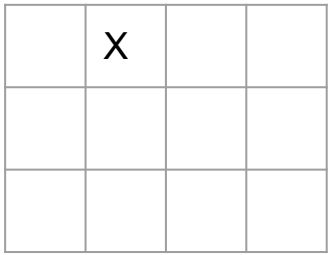
Homework 7: Active Robot

- Read integers N, M represents a matrix. A robot start at cell (0, 0).
- Read integer K, then K commands. Each command is 2 values
  - Direction from 1 to 4: up, right, down, left
  - Steps: a number to number steps to take in the direction. Steps [1, 1000000000]
  - If the robot hits the wall during the move, it **circulates** in the matrix.
  - For every command, print where is the robot now
- Input
  - 3 4 4 **2 1 3 2 4 2 1 3**
    - 2 1 means to right 1 step - 3 2 means down 2 steps
- Output
  - (0, 1) (2,1) (2, 3) (2, 3)

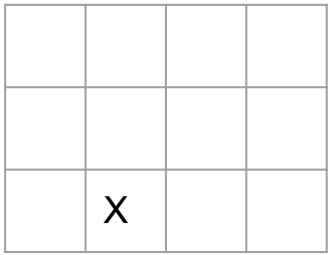
Homework 7: Active Robot



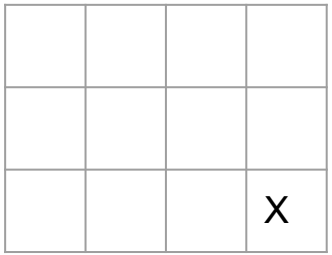
2 1 (right 1 step) ⇒
New pos (0, 1)



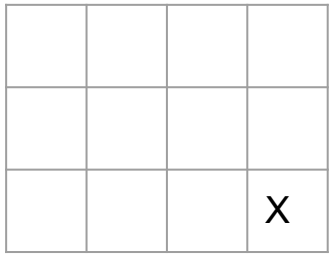
3 2 (down 2 steps) ⇒
New pos (2, 1)



4 2 (left 2 steps) ⇒
New pos (2, 3)
Circulation



1 3 (up 3 steps) ⇒
New pos (2, 3)
Circulation



Homework 8: How many primes

- Read integers N, M, then Read **matrix** NxM. Then read integer Q, for Q queries. Each queries is a grid with **top left** (i, j) and # rows & # cols
  - So read 4 integers for i j r c
- For each query, print how many prime numbers in the requested grid.
- Input ⇒ Output
  - 3 4
  - 8 2 9 5
  - **3 2** 27 6
  - **7 8** 29 22
  - 2
  - 1 0 2 2 ⇒ 3 (primes 3, 2, 7 in rectangle (0, 1) (2, 1))
  - 0 1 2 3 ⇒ 3 (primes 2, 5, 2 in rectangle (0, 1) (1, 3))

"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."