Theme Project

Team Mirza Lorena and Moldovan Vasilica, Group 935/1

Requirement

Find a n-coloring of a graph.

Hardware platform:

Intel(R) Core(TM) i5-10210U CPU @ 1.60GHz 2.11 GHz

8 GB DDR4

512 GB SSD

Algorithms:

- **Regular threads**
  - Complexity: O(V^2 + E) in worst case
  - A proper coloring of a graph is an assignment of colors to the vertices of the graph so that no two adjacent vertices have the same color.
  - Uses Java thread Pool
- **MPI**
  - Coloring itself is an NP-hard problem, but it can be solved using a greedy approach. Indeed, this might not find a best coloring, by which we mean coloring with the least possible colors, but can color a graph with colors close to this number. Using MPI, we do a task parallelization distributing the nodes between the processes. The coloring of the nodes will be done by every process for each node, but the administration of the free colors and the freedom of colors will be done by each process only to a partition of the nodes that are assigned to them.
  - Complexity: O(N ^ 2)

Time Statistics:

Number of vertices: 5

Number of threads: 8

Regular threads: 30 milliseconds

MPI: 81 milliseconds

Number of vertices: 10

Number of threads: 8

Regular threads: 38 milliseconds

MPI: 103 milliseconds