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Prac-5 : Dijkstra's algorithm for single source shortest path

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

#define V 10

int minDistance(int dist[], bool included[])
{
    int min = INT_MAX, min_index;

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

    return min_index;
}

void dijkstra(int graph[V][V], int src)
{
    int dist[V];
    bool included[V];

    for (int i = 0; i < V; i++)
        dist[i] = INT_MAX, included[i] = false;

    dist[src] = 0;

    for (int i = 0; i < V-1; i++)
    {
        int u = minDistance(dist, included);
        included[u] = true;

        for (int v = 0; v < V; v++)
            if (!included[v] && graph[u][v] && dist[u] != INT_MAX &&
                dist[u] + graph[u][v] < dist[v])
                dist[v] = dist[u] + graph[u][v];
    }

    cout << "\n-----\n";
    cout << "Vertex      Distance\n";
    cout << "-----\n";
}
```

```

    for (int i = 0; i < V; i++)
        cout << "    " << i << "    --->    " << dist[i] << "\n";
    cout << '\n';
}

int main()
{
    int graph[V][V] =    { { 0, 6, 4, 4, 8, 3, 4, 0, 2, 6 },
                           { 6, 0, 0, 9, 6, 3, 3, 1, 2, 4 },
                           { 4, 0, 0, 5, 4, 1, 2, 8, 4, 8 },
                           { 4, 9, 5, 0, 5, 6, 7, 2, 1, 7 },
                           { 8, 6, 4, 5, 0, 0, 2, 1, 6, 3 },
                           { 3, 3, 1, 6, 0, 0, 4, 2, 0, 0 },
                           { 4, 3, 2, 7, 2, 4, 0, 9, 8, 7 },
                           { 0, 1, 8, 2, 1, 2, 9, 0, 2, 3 },
                           { 2, 2, 4, 1, 6, 0, 8, 2, 0, 7 },
                           { 6, 4, 8, 7, 3, 0, 7, 3, 7, 0 } };

    int source = 4;
    cout << "\nSource vertex = " << source << '\n';

    dijkstra(graph, source);
    return 0;
}

```

## OUTPUT :

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Source vertex = 4

```

-----
Vertex      Distance
-----
0    --->    5
1    --->    2
2    --->    4
3    --->    3
4    --->    0
5    --->    3
6    --->    2
7    --->    1
8    --->    3
9    --->    3

```