DAA EXP 6

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AIM:

Greedy-Approach single source shortest path- Dijkstra's Algorithm

ALGORITHM:

1. Create cost matrix C[ ][ ] from adjacencymatrix adj[ ][ ]. C[i][j] is the cost of going from vertex i to vertex j. Ifthere 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 thenvisited[0] is marked as 1.4. Create the distance matrix, by storingthe 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 takenas 0.i.e.distance[0]=0;5. for(i=1;i<n;i++)– Choose a vertex w, such that distance[w] isminimum and visited[w] is 0.Mark visited[w] as 1.– Recalculate the shortest distance ofremaining vertices from the source.– Only, the vertices not marked as 1 in arrayvisited[ ] 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[v]

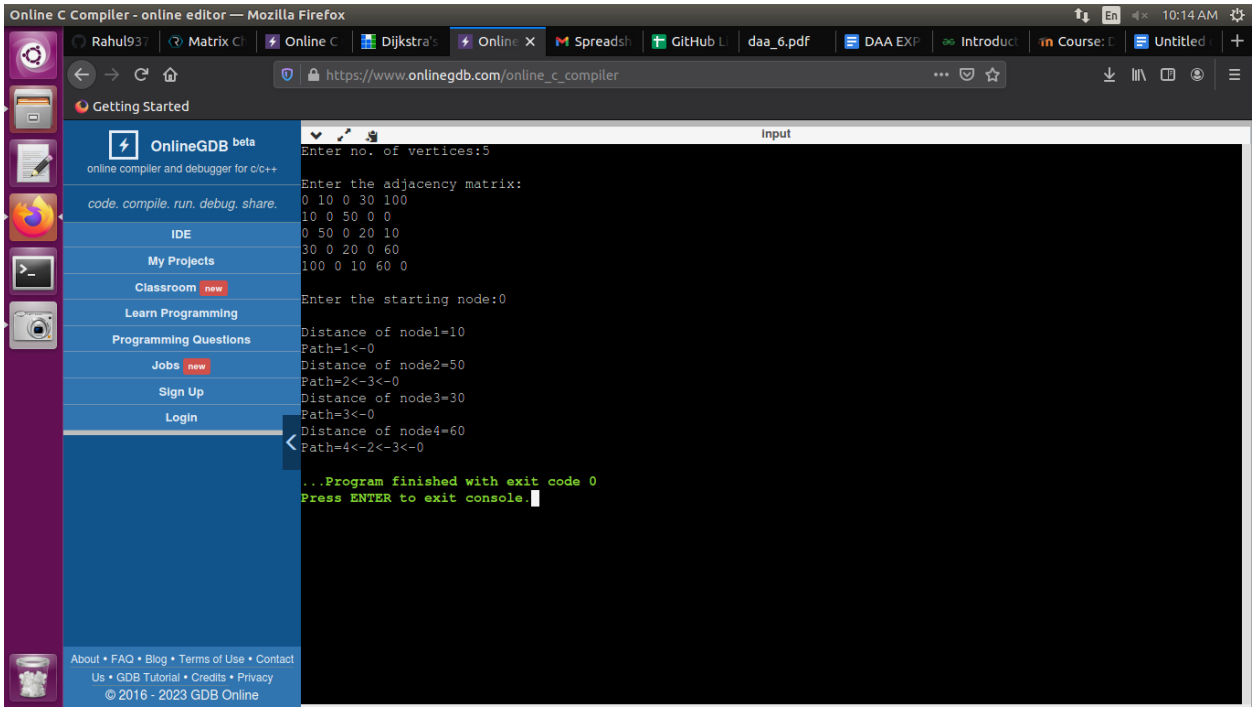
CODE:

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

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

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;
}

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;
//pred[] stores the predecessor of each node
//count gives the number of nodes seen so far
//create the cost matrix
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];
//initialize pred[],distance[] and visited[]
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;
//nextnode gives the node at minimum distance
for(i=0;i<n;i++)
if(distance[i]<mindistance&&!visited[i])
{
mindistance=distance[i];
nextnode=i;
}
//check if a better path exists through nextnode
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++;
}

//print the path and distance of each node
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);
}
}
```

OUTPUT:



CONCLUSION:

IN this experiment i HAVE UNDERSTOOD Dijkstra algorithm in C.