

SUPPLY CHAIN MANAGEMENT

TEAM MEMBER:

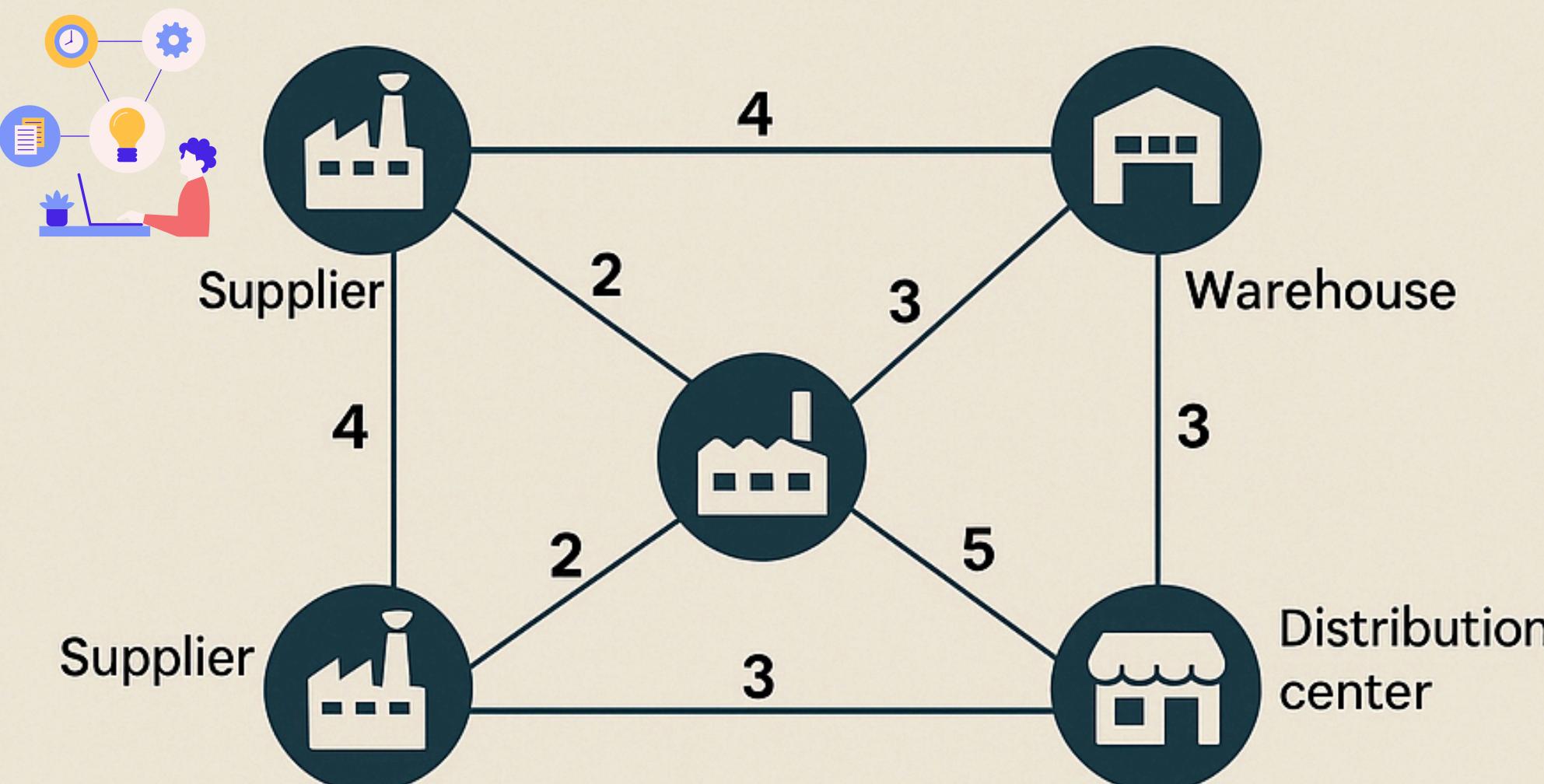
- SARIS SINGH
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Problem Statement

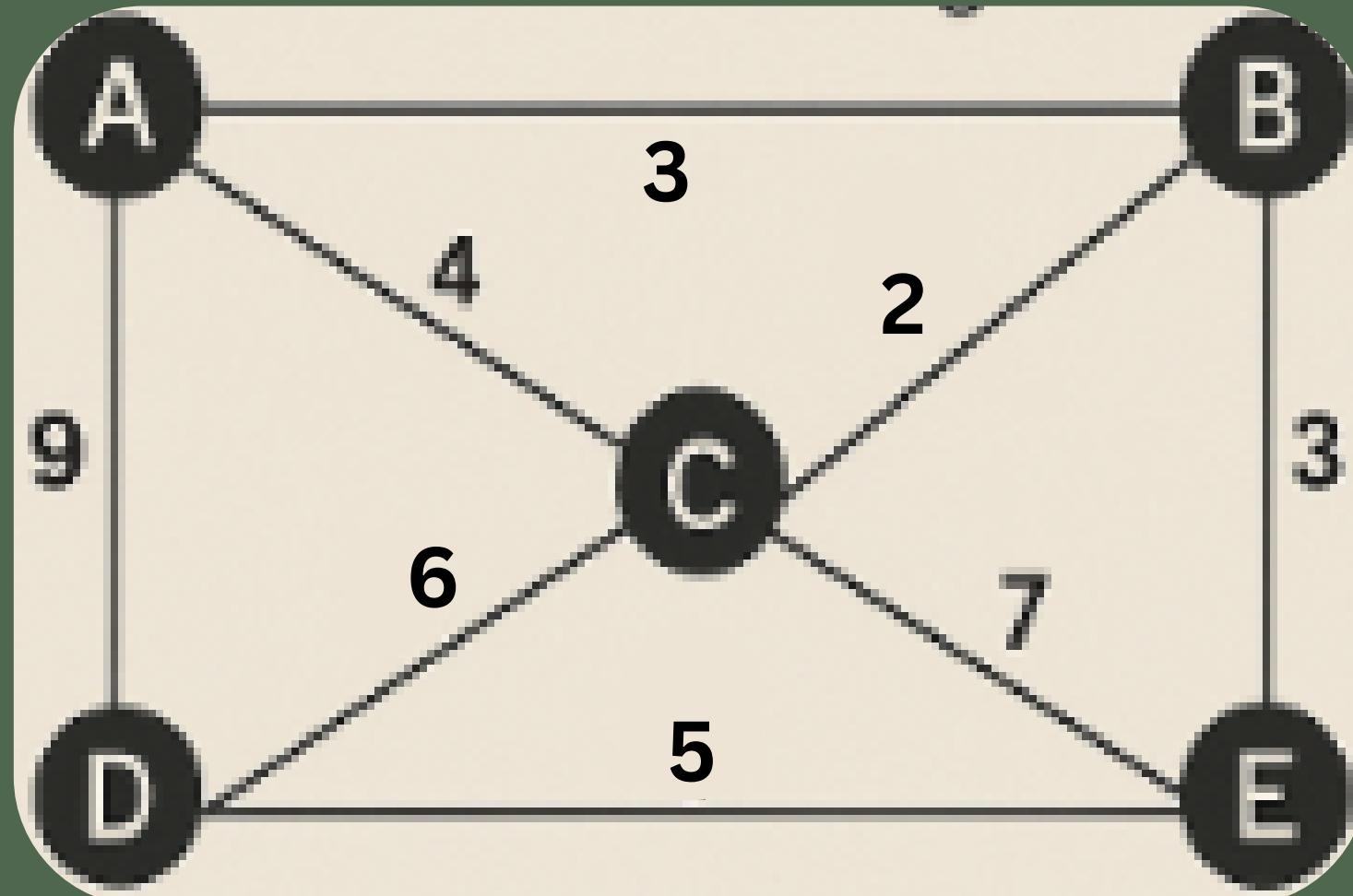


Optimizing Supply Chain Logistics Using Kruskal's Algorithm for Minimum Cost Connectivity

In modern supply chain management, minimizing transportation costs while maintaining efficient connectivity between suppliers, warehouses, and distribution centers is critical. However, with increasing network complexity and dynamic logistics requirements, determining the most cost-effective structure for supply routes poses a significant challenge.

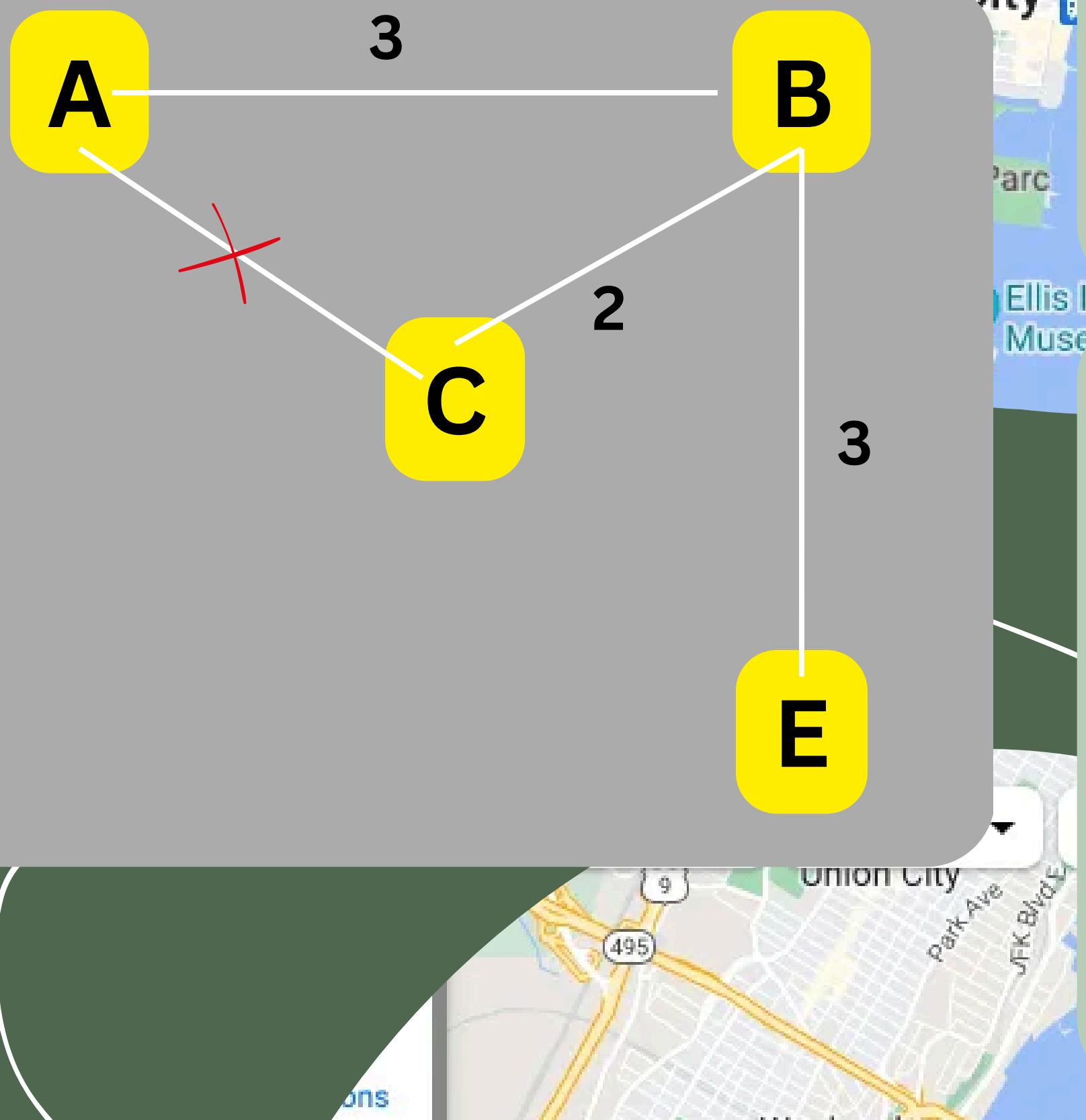


KRUSKAL'S ALGORITHM



B-C->2	
B-E->3	D-E->5
A-B->3	D-C->6
A-C->4	C-E->7
	A-D->9

- ◆ Step 1: Sort all the edges..
 - List all edges of the graph along with their weights.
 - Sort them in non-decreasing order of weight (smallest to largest).

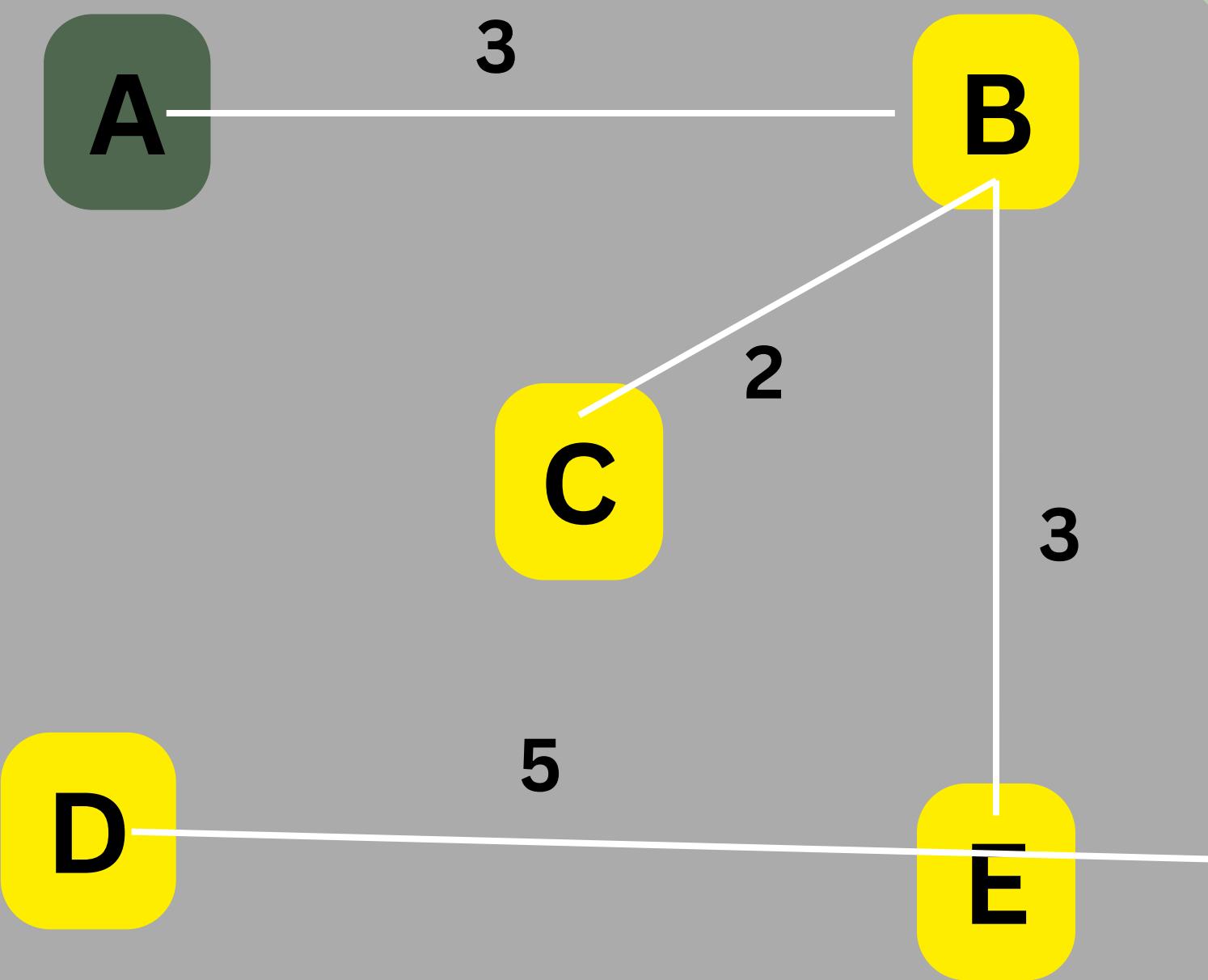


Step 2: Initialize the MST

- Create an empty set to hold the edges of the MST.
- Each vertex is initially in its own disjoint set (used for cycle detection).

Step 3: Iterate through the sorted edges

- Check if it forms a cycle using the Disjoint Set Union (Union-Find) method.
- If no cycle is formed, add the edge to the MST.
- If a cycle is formed, skip this edge.



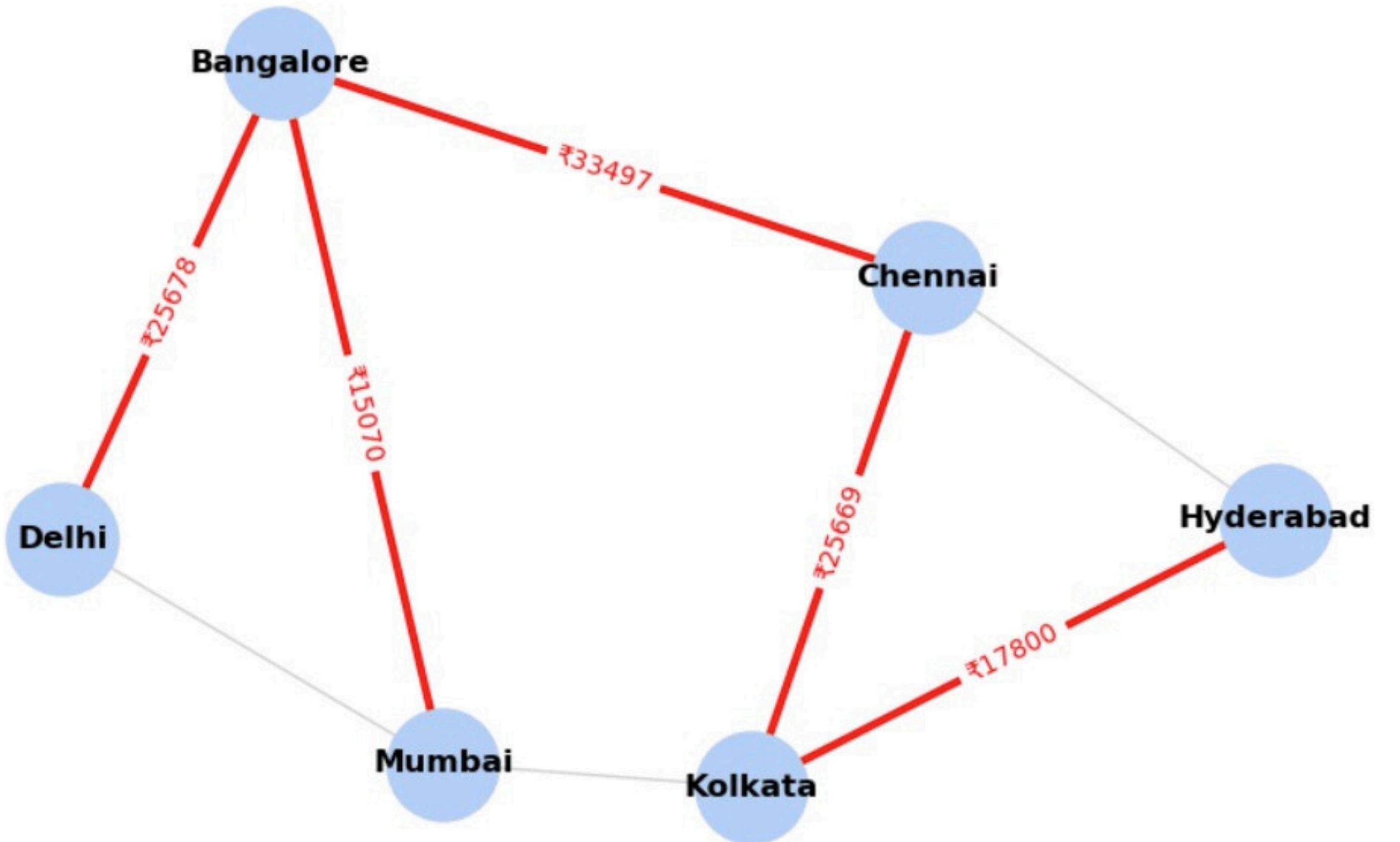
Step 4: Stop when MST is complete

Keep adding edges until:

- The MST has exactly $(V - 1)$ edges, where V is the number of vertices.
- At this point, all nodes are connected with the minimum total weight.

IMPLEMENTATION ON SUPPLY CHAIN

Supply Chain MST



Time Complexity:

- Sorting edges: $O(E \log E)$
- Processing edges: up to $O(E \log V)$ using simple methods like union-find with path compression .

APPLICATION OF KRUSKAL'S ALGORITHM

- Telecommunication Network Design
- Computer Network Optimization
- Power Grid Construction
- Transportation and Road Planning
- Supply Chain Optimization
- Geographic Information Systems (GIS)

ANY QUESTIONS?



Thank you!

