CIT300 Graded Practical Assignment 1 (Week 10): Smart City Route Planner

Scope: Weeks 1–9 (Linear Data Structures, Trees, Hashing, Graphs)
Objective: Develop a **graph-based console program** that models a city's transport network and demonstrates how data structures can be used to represent and manage real-world connections between locations.
This practical assignment contributes 10% towards the final module grade.

Create a console-based system that:

1. **Represents locations and roads** using an appropriate **graph representation** (e.g., adjacency list or adjacency matrix).
2. Allows users to **add/remove locations** and **add/remove roads** (edges).
3. Displays the **list of all connections** between locations.
4. Uses **queues or stacks** to manage traversal or route listing operations
5. Demonstrates the relationship between **tree structures** (like AVL trees) and **graph data organization**, e.g., storing location data in an AVL tree or linked structure before mapping into the graph.
6. Provides a **menu-driven interface** with proper input validation and clear console outputs.

Example Menu:

```
--- Smart City Route Planner ---
1. Add a new location
2. Remove a location
3. Add a road between locations
4. Remove a road
5. Display all connections
6. Display all locations (using a tree or linked list)
7. Exit
Enter your choice:
```

Team Role Distribution

Member	Task
Member 1	Design and implement the **Graph data structure** (using adjacency list or matrix).
Member 2	Implement **location and road management** (add/remove operations).
Member 3	Implement **data organization** using **trees/AVL trees/linked lists** to manage location data.
Member 4	Develop the **menu-driven user interface**, handle **input validation**, and perform **integration/testing**.

Deliverables: GitHub repository link + one merged demo video
• Each member records their own part and all clips are merged before submission
• Collaboration must be visible through branches, commits, and pull requests
Deadline : Submit the completed assignment to the given link in the LMS on or before the 25th.