**Graph Coloring:**

In order to color the graph in a parallel manner following steps are followed.

1. Identify the maximal independent set of vertexes which can be colored in any given iteration.
2. Try to identify smallest color that can be given to the vertex.
3. Repeat above to steps until all nodes are colored.

Tried two heuristics to identify the maximum independent set as mentioned in “**A Comparison of Parallel Graph Coloring Algorithms. J. R. Allwright**.”

* Largest Degree First : Identify the set of vertexes such that its effective degree is greater than all its neighbor.
* Smallest Degree Last : Weight each and every vertex such that the least degree node is colored at the end.

But certain additional heuristics are applied above LDF and SDL so that number colors can be brought further down like recoloring as mentioned in “**Improving Graph Coloring on Distributed-Memory Parallel Computers ,Ahmet Erdem Sarıyuce**”. Maximum recoloring iteration is kept to 20.

**Cilk View Report :**

For big Dataset containing 900 nodes :

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | Approach | Duration (ms) | Overall Parallelism | Parrallelism in Parallel region | Speed Up in Parallel Region | | LDF with recoloring | 4860 | 7.25  5.24  (burdened) | 292.14  15.44  (burdened) | 2 processors: 1.80 - 2.00  4 processors: 3.01 - 4.00  8 processors: 4.52 - 8.00  16 processors: 6.03 - 16.00  32 processors: 7.25 - 32.00  64 processors: 8.06 - 64.00  128 processors: 8.54 - 128.00  256 processors: 8.80 - 256.00 | | SDL with recoloring | 1070 | 2.66  1.82  (burdened) | 112.82  3.54  (burdened) | 2 processors: 1.35 - 2.00  4 processors: 1.64 - 4.00  8 processors: 1.83 - 8.00  16 processors: 1.95 - 16.00  32 processors: 2.01 - 32.00  64 processors: 2.05 - 64.00  128 processors: 2.06 - 112.82  256 processors: 2.07 - 112.82 | |

**Cilk Screen Report :**

Cilk screen has been run on smaller instance of data, since it takes a longer time to compute race in a larger data set,

|  |
| --- |
| sudhar@ubuntu:~/assignments/ConcurrentProgramming/Assignment1$ cilkscreen ./gc1 < testcases/GraphColoring/Public/small/myciel4.col\(23\,71\)\_mod.txt  Cilkscreen Race Detector V2.0.0, Build 3566  No errors found by Cilkscreen |