

2023-Batch-I-Set-1 & 2

Lab 8 - CSS 311 – Parallel and Distributed Computing

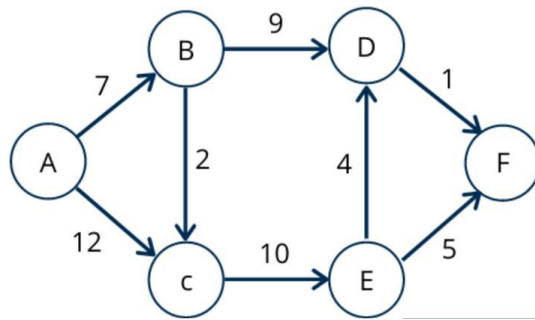
OpenMP – Shortest path algorithms-Single Source & All Pairs

Instructions

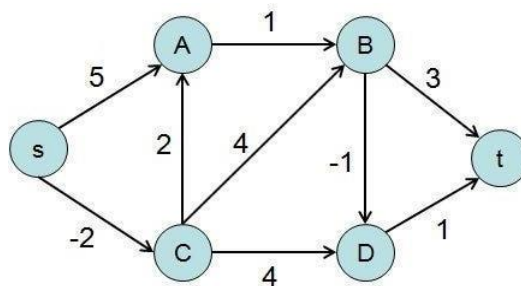
Due date: 12-10-2025 (Sunday), 05:30 P.M. (deadline)

Q1. Parallelise **Dijkstra's algorithm** using OpenMP for finding the shortest paths in a weighted directed graph. The graph is represented as an adjacency matrix, where $\text{graph}[i][j]$ represents the weight of the edge from vertex i to vertex j . The number of vertices in the graph is V .

Test Case 1: Positive Weights - Start Node is **A**



Test Case 2: Negative Weights - Start Node is **S**



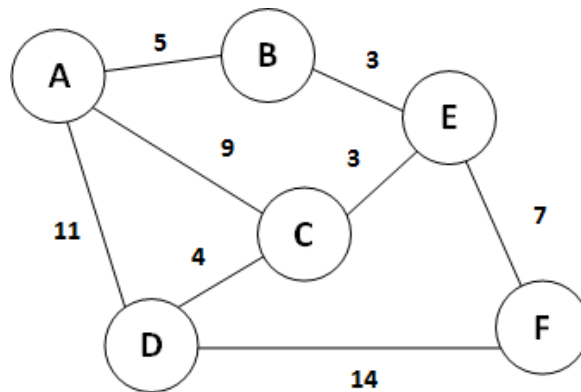
Output:

- 1) Result table – Shows the shortest path from the given source vertex.
- 2) Comparison table for execution time

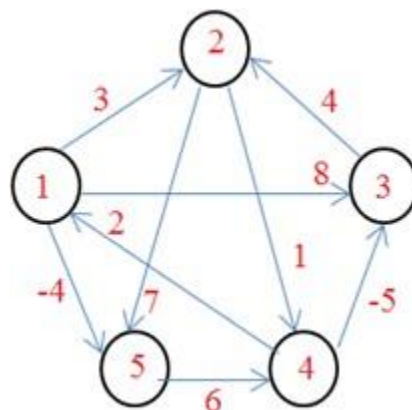
Number of Nodes, Number of Edges (N, E)	Serial Code (Execution Time)	Parallel Code (Execution Time)
Test Case 1: (6, 8)		

Q2. Write a Parallel Program with MPI to Implement the **Floyd-Warshall algorithm** to find the **all-pairs shortest paths** in a weighted graph. The input should be a directed graph represented by an adjacency matrix, and the output should be the shortest paths between all pairs of vertices.

Test Case 1: +ve weights



Test Case 2: -ve weights



Output:

- 1) Result table – Shows the shortest path from the all vertex.
- 2) Comparison table for execution time

Number of Nodes, Number of Edges (N, E)	Serial Code (Execution Time)	Parallel Code (Execution Time)