Networking Lab Assignment 12

Link state routing protocol

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1 Link state routing protocol

1.1 Aim

Implement and simulate algorithm for Link state routing protocol.

1.2 Theory

Link-State Routing protocol is a main class of routing protocols. It is performed by every switching node/router in the network. The basic concept of link-state routing is that every node constructs a map of the connectivity to the network, in the form of a Graph, showing which nodes are connected to which other nodes. Each node then independently calculates the next best logical path from it to every possible destination in the network. The collection of best paths will then form the node's routing table.

1.3 Algorithm

Algorithm 1 Algorithm for Link State Protocol

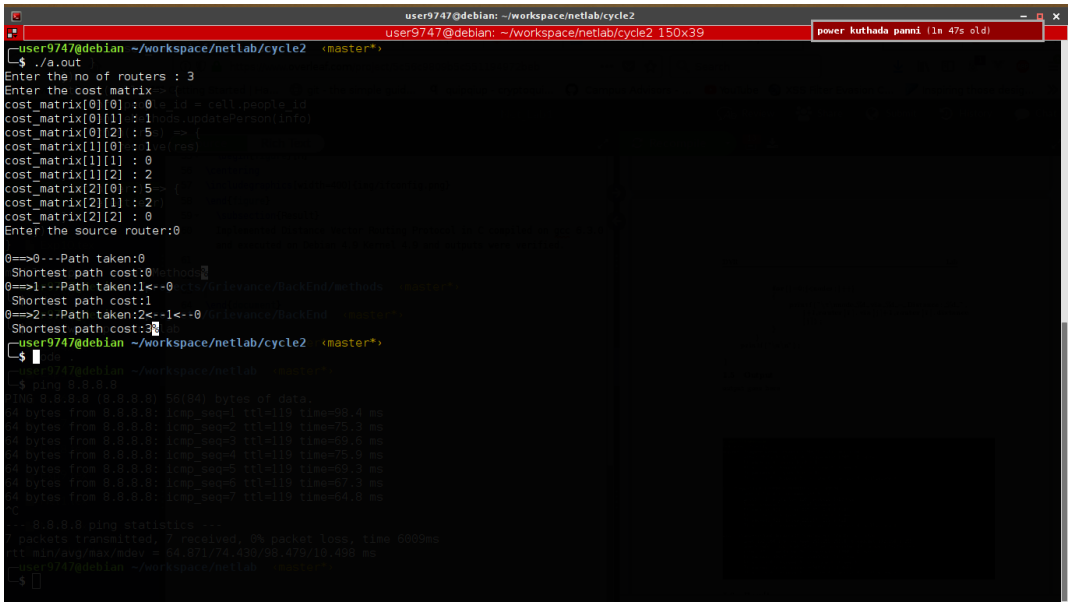
```
1     Add u to vector, N .
2     Input cost matrix, c.
3     for all node v
4         if v is a neighbour of u
5         * D[v]=c[u][v]
6         else
7         * D[v]=
8     Iterate till size of N becomes N (no of nodes in
      network)
9         Find a node w not in N such that D(w) is minimum
10        Add w to N
11        Update D[v] for each neighbour v of w and not in
          N
12    * D[v]=min(D[v],D[w]+c[w][v])
13    print d[v] for all node v
```

1.4 Program

```
#include <stdio.h>
#include <string.h>
int main()
{
    int count,source,i,j,k,w,v,min;
    int cost_matrix[100][100],distance[100],last[100];
    int flag[100];
    printf("Enter the no of routers :");
    scanf("%d",&count);
    printf("Enter the cost matrix\n");
    for(i=0;i<count;i++)
    {
        for(j=0;j<count;j++)
        {
            printf("cost_matrix[%d][%d] : ",i,j);
            scanf("%d",&cost_matrix[i][j]);
            if(cost_matrix[i][j]<0)cost_matrix[i][j]=1000;
        }
    }
    printf("Enter the source router:");
    scanf("%d",&source);
    for(v=0;v<count;v++)
    {
        flag[v]=0;
        last[v]=source;
        distance[v]=cost_matrix[source][v];
    }
    flag[source]=1;
    for(i=0;i<count;i++)
    {
        min=1000;
        for(w=0;w<count;w++)
        {
            if(!flag[w])
                if(distance[w]<min)
                {
                    v=w;
                    min=distance[w];
                }
            }
            flag[v]=1;
            for(w=0;w<count;w++)
            {
                if(!flag[w])
```

```
                    if(min+cost_matrix[v][w]<distance[w])
                    {
                        distance[w]=min+cost_matrix[v][w];
                        last[w]=v;
                    }
                }
            }
            for(i=0;i<count;i++)
            {
                printf("\n%d==>%d---Path taken:%d",source,i,
                    i);
                w=i;
                while(w!=source)
                {
                    printf("<--%d",last[w]);w=last[w];
                }
                printf("\n Shortest path cost:%d",distance[i
                    ]);
            }
        }
```

1.5 Output



1.6 Result

Implemented Link State Routing Protocol in C compiled on gcc 6.3.0 and executed on Debian 9.4 Kernel 4.9 and outputs were verified.