M.Sc. in High-Performance Computing
5613 - C programming
Assignment 8

Marina Krstic Marinkovic
(mmarina@maths.tcd.ie)
School of Mathematics, TCD

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 **Wednesday January 18th**. 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

Write a C program that reads in the matrix of dimension `N`×`M` with entries `0` or `1`, and finds a maximal square submatrix that consists of entries `1` only. A submatrix denotes a set of elements belonging to the neighbouring rows and columns of the matrix. In the example given in the figure bellow, the resulting maximal square submatrix with entries `1` is framed.

1	1	1	1	1	1
0	1	1	1	0	1
1	1	1	1	1	1
1	1	0	1	1	1
1	0	1	1	0	1

Your program should read the dimensions `N` and `M`, as well as the entries of the `N`×`M` matrix from the file `matrix.txt` of the format:

```
5 6
1 1 1 1 1 1
0 1 1 1 0 1
1 1 1 1 1 1
1 1 0 1 1 1
1 0 1 1 0 1
```

and write the result in the output file `result.txt`. The output file should contain in the first line the length of the side of the maximal square submatrix of ones and in the second line the coordinates of the lower right corner of the resulting submatrix in the original matrix (counting from rows from `0` to `N-1` and columns from `0` to `M-1`). Namely, for the above example `result.txt` would contain:

```
3
2 3
```

If there is more than one solution submatrix with the same length, please write the coordinates of the lower right corner of all the solutions in the consecutive lines of `result.txt`.