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REPORT

Parallel and Concurrent Course Programming Course Project Submission

Abstract

This project implements concurrent algorithms for finding Minimum Spanning Tree (MST) in a connected undirected graph. Two well known sequential algorithms "Prim's Algorithm" & "Boruvka Algorithm" are state-of-the-art algorithms for finding the Minimum Spanning Tree. But these algorithms do not scale well for large number of nodes. That's where concurrency comes into the picture. For this project we implemented concurrent "Prim's Algorithm" & "Boruvka Algorithm" for finding the MST and analyzed their performance with their sequential counterparts and also with each other.

Introduction:

Minimum Spanning Tree (MST) problem is defined as follows: Given an undirected connected graph G with n vertices and m edges, the minimum spanning tree (MST) problem finds a spanning tree with the minimum sum of edge weights.

There are various algorithms to find minimum spanning tree in a graph. In our project we focused on two algorithms namely:

- Prim's Algorithm
- Boruvka's Algorithm

Parallel Prim's Implementation:

Prim's algorithm is a greedy algorithm. It starts with empty tree and grows till all the vertices are covered. It maintains two sets, one to store unvisited nodes and other which are already included in the tree. At each step, one vertex is selected and all the