|  |  |  |
| --- | --- | --- |
| **Academic Year:** 2024-25 | **Year:** Third Year | **Term:** II |
| **PRN No.: 1012412079** | **Name: Ratnajeet Patil** | |
| **Subject:** DS2 | | |
| **Assignment No.**: 2 |  | |
| **Date:** |  | |

**Lab Assignment:**

**Title:** Develop a Java application to model a city map using a graph data structure. Implement algorithms to analyze connectivity and navigation across the cities.

1. import java.util.Scanner;

2.

3. public class CityMapMain {

4.     public static void main(String[] args) {

5.         Scanner scanner = new Scanner(System.in);

6.         CityMapGraph cityMap = new CityMapGraph();

7.

8.         while (true) {

9.             System.out.println("\n--- City Map Navigation System ---");

10.             System.out.println("1. Add a city");

11.             System.out.println("2. Add a road between cities");

12.             System.out.println("3. Display city map");

13.             System.out.println("4. BFS traversal");

14.             System.out.println("5. DFS traversal");

15.             System.out.println("6. Check if path exists between two cities");

16.             System.out.println("7. Exit");

17.             System.out.print("Choose an option: ");

18.

19.             int choice = scanner.nextInt();

20.             scanner.nextLine(); // Consume newline

21.

22.             switch (choice) {

23.                 case 1:

24.                     System.out.print("Enter city name: ");

25.                     String cityName = scanner.nextLine();

26.                     cityMap.addCity(cityName);

27.                     break;

28.

29.                 case 2:

30.                     System.out.print("Enter first city name: ");

31.                     String city1 = scanner.nextLine();

32.                     System.out.print("Enter second city name: ");

33.                     String city2 = scanner.nextLine();

34.                     cityMap.addRoad(city1, city2);

35.                     break;

36.

37.                 case 3:

38.                     cityMap.displayCityMap();

39.                     break;

40.

41.                 case 4:

42.                     System.out.print("Enter starting city for BFS traversal: ");

43.                     String bfsStart = scanner.nextLine();

44.                     cityMap.bfsTraversal(bfsStart);

45.                     break;

46.

47.                 case 5:

48.                     System.out.print("Enter starting city for DFS traversal: ");

49.                     String dfsStart = scanner.nextLine();

50.                     cityMap.dfsTraversal(dfsStart);

51.                     break;

52.

53.                 case 6:

54.                     System.out.print("Enter source city: ");

55.                     String source = scanner.nextLine();

56.                     System.out.print("Enter destination city: ");

57.                     String destination = scanner.nextLine();

58.                     boolean exists = cityMap.pathExists(source, destination);

59.                     if (exists) {

60.                         System.out.println("A path exists between " + source + " and " + destination);

61.                     } else {

62.                         System.out.println("No path exists between " + source + " and " + destination);

63.                     }

64.                     break;

65.

66.                 case 7:

67.                     System.out.println("Exiting... Thank you!");

68.                     scanner.close();

69.                     return;

70.

71.                 default:

72.                     System.out.println("Invalid option. Please try again.");

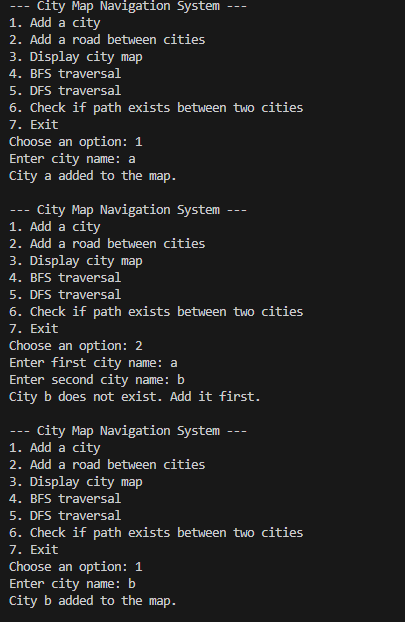
73.             }

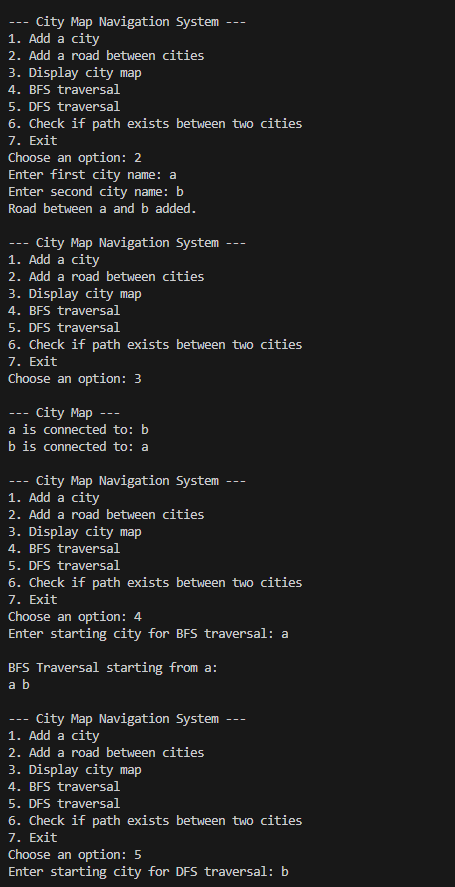
74.         }

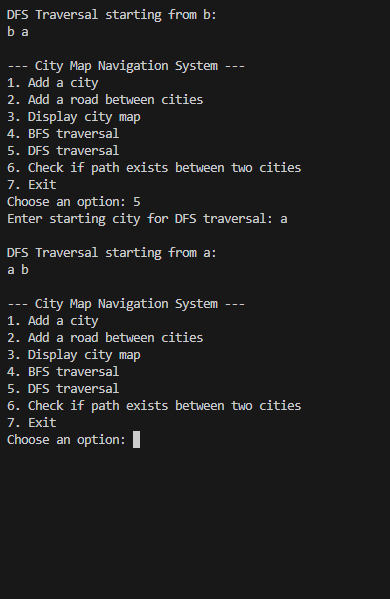
75.     }

76. }

77.

****

****

****