

Assignment #4, Module: MA5611

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1 PART 1: SERIAL

Serial implementations can be found in directories task1/ and task2/.

Gauss:

In task1/, gauss.c is an implementation of Gauss elimination method. That implementation uses random numbers to set the augmented matrix, so there are no problems with zeroes on the diagonal, and therefore no need for pivoting; for this reason, the implementation there is a very simple without partial pivoting one.

Sieve:

In task2/, sieve.c is a serial implementation of Sieve of Eratosthenes. Given the max number N, it's based on a creation of a list of numbers from 0 to N, and then marking which of those is a prime and which isn't. Due to the double loop implementation, it's suitable for OpenMP pragmas use.

2 PART 2: PARALLEL

Parallel implementations can be found in directory task3/.

In the case of Gauss elimination, the OpenMP pragma is used to optimize the creation of the upper triangular part. Specifically, on each column, the parallelization is implemented by dividing the rows statically over the threads.

On the other hand, when implementing Sieve of Eratosthenes, because of the non-uniform increase on the tested numbers, an OpenMP dynamic implementation is appropriate.

3 PART 3: PROCESSING SCRIPTS AND RESULTS

The script data_gen.py executes the serial and parallel implementations for multiple values of n (both for Gauss elimination and Sieve of Eratosthenes); also, makes the executions for 2, 4 and 8 cores. The data results (output of this Python script) can be found on the directory ./results/.

Finally, the Python script plotter.py reads all the .dat files in ./results/, plotting the results and locating the plots in the directory ./plots/.

There's a speedup in both cases after implementing parallel OpenMP pragmas.