Implementation and Performance Analysis
PCOM project 2

To be develop by groups of 2 elements, which aims to implement and evaluate the following algorithm.

The Sieve of Erastosthenes

The Sieve of Eratosthenes is a simple algorithm to find the prime numbers up to a given number **n**.

Consider the following implementations:

 (i) sequential, on a single CPU-core;
 (ii) parallel, on a shared memory system, using OpenMP;

The following steps describe the algorithm:

```
1. Create list of unmarked natural numbers 2, 3, …, n
2. k ← 2
3. Repeat
       (a) Mark all multiples of k between k² and n
       (b) k ← smallest unmarked number > k
   until k² > n
4. The unmarked numbers are primes
```

The time complexity of the algorithm is $\Theta(n \ln \ln n)$.

Data range to consider (n): up to 2^{32}.

NOTE

Performance <u>analysis</u> consists in analyzing single processor performance and, speedup, efficiency and scalability from 1 to P processors for the parallel versions. A <u>discussion</u> on the obtained results is also expected.

Computing Platforms: One multicore processor.

To be delivered up to: 10/12/2018

Parameters for Report Evaluation (Maximum of 10 pages):

- Problem description;

- Sequential solutions and performance measures;

- Parallel algorithms and their characterization;

- Time measures of the parallel programs;

- Performance evaluation and scalability analysis;

- Writing and results analysis.