ASSIGNMENT 14

```
#include <bits/stdc++.h>
using namespace std;



class Graph {
private:
  map<string, vector<pair<int, string>>> adjMatrix;

public:
  Graph() {};

  Graph(vector<string>& cities) {
    std::sort(cities.begin(), cities.end());
    // Initialize everything to 0
    for (const string& cityA : cities) {
      for (const string& cityB : cities) {
        adjMatrix[cityA].emplace_back(0, cityB);
      }
    }
  }

  void addEdge(const string& ca, const string& cb, int weight) {
    auto& cityARow = adjMatrix[ca];
    auto pair = std::find(cityARow.begin(), cityARow.end(), make_pair(0, cb));
    pair->first = weight;

    auto& cityBRow = adjMatrix[cb];
    pair = std::find(cityBRow.begin(), cityBRow.end(), make_pair(0, ca));
    pair->first = weight;
    }

    void displayMatrix() {
        cout << endl;

        // Display Column Labels
        cout << "   ";
        for (const auto& element : adjMatrix) {
            cout << " " << element.first;
        }
        cout << endl;

        // Display Rows
        for (const auto& element : adjMatrix) {
            cout << element.first << " [";
            for (auto weights : element.second) {
                cout << " " << weights.first;
            }
            cout << " ]" << endl;
        }

        cout << endl;
    }
};


int main() {
    int n;
    vector<string> edges;

    cout << "Enter number of cities: ";
```

```
cin >> n;
cout << "Enter list of cities: " << endl;
string city;
for (int i = 0 ; i < n ; i++) {
   cin >> city;
   edges.push_back(city);
}

Graph g(edges);

string cityA, cityB;
int weight;
char choice;
cout << "\nDo you want to create paths? (y/n): ";
cin >> choice;
while (choice == 'y') {
   // Clear input buffer
   cin.clear();
   cin.ignore();

   cout << "Enter 1st city in path: ";
   cin >> cityA;
   cout << "Enter 2nd city in path: ";
   cin >> cityB;
   cout << "Enter weight of path: ";
   cin >> weight;

   g.addEdge(cityA, cityB, weight);

   // Clear input buffer
   cin.clear();
```

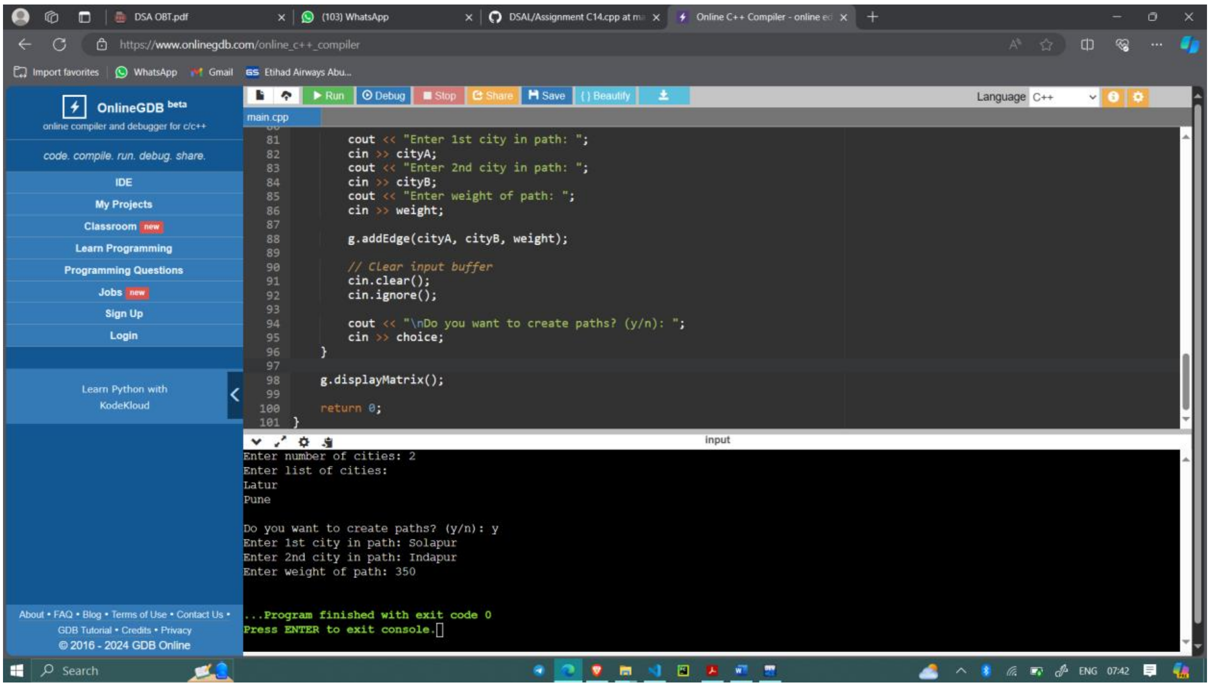
```
        cin.ignore();

        cout << "\nDo you want to create paths? (y/n): ";
        cin >> choice;
    }

    g.displayMatrix();

    return 0;
}
```

OUTPUT :



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{ } Beautify
Language C++
main.cpp
input
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```
            cout << "Enter 1st city in path: ";
            cin >> cityA;
            cout << "Enter 2nd city in path: ";
            cin >> cityB;
            cout << "Enter weight of path: ";
            cin >> weight;

            g.addEdge(cityA, cityB, weight);

            // Clear input buffer
            cin.clear();
            cin.ignore();

            cout << "\nDo you want to create paths? (y/n): ";
            cin >> choice;
        }

        g.displayMatrix();

        return 0;
    }
```

```
Enter number of cities: 2
Enter list of cities:
Latur
Pune

Do you want to create paths? (y/n): y
Enter 1st city in path: Solapur
Enter 2nd city in path: Indapur
Enter weight of path: 350


...Program finished with exit code 0
Press ENTER to exit console.
```