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AIM:	To implement Dijkstra's Algorithm
Program	
PROBLEM STATEMENT :	To implement Dijkstra's Algorithm

ALGORITHM/ THEORY:	1. Create cost matrix C[ ][ ] from adjacency matrix adj[ ][ ]. C[i][j] is the cost of going from vertex i to vertex j. If there is no edge between vertices i and j then C[i][j] is infinity.
	
	2. Array visited[ ] is initialized to zero.
	for(i=0;i<n;i++)
	visited[i]=0;
	
	3. If the vertex 0 is the source vertex then visited[0] is marked as 1.
	
	4. Create the distance matrix, by storing the cost of vertices from vertex no. 0 to n-1 from the source vertex 0.
	for(i=1;i<n;i++)
	distance[i]=cost[0][i];
	Initially, distance of source vertex is taken as 0. i.e. distance[0]=0;
	
	5. for(i=1;i<n;i++)
	– Choose a vertex w, such that distance[w] is minimum and visited[w] is 0. Mark visited[w] as 1.
	– Recalculate the shortest distance of remaining vertices from the

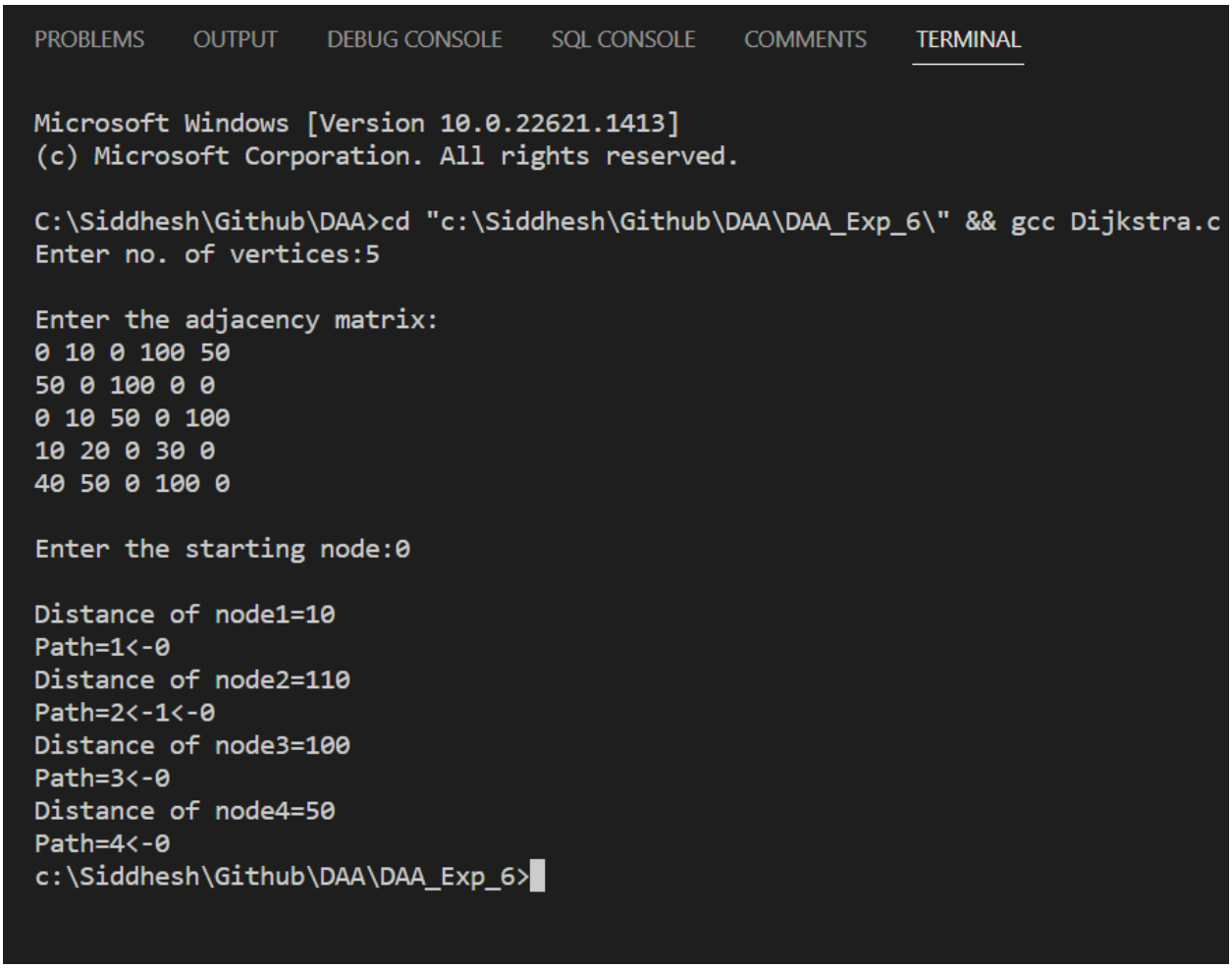
	source. – Only, the vertices not marked as 1 in array visited[ ] should be considered for recalculation of distance. i.e. for each vertex v if(visited[v]==0) distance[v]=min(distance[v], distance[w]+cost[w][v])
PROGRAM:	

```c
#include <stdio.h>
#include <conio.h>
#define INFINITY 9999
#define MAX 10

void dijkstra(int G[MAX][MAX], int n, int startnode)
{

    int cost[MAX][MAX], distance[MAX], pred[MAX];
    int visited[MAX], count, mindistance, nextnode,
i, j;
    for (i = 0; i < n; i++)
        for (j = 0; j < n; j++)
            if (G[i][j] == 0)
            {
                cost[i][j] = INFINITY;
            }
            else
            {
                cost[i][j] = G[i][j];
            }
    for (i = 0; i < n; i++)
    {
        distance[i] = cost[startnode][i];
        pred[i] = startnode;
        visited[i] = 0;
    }
    distance[startnode] = 0;
    visited[startnode] = 1;
    count = 1;
    while (count < n - 1)
```

```
    {
        mindistance = INFINITY;

        for (i = 0; i < n; i++)
            if (distance[i] < mindistance &&
!visited[i])
            {
                mindistance = distance[i];
                nextnode = i;
            }

        visited[nextnode] = 1;
        for (i = 0; i < n; i++)
            if (!visited[i])
                if (mindistance + cost[nextnode][i] <
distance[i])
                {
                    distance[i] = mindistance +
cost[nextnode][i];
                    pred[i] = nextnode;
                }
        count++;
    }

    for (i = 0; i < n; i++)
        if (i != startnode)
        {
            printf("\nDistance of node%d=%d", i,
distance[i]);
            printf("\nPath=%d", i);
            j = i;
            do
            {
                j = pred[j];
                printf("<-%d", j);
            } while (j != startnode);
        }
}
```

```c
int main()
{
    int G[MAX][MAX], i, j, n, u;
    printf("Enter no. of vertices:");
    scanf("%d", &n);
    printf("\nEnter the adjacency matrix:\n");
    for (i = 0; i < n; i++)
    {
        for (j = 0; j < n; j++)
        {
            scanf("%d", &G[i][j]);
        }
    }
    printf("\nEnter the starting node:");
    scanf("%d", &u);
    dijkstra(G, n, u);
    return 0;
}
```

RESULT:



CONCLUSION:	Successfully understood Dijkstra's algorithm and implemented it in C program to find the shortest path.