PROGRAM 6

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- 2K18/SE/041

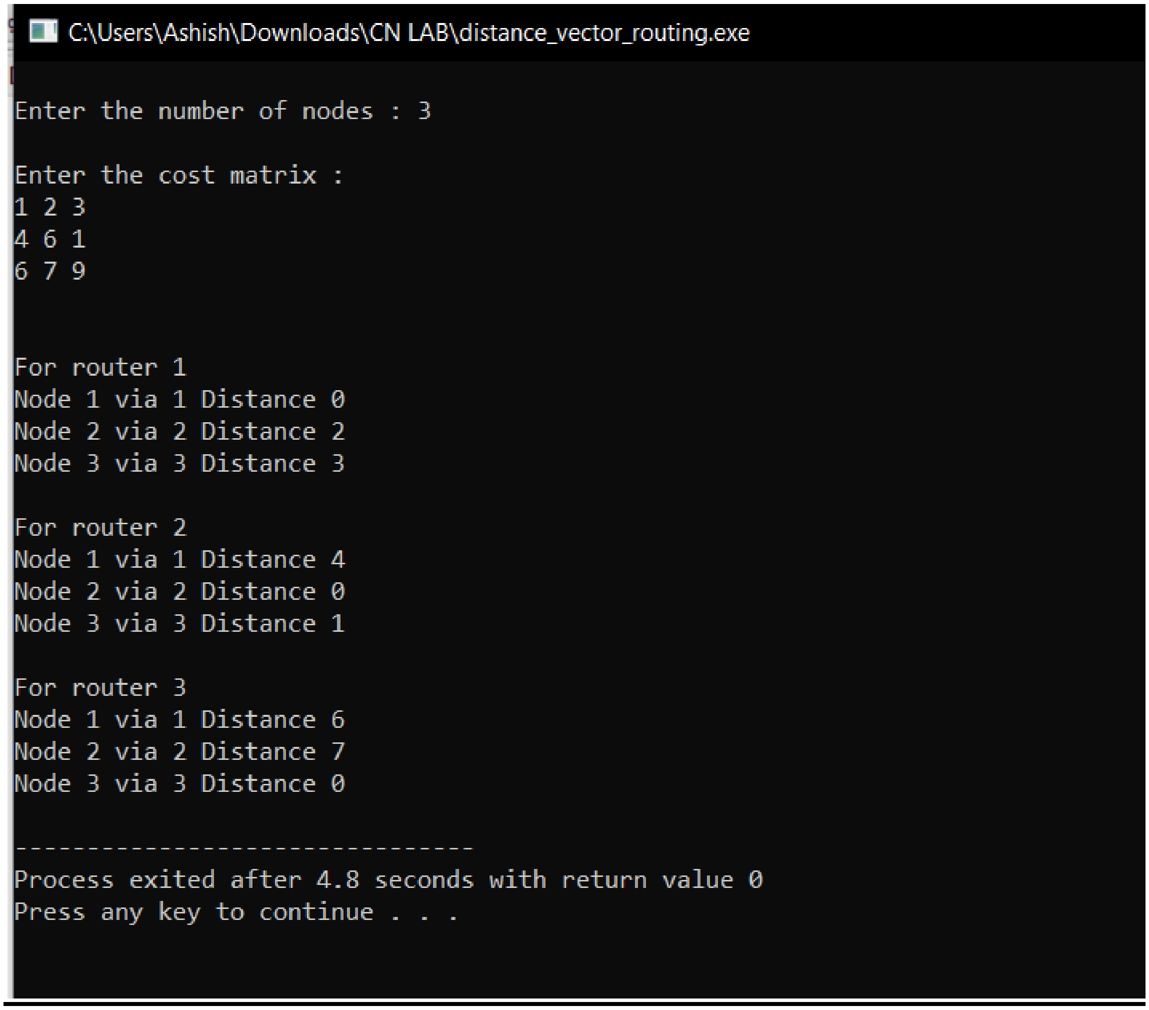
Aim:- Write a C++ program to implement distance vector routing(DVR) algorithm.

Theory:- A distance-vector routing algorithm also called the Bellman-Ford algorithm is a routing algorithm in which every router maintains a database with one entry for each possible destination on the network. It requires that a router inform its neighbours of topology changes periodically. Routers select the route with the lowest cost to each possible destination and add this to their own routing tables. These neighbors propagate the information to their neighbors hop by hop until information from all routers has spread throughout the entire internetwork.

CODE:-

```
#include<iostream>

using namespace std;

struct node

{

unsigned dist[20];

unsigned parent[20];

} rt[10];


int main()

{

int costmat[20][20];
int nodes,i,j,k,count=0;

cout<<"\nEnter the number of nodes : ";

cin>>nodes;

cout<<"\nEnter the cost matrix :\n";

for(i=0;i<nodes;i++)

for(j=0;j<nodes;j++)

{

cin>>costmat[i][j];

costmat[i][i]=0;

rt[i].dist[j]=costmat[i][j];

rt[i].parent[j]=j;

}

do

{

count=0;

for(i=0;i<nodes;i++)

for(j=0;j<nodes;j++)

for(k=0;k<nodes;k++)

if(rt[i].dist[j]>costmat[i][k]+rt[k].dist[j])

{

rt[i].dist[j]=rt[i].dist[k]+rt[k].dist[j];

rt[i].parent[j]=k;

count++;

}
}while(count!=0);


for(i=0;i<nodes;i++)
{
cout<<"\n\nFor " <<"router "<<i+1;
for(j=0;j<nodes;j++)
cout<<"\nNode "<<j+1<<" via "<<rt[i].parent[j]+1<<" Distance "<<rt[i].dist[j]<<" ";
}
cout<<endl;
return 0;
}
```

OUTPUT:-



C:\Users\Ashish\Downloads\CN LAB\distance_vector_routing.exe

```
Enter the number of nodes : 3

Enter the cost matrix :
1 2 3
4 6 1
6 7 9


For router 1
Node 1 via 1 Distance 0
Node 2 via 2 Distance 2
Node 3 via 3 Distance 3

For router 2
Node 1 via 1 Distance 4
Node 2 via 2 Distance 0
Node 3 via 3 Distance 1

For router 3
Node 1 via 1 Distance 6
Node 2 via 2 Distance 7
Node 3 via 3 Distance 0

--------------------------------
Process exited after 4.8 seconds with return value 0
Press any key to continue . . .
```

Finding & Learning:- We have learned following things :

1. Distance vector algorithm is a dynamic algorithm. Each of the routers present in the network maintains a distance vector to store information regarding the shortest route to any given node from that node.
2. **Advantages of Distance Vector routing** :-
   • It is easy to administer and implement.
   • It is simpler to configure and maintain than link state routing.
   • Requires less hardware and processing power than other routing methods.
3. **Disadvantages of Distance Vector routing** :-
   • The problem with distance vector routing is its slowness in converging to the correct answer. This is due to a problem called count to infinity problem.
   • Another problem is that this algorithm does not take the line bandwidth into consideration when choosing root. For larger networks, distance vector routing results in larger routing tables than link state since each router must know about all other routers. This can also lead to congestion on WAN links.
   • It creates more traffic than link state since a hop count change must be propagated to all routers and processed on each router. Hop count updates take place on a periodic basis, even if there are no changes in the network topology, so bandwidth-wasting broadcasts still occur.