OSCN LAB – 2

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PROGRAM 1.2 Write a C++ program to implement Dijkstra's Single Source Shortest Path Algorithm for a given weighted, undirected graph using an adjacency matrix representation.

1. **Problem Setup**

- We have **9 vertices** (0 to 8).

  Graph[][] = 0 5 10 0
  5 0 3 20
  10 3 0 2
  0 20 2 0

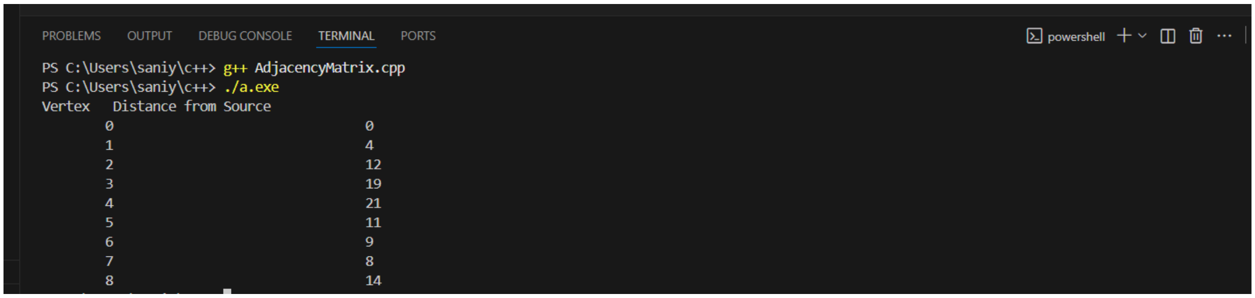
Code:

```
#include<limits.h>
#include<stdio.h>
#include<stdbool.h>
#define V 9
int minDistance(int dist[], bool sptSet[])

{

   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[], int n)
```

```
{
    printf("     Vertex                   Distance from Source\n");
    for (int i = 0; i < V; i++)
        printf("\t%d \t\t\t\t %d\n", i, dist[i]);
}
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, V);
}
```

```
int main()
{
   int graph[V][V]= {{0,4,0,0,0,0,0,8,0},
   {4,0,8,0,0,0,11,0},{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:



```
PS C:\Users\saniy\c++> g++ AdjacencyMatrix.cpp
PS C:\Users\saniy\c++> ./a.exe
Vertex   Distance from Source
        0                               0
        1                               4
        2                               12
        3                               19
        4                               21
        5                               11
        6                               9
        7                               8
        8                               14
```