COMPUTER NETWORKS
LAB 7

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Ques - Implement distance vector routing algorithm for obtaining routing tables at each node.

Distance Vector routing algorithm works on the data i.e the shortest routing path got from dijkstar's algorithm and maintains a routing table at each router giving the best-known distance to each destination and which line to use to get there.

Routing is the process of selecting the shortest path to reach the destination. The routing table consists of two parts - one is which line to use to reach the destination and the other one is the distance to the destination.

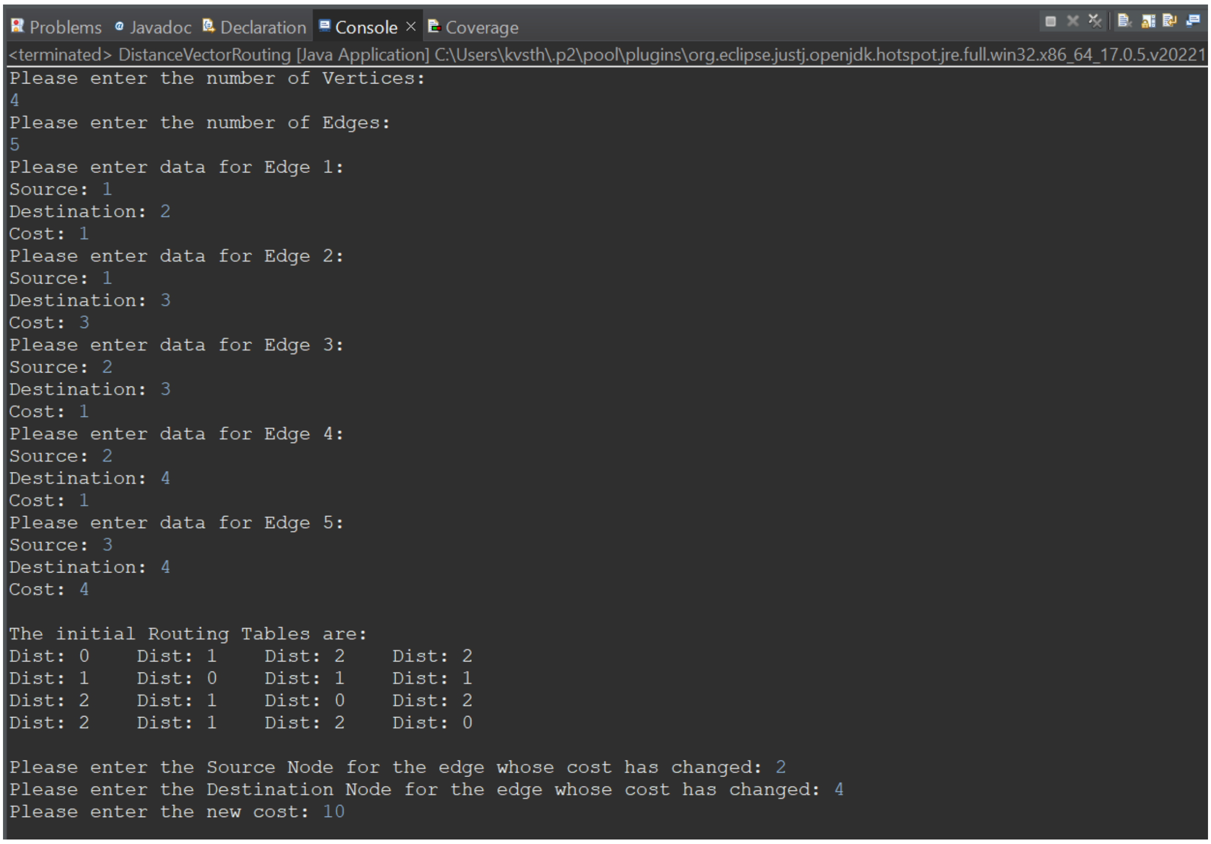
CODE :

```
import java.io.*;
public class DistanceVectorRouting
{
 static int graph[ ][ ];
 static int via[ ][ ];
 static int rt[ ][ ];
 static int v;
 static int e;

 public static void main(String args[]) throws IOException
 {
  BufferedReader br = new BufferedReader(new InputStreamReader(System.in));

  System.out.println("Please enter the number of Vertices: ");
  v = Integer.parseInt(br.readLine());

  System.out.println("Please enter the number of Edges: ");
  e = Integer.parseInt(br.readLine());

  graph = new int[v][v];
  via = new int[v][v];
  rt = new int[v][v];
  for(int i = 0; i < v; i++)
   for(int j = 0; j < v; j++)
   {
    if(i == j)
     graph[i][j] = 0;
    else
     graph[i][j] = 9999;
   }

  for(int i = 0; i < e; i++)
  {
   System.out.println("Please enter data for Edge " + (i + 1) + ":");
   System.out.print("Source: ");
   int s = Integer.parseInt(br.readLine());
   s--;
   System.out.print("Destination: ");
   int d = Integer.parseInt(br.readLine());
   d--;
   System.out.print("Cost: ");
   int c = Integer.parseInt(br.readLine());
   graph[s][d] = c;
   graph[d][s] = c;
  }

  dvr_calc_disp("The initial Routing Tables are: ");

  System.out.print("Please enter the Source Node for the edge whose cost has
changed: ");
  int s = Integer.parseInt(br.readLine());
  s--;
  System.out.print("Please enter the Destination Node for the edge whose cost
has changed: ");
  int d = Integer.parseInt(br.readLine());
  d--;
  System.out.print("Please enter the new cost: ");
  int c = Integer.parseInt(br.readLine());
  graph[s][d] = c;
  graph[d][s] = c;

  dvr_calc_disp("The new Routing Tables are: ");
 }

 static void dvr_calc_disp(String message)
 {
```

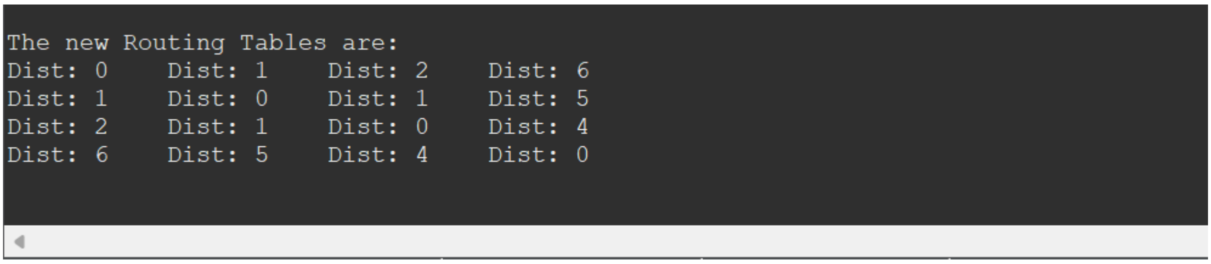
```
 System.out.println( );
 init_tables ( );
 update_tables( );
 System.out.println(message);
 print_tables( );
 System.out.println( );
}

static void update_table(int source)
{
 for(int i = 0; i < v; i++)
 {
  if(graph[source][i] != 9999)
  {
   int dist = graph[source][i];
   for(int j = 0; j < v; j++)
   {
    int inter_dist = rt[i][j];
    if(via[i][j] == source)
     inter_dist = 9999;
    if(dist + inter_dist < rt[source][j])
    {
     rt[source][j] = dist + inter_dist;
     via[source][j] = i;
    }
   }
  }
 }
}

static void update_tables()
{
 int k = 0;
 for(int i = 0; i < 4*v; i++)
 {
  update_table(k);
  k++;
  if(k == v)
   k = 0;
 }
}

static void init_tables()
{
 for(int i = 0; i < v; i++)
 {
  for(int j = 0; j < v; j++)
  {
   if(i == j)
```

```
    {
     rt[i][j] = 0;
     via[i][j] = i;
    }
    else
    {
     rt[i][j] = 9999;
     via[i][j] = 100;
    }
   }
  }
 }

 static void print_tables()
 {
  for(int i = 0; i < v; i++)
  {
   for(int j = 0; j < v; j++)
   {
    System.out.print("Dist: " + rt[i][j] + "     ");
   }
   System.out.println( );
  }
 }

}
```

OUTPUT:



```
<terminated> DistanceVectorRouting [Java Application] C:\Users\kvsth\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.5.v20221
Please enter the number of Vertices:
4
Please enter the number of Edges:
5
Please enter data for Edge 1:
Source: 1
Destination: 2
Cost: 1
Please enter data for Edge 2:
Source: 1
Destination: 3
Cost: 3
Please enter data for Edge 3:
Source: 2
Destination: 3
Cost: 1
Please enter data for Edge 4:
Source: 2
Destination: 4
Cost: 1
Please enter data for Edge 5:
Source: 3
Destination: 4
Cost: 4

The initial Routing Tables are:
Dist: 0    Dist: 1    Dist: 2    Dist: 2
Dist: 1    Dist: 0    Dist: 1    Dist: 1
Dist: 2    Dist: 1    Dist: 0    Dist: 2
Dist: 2    Dist: 1    Dist: 2    Dist: 0

Please enter the Source Node for the edge whose cost has changed: 2
Please enter the Destination Node for the edge whose cost has changed: 4
Please enter the new cost: 10
```



```
The new Routing Tables are:
Dist: 0    Dist: 1    Dist: 2    Dist: 6
Dist: 1    Dist: 0    Dist: 1    Dist: 5
Dist: 2    Dist: 1    Dist: 0    Dist: 4
Dist: 6    Dist: 5    Dist: 4    Dist: 0
```