# Lab 8 - Parallelizing techniques (3 - parallel explore)

December 11, 2018

## 1   Goal

The goal of this lab is to implement a simple but non-trivial parallel algorithm.

## 2   Requirement

Given a directed graph, find a Hamiltonian cycle, if one exists. Use multiple threads to parallelize the search.

## 3   Computer Specification

- *CPU:* Intel Core i7-7500U, 2.90GHz

- *RAM:* 8 GB

- *System type:* 64-bit

## 4   Short Description of the Implementation

Algorithm - Backtracking:

- *generate all possible paths starting from each node, and check each one if it is a Hamiltonian cycle*

- *in parallelized version we have one thread executing the backtrack for one node*

Parallelization - Used the Thread class along with the ArrayBlockingQueue.

# 5    Performance Tests

note: by level 'x' i am referring that the graph will have x * 10 nodes

| Algorithm | Level 1 | Level 50 | Level 100 |
|---|---|---|---|
| regular linear algorithm | 2ms | 82ms | 609ms |
| binary tree algorithm parallel | 0ms | 40ms | 299ms |

Throughout the tests I've put those algorithm through, the results were conclusive By parallelizing the backtracking algorithm we obtain results up to 3 times faster.

# 6    Conclusion

Parallelism should be used when talking about backtracking.