Assignment 3

Write a C+OpenMP program to simulate ocean currents. The input is a number n and data for an $n \times n$ matrix of double precision numbers. Your goal is to process this matrix and o/p the matrix content. Download the two files simulate.c and P3.c (`http://www.cse.iitm.ac.in/~krishna/cs6868/P3/P3.c` and `http://www.cse.iitm.ac.in/~krishna/cs6868/P3/simulate.c`). You are required to use the `P3.c`, as is (has functions to read input, write output and measure time) and add your code only in `simulate.c`.

The program (main file name - P3.c) should take three inputs: number of threads, threshold amount, and an option specifying if the simulation should be done in serial or parallel. The program reads the input (from stdin) and prints the final grid (to stdout). Example: the following sequence of commands should lead to the o/p given below:

```
$ cat input.txt
4
23 456 45 456
456 26 346 35
345 247 986 24
24 222 256 24
$ gcc -fopenmp P3.c simulate.c  -o P3

$ cat input.txt | ./P3 2 0.002 -parallel # threshold = 0.002 and 2 threads

Options: Procs = 1, Tol = 0.002000, Execution-serial

Number of iterations = 15
23.000000 456.000000 45.000000 456.000000
456.000000 331.592375 146.297905 35.000000
345.000000 268.047905 173.587637 24.000000
24.000000 222.000000 256.000000 24.000000

Start time:     1520057486.380683
End time:       1520057486.380686
Total time:     0.000003 (s)
```

Notes: 1) The i/p and o/p routines are given in P3.c 2) The Exact time taken to compute may vary from user to user. 3) We will test the program for varying number of threads and see (i) the correct o/p is generated all the times, (ii) how it scales. 4) Pay special attention to globals and their effect on threads.