M.Sc. in High-Performance Computing
5613 - C programming
Assignment 3

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Rules

To submit, make a single tar-ball with all your code and a pdf of any written part you want to include. Submit this via `msc.tchpc.tcd.ie` by the end of **Tuesday November 1st**. Attempt all parts. Marks will be given for the efficiency of your implementation. Late submissions without prior arrangement or a valid explanation will result in reduced marks.

Question

Conway's game of life is a cellular automata, acting in a two-dimensional square grid. Each cell is either "live" or "dead" and in each iteration, a dead cell comes alive if three of its eight nearest neighbours (including those connected diagonally) are alive. A live cell stays alive if it has two or three live neighbours, otherwise it is dead in the next iteration.

Write software to evolve a start on a grid of size $n \times n$ (n<50) read from the input file for 100 iterations, printing the resulting configuration to the terminal. Assume periodic boundary conditions, *eg.* if n=40, the cell to the right of cell $(20, 39)$ is cell $(20, 0)$.

The input should be read from a text file `start_config.txt` which contains in the first line the integer determining the size of the grid (`n`) and the next `n` lines denoting the the states of the cells in `n x n` matrix. Example of an input file for `n=10`:

```
10
0 0 0 0 0 0 0 0 0 0
0 0 1 1 0 0 0 0 0 0
0 0 1 1 0 0 1 0 0 0
0 0 0 0 0 0 1 0 0 0
0 0 0 0 0 0 1 1 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 1 1 1 0 0
0 0 0 0 1 1 1 0 0 0
0 0 0 0 0 1 1 0 0 0
0 0 0 0 0 0 0 0 0 0
```

where **0** denotes a dead cell and **1** denotes a live cell. The output file `config100.txt` should have the same format.