Birzeit University - Faculty of Engineering and Technology
Electrical & Computer Systems Engineering Department - ENCS313
Linux Laboratory - 1^{st} semester - 2014/15

Project #1

C-language under Linux

Due: December 15, 2014

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Problem: Matrix neighborhood

Assume you have the following matrix that contains 8 cells (Figure 1).

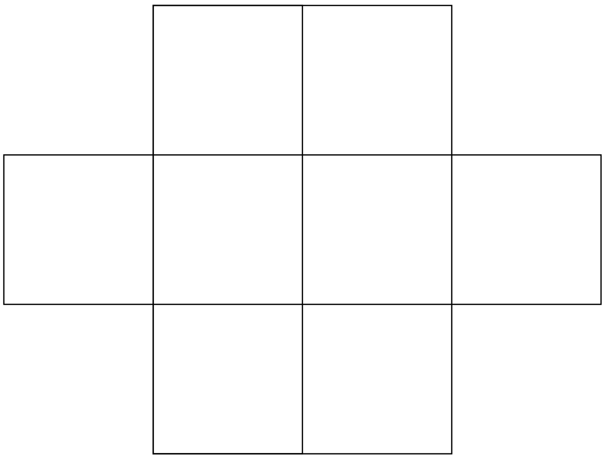

Figure 1: Matrix.

Assume as well that we have the 8 integer numbers 1 up to 8. We want to distribute the 8 numbers 1 . . . 8 in the matrix of Figure 1 so that no 2 successive numbers will be neighbors on the same row, or neighbors on the same column, or diagonaly neighbors. Figures 2, 3, 4 illustrate what do we mean by row, column or diagonal neighborhood. In Figure 2, you'll notice that numbers 3 and 4 are neighbors on the same row. In Figure 3, you'll notice that numbers 3 and 4 are neighbors on the same column. In Figure 4, you'll notice that numbers 3 and 4 are neighbors diagonaly.

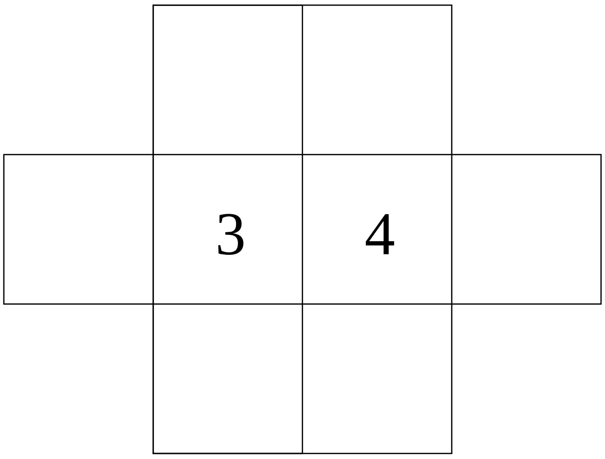

Figure 2: Row neighborhood.

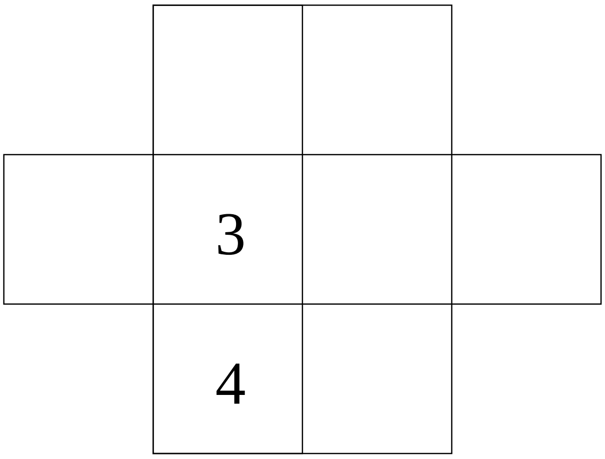

Figure 3: Column neighborhood.

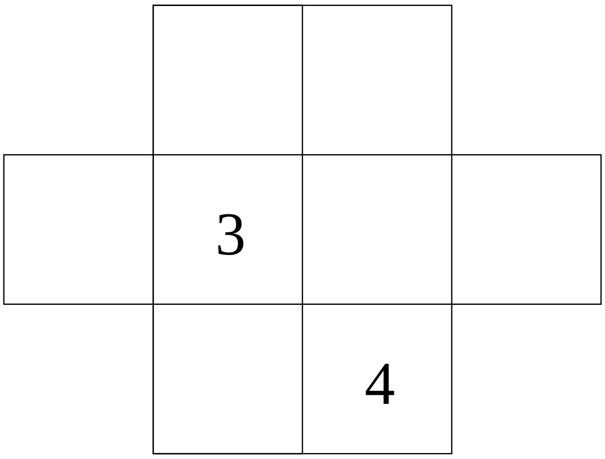

Figure 4: Diagonal neighborhood.

Note that the Figures 2, 3, 4 represent situations that you should avoid getting into. These scenarios are not allowed.

You are required to write and test a C-language program that checks if a solution exists and if multiple solutions exist, the program should output all of them.

To do

- Write the code for the application described above and name the executable as `matrix_distribute`. Generic functions must be located in separate C-files.
- Debug the application using the `gdb` debugger and/or the `ddd` interface.
- Use macros whenever necessary to add clarity.
- Make sure your code is clean and well indented, variables have meaningful names, etc.
- Make sure the C-files and header files have enough comments.
- Create a `makefile` that will help you compile the application.