Experiment 2.2

Student Name: Gaurav Kumar **UID:** 22MCC20177

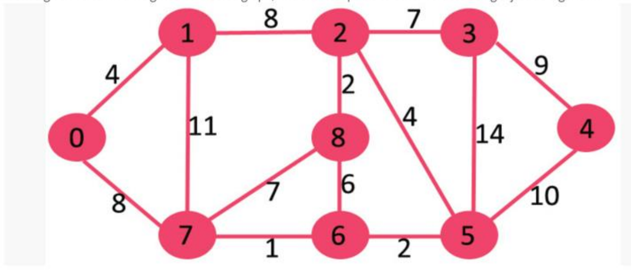
Branch: Computer **Section/Group:-** 1/B

Semester: One **Date of Performance:** 27/11/2022

Subject Name:- Design & Analysis of Algorithms Lab **Subject Code:** 22CAP-646

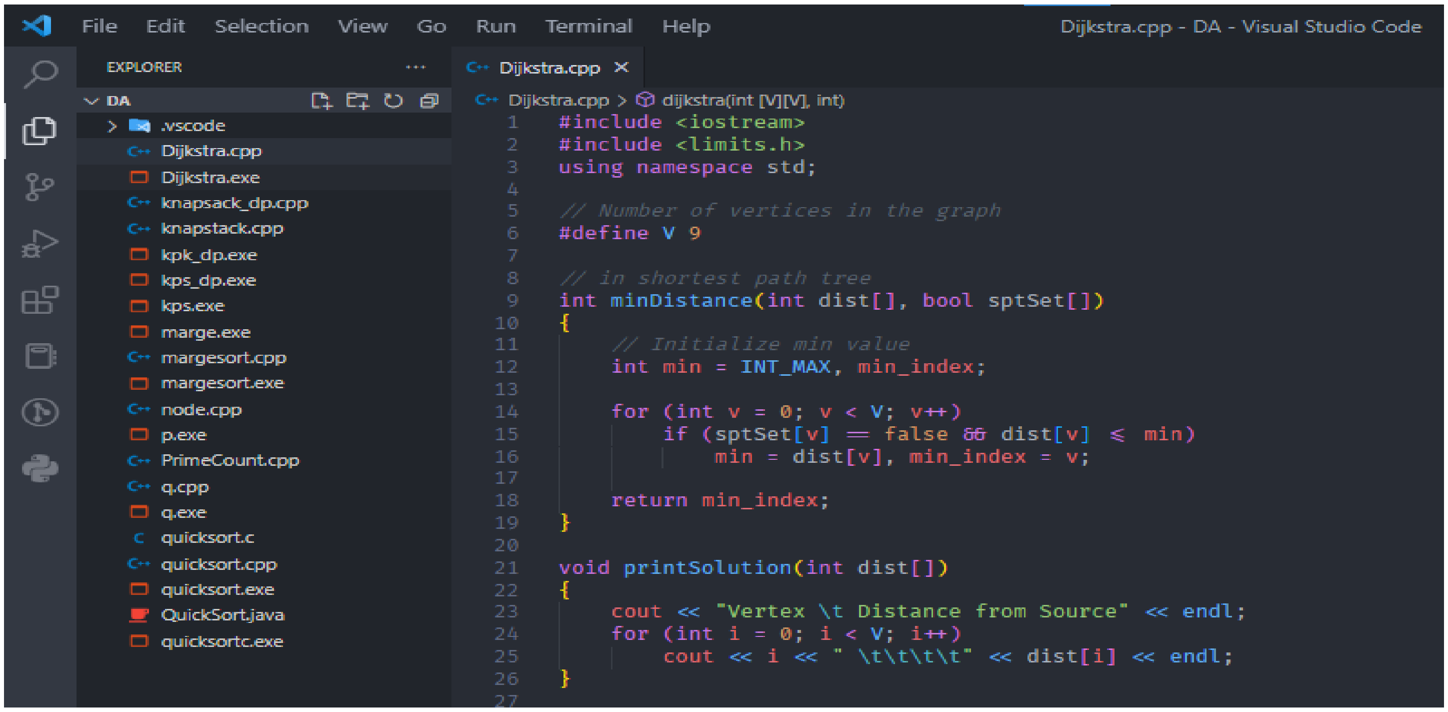
Task to be done:

From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.

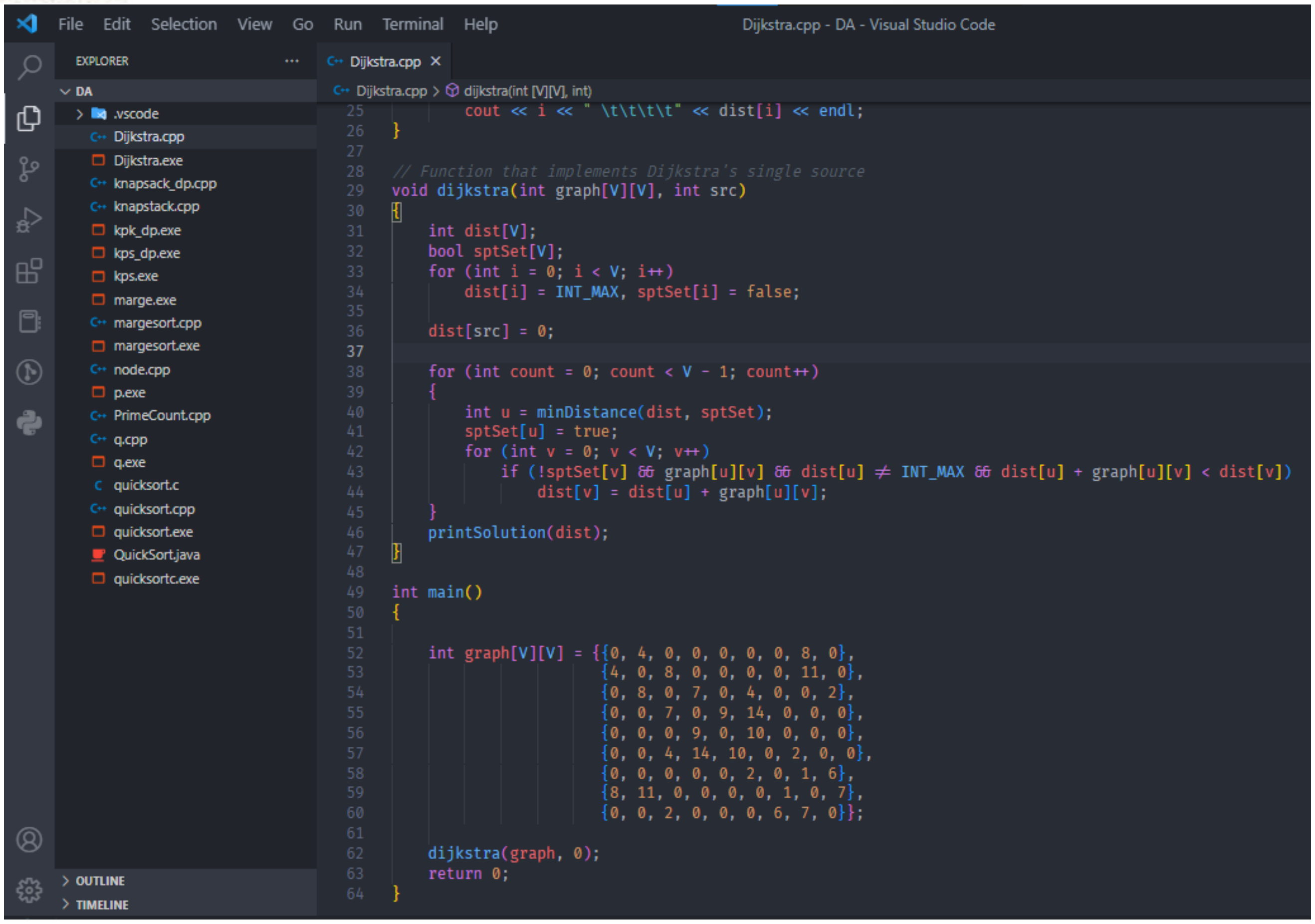


Steps for experiment/practical:

copy and paste your code here/screenshots

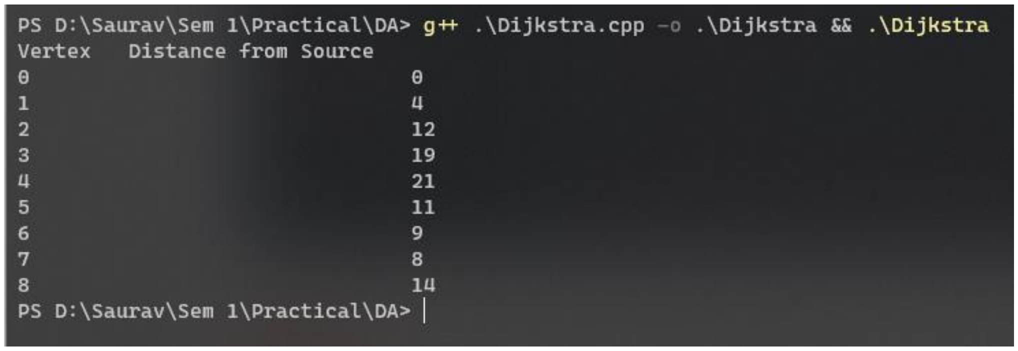


```cpp
#include <iostream>
#include <limits.h>
using namespace std;

// Number of vertices in the graph
#define V 9

// in shortest path tree
int minDistance(int dist[], bool sptSet[])
{
    // Initialize min value
    int min = INT_MAX, min_index;

    for (int v = 0; v < V; v++)
        if (sptSet[v] == false && dist[v] <= min)
            min = dist[v], min_index = v;

    return min_index;
}

void printSolution(int dist[])
{
    cout << "Vertex \t Distance from Source" << endl;
    for (int i = 0; i < V; i++)
        cout << i << " \t\t\t\t" << dist[i] << endl;
}
```



```cpp
        cout << i << " \t\t\t\t" << dist[i] << endl;
}

// Function that implements Dijkstra's single source
void dijkstra(int graph[V][V], int src)
{
    int dist[V];
    bool sptSet[V];
    for (int i = 0; i < V; i++)
        dist[i] = INT_MAX, sptSet[i] = false;

    dist[src] = 0;

    for (int count = 0; count < V - 1; count++)
    {
        int u = minDistance(dist, sptSet);
        sptSet[u] = true;
        for (int v = 0; v < V; v++)
            if (!sptSet[v] && graph[u][v] && dist[u] != INT_MAX && dist[u] + graph[u][v] < dist[v])
                dist[v] = dist[u] + graph[u][v];
    }
    printSolution(dist);
}

int main()
{

    int graph[V][V] = {{0, 4, 0, 0, 0, 0, 0, 8, 0},
                       {4, 0, 8, 0, 0, 0, 0, 11, 0},
                       {0, 8, 0, 7, 0, 4, 0, 0, 2},
                       {0, 0, 7, 0, 9, 14, 0, 0, 0},
                       {0, 0, 0, 9, 0, 10, 0, 0, 0},
                       {0, 0, 4, 14, 10, 0, 2, 0, 0},
                       {0, 0, 0, 0, 0, 2, 0, 1, 6},
                       {8, 11, 0, 0, 0, 0, 1, 0, 7},
                       {0, 0, 2, 0, 0, 0, 6, 7, 0}};

    dijkstra(graph, 0);
    return 0;
}
```

Output (screenshots)



```
PS D:\Saurav\Sem 1\Practical\DA> g++ .\Dijkstra.cpp -o .\Dijkstra && .\Dijkstra
Vertex   Distance from Source
0                               0
1                               4
2                               12
3                               19
4                               21
5                               11
6                               9
7                               8
8                               14
PS D:\Saurav\Sem 1\Practical\DA> |
```

Learning outcomes (What I have learnt): Times new roman 12 size

Evaluation Grid:

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.	Demonstration and Performance (Quiz)		22
2.	Worksheet		8