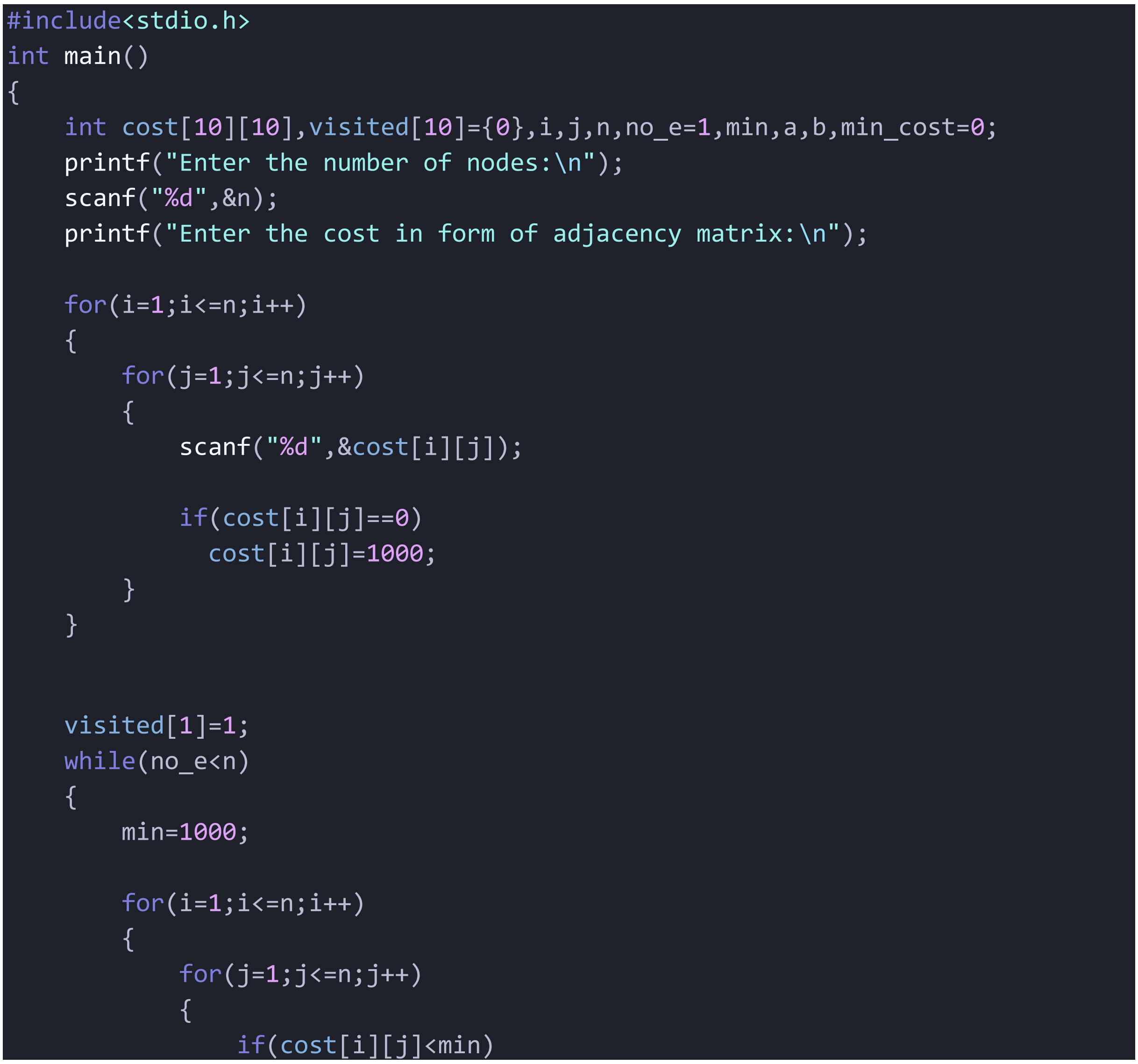
WEEK 7

Y. Shamil Ahamed

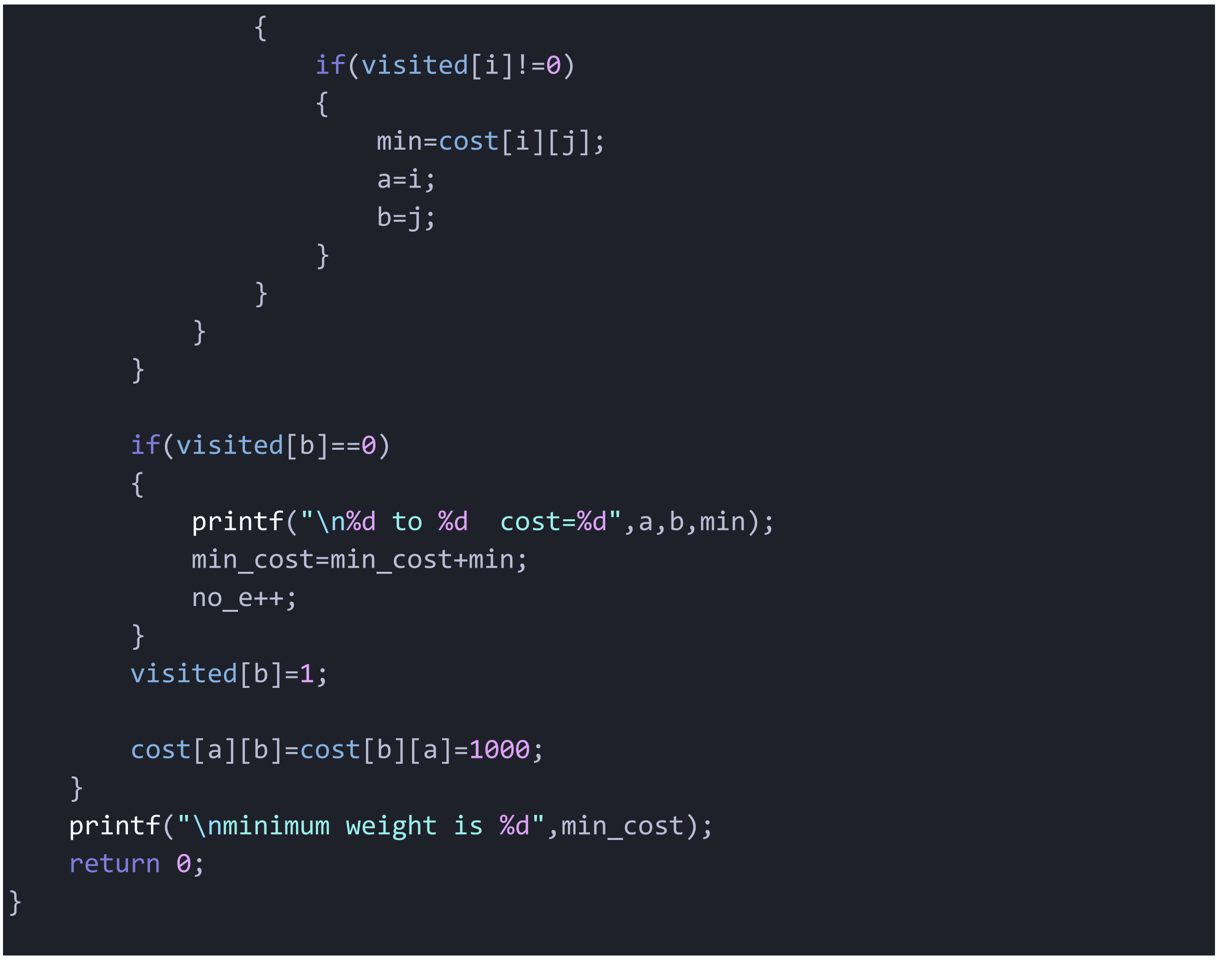
1BM21CS248

PRIM'S Algorithm:

INPUT:

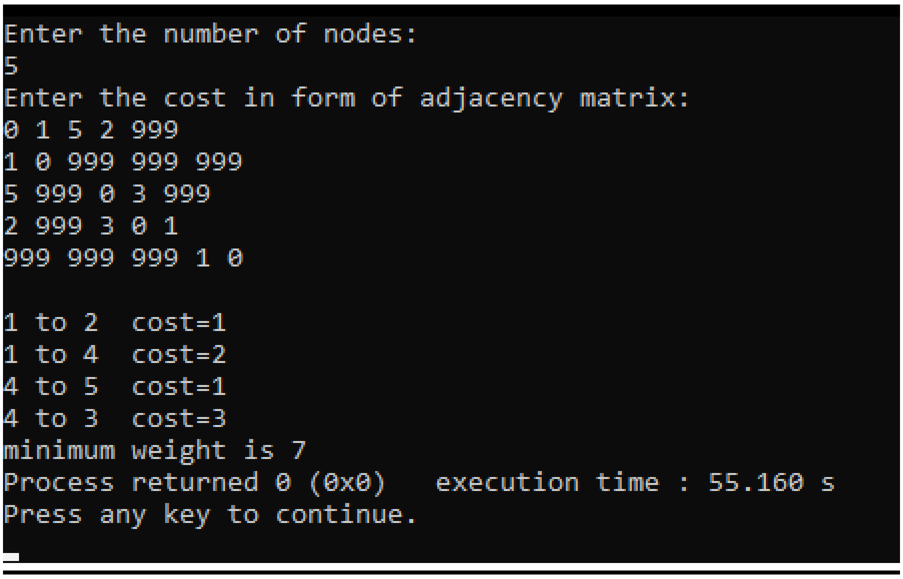


```
#include<stdio.h>
int main()
{
    int cost[10][10],visited[10]={0},i,j,n,no_e=1,min,a,b,min_cost=0;
    printf("Enter the number of nodes:\n");
    scanf("%d",&n);
    printf("Enter the cost in form of adjacency matrix:\n");

    for(i=1;i<=n;i++)
    {
        for(j=1;j<=n;j++)
        {
            scanf("%d",&cost[i][j]);

            if(cost[i][j]==0)
              cost[i][j]=1000;
        }
    }


    visited[1]=1;
    while(no_e<n)
    {
        min=1000;

        for(i=1;i<=n;i++)
        {
            for(j=1;j<=n;j++)
            {
                if(cost[i][j]<min)
```



```
                {
                    if(visited[i]!=0)
                    {
                        min=cost[i][j];
                        a=i;
                        b=j;
                    }
                }
            }
        }

        if(visited[b]==0)
        {
            printf("\n%d to %d  cost=%d",a,b,min);
            min_cost=min_cost+min;
            no_e++;
        }
        visited[b]=1;

        cost[a][b]=cost[b][a]=1000;
    }
    printf("\nminimum weight is %d",min_cost);
    return 0;
}
```

OUTPUT:

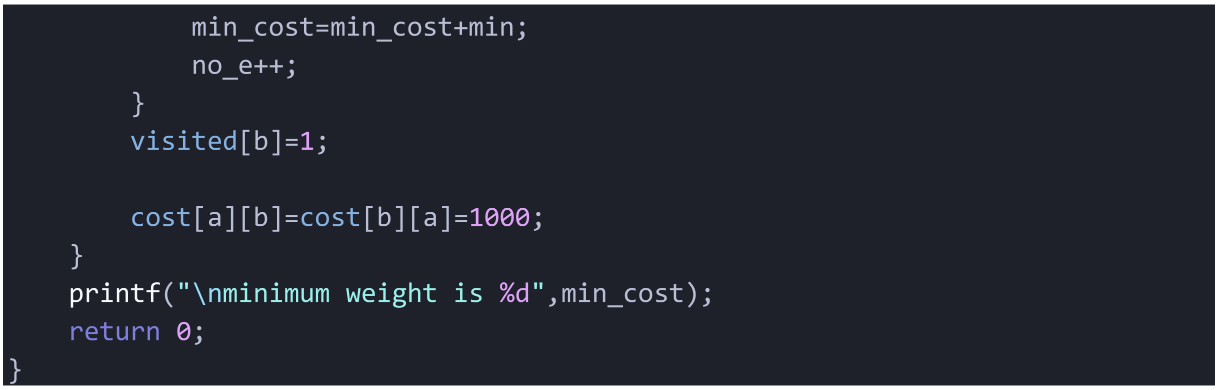


```
Enter the number of nodes:
5
Enter the cost in form of adjacency matrix:
0 1 5 2 999
1 0 999 999 999
5 999 0 3 999
2 999 3 0 1
999 999 999 1 0

1 to 2  cost=1
1 to 4  cost=2
4 to 5  cost=1
4 to 3  cost=3
minimum weight is 7
Process returned 0 (0x0)   execution time : 55.160 s
Press any key to continue.
```

Kruskal’s Algorithm:

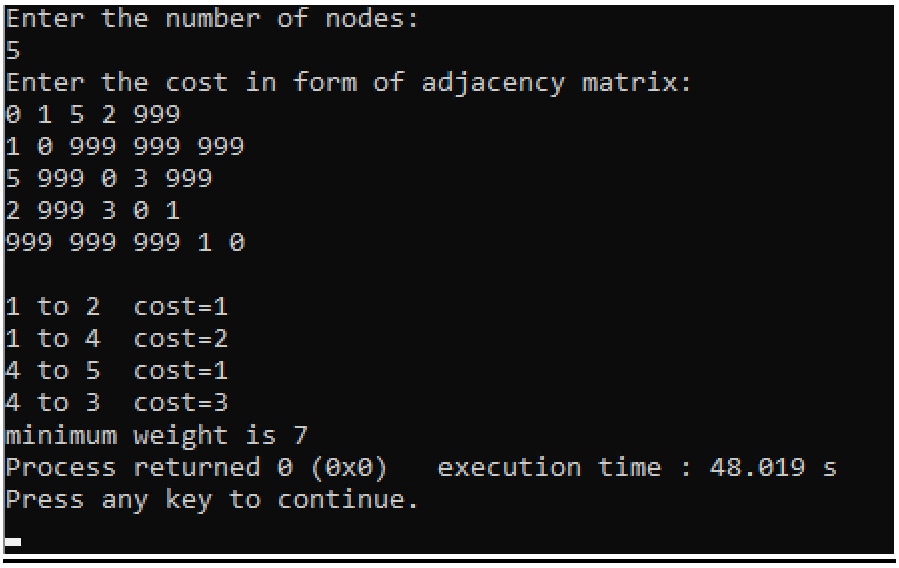
INPUT:

```
#include<stdio.h>
int main()
{
    int cost[10][10],visited[10]={0},i,j,n,no_e=1,min,a,b,min_cost=0;
    printf("Enter the number of nodes:\n");
    scanf("%d",&n);
    printf("Enter the cost in form of adjacency matrix:\n");

    for(i=1;i<=n;i++)
    {
        for(j=1;j<=n;j++)
        {
            scanf("%d",&cost[i][j]);

            if(cost[i][j]==0)
              cost[i][j]=1000;
        }
    }


    visited[1]=1;
    while(no_e<n)
    {
        min=1000;

        for(i=1;i<=n;i++)
        {
            for(j=1;j<=n;j++)
            {
                if(cost[i][j]<min)
                {
                    if(visited[i]!=0)
                    {
                        min=cost[i][j];
                        a=i;
                        b=j;
                    }
                }
            }
        }

        if(visited[b]==0)
        {
            printf("\n%d to %d  cost=%d",a,b,min);
```



```
            min_cost=min_cost+min;
            no_e++;
        }
        visited[b]=1;

        cost[a][b]=cost[b][a]=1000;
    }
    printf("\nminimum weight is %d",min_cost);
    return 0;
}
```

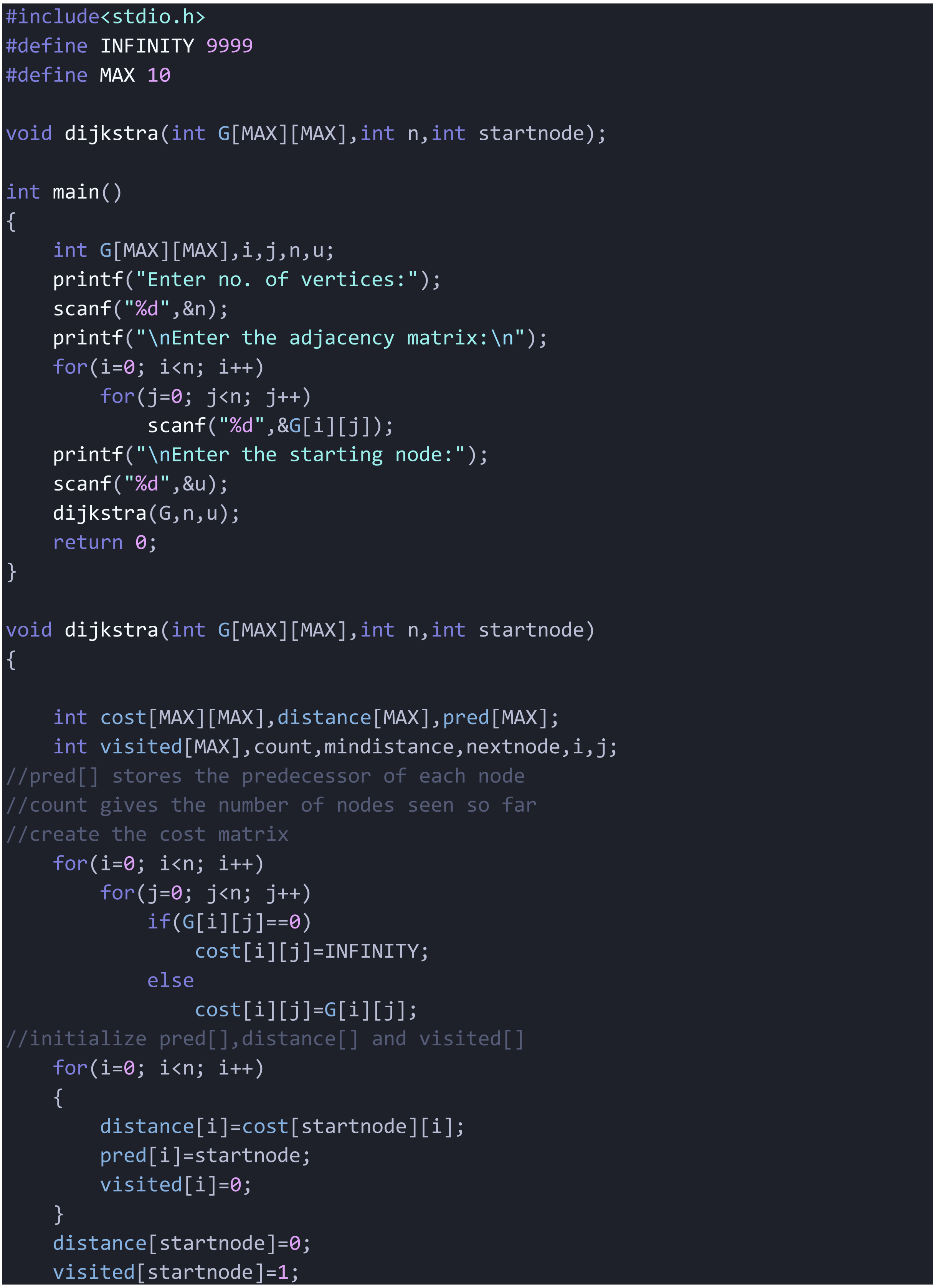
OUTPUT:



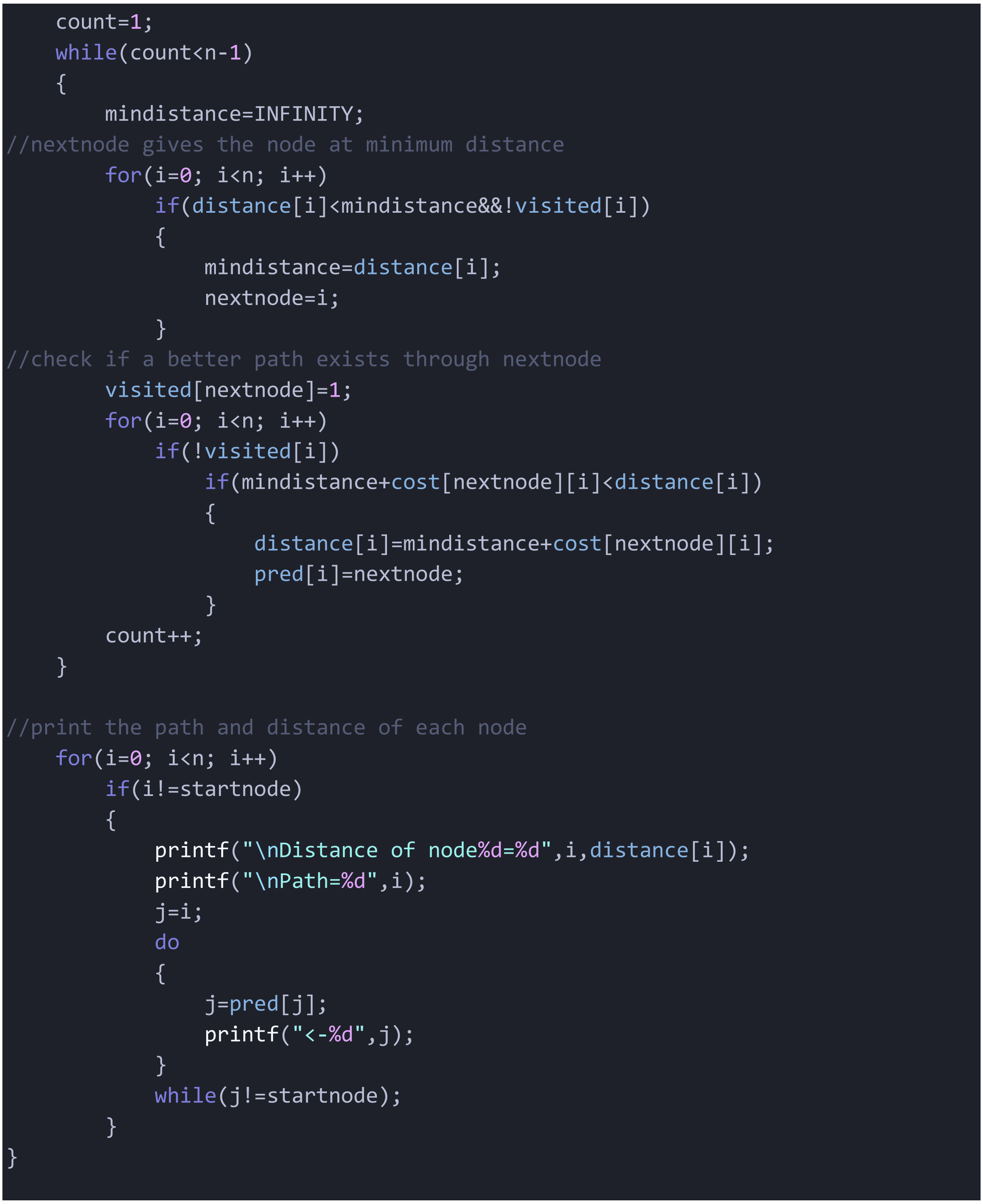
```
Enter the number of nodes:
5
Enter the cost in form of adjacency matrix:
0 1 5 2 999
1 0 999 999 999
5 999 0 3 999
2 999 3 0 1
999 999 999 1 0

1 to 2  cost=1
1 to 4  cost=2
4 to 5  cost=1
4 to 3  cost=3
minimum weight is 7
Process returned 0 (0x0)   execution time : 48.019 s
Press any key to continue.
```

DIJKSTRA'S ALGORITHM:

INPUT:

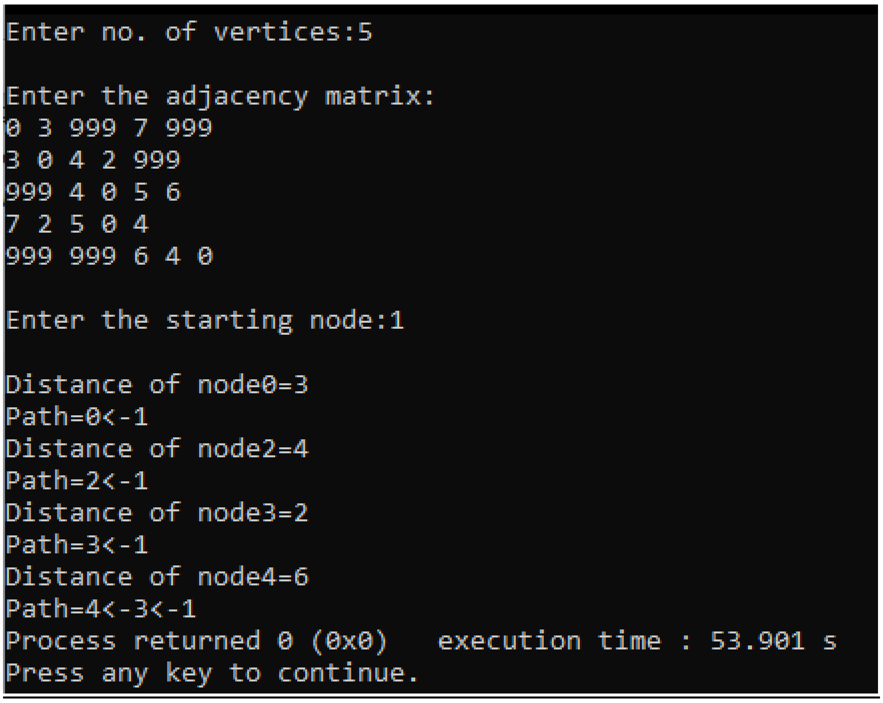


```c
#include<stdio.h>
#define INFINITY 9999
#define MAX 10

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:



```
Enter no. of vertices:5

Enter the adjacency matrix:
0 3 999 7 999
3 0 4 2 999
999 4 0 5 6
7 2 5 0 4
999 999 6 4 0

Enter the starting node:1

Distance of node0=3
Path=0<-1
Distance of node2=4
Path=2<-1
Distance of node3=2
Path=3<-1
Distance of node4=6
Path=4<-3<-1
Process returned 0 (0x0)   execution time : 53.901 s
Press any key to continue.
```