CS 211 High Performance Computing Project 3

Parallel Sieve of Eratosthenes for Finding All Prime Numbers within 10^{10}

Part 1: Modify the parallel Sieve of Eratosthenes program in class so that the program does **NOT** set aside memory for even integers.

Part 2: Modify the parallel Sieve of Eratosthenes program in **Part 1** so that each process of the program finds its own sieving primes via local computations instead of broadcasts.

Part 3: Modify the parallel Sieve of Eratosthenes program in **Part2** so that the program can have effective uses of caches.

Use your program to find all prime numbers within 10^{10}. **Output the total number of prime numbers within 10^{10} and the program execution time (i.e., maximum time of all processes used in the MPI program).** Benchmark your program on TARDIS with 32 (1 node), 64(2 nodes), 128(4 nodes), and 256 (8 node) cores to see whether your execution time is reduced by half or not when double the number of computing cores. Compare the execution time of each version of your program to see how different designs affect the execution time of your program. Note that, in syllabus, we emphasize for **ALL** homework assignments: "Please make sure that your programs are properly documented and indented. Provide instructions on how to run your programs, give example runs, **and analyze your results."**