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Experiment-1

- Aim: To simulate sending a simple PDU from source to destination using hub and switch as connecting devices.

- Topology: Star topology

- Procedure:
  - End devices are connected through the hub.
  - The hubs are connected by using switch.
  - IP addresses of the end devices are configured.
  - Connections between all the devices are formed and checked
  - Connections are checked by pinging a message between two end devices.
  - Once verified a simple PDU file is transmitted between a source and destination.

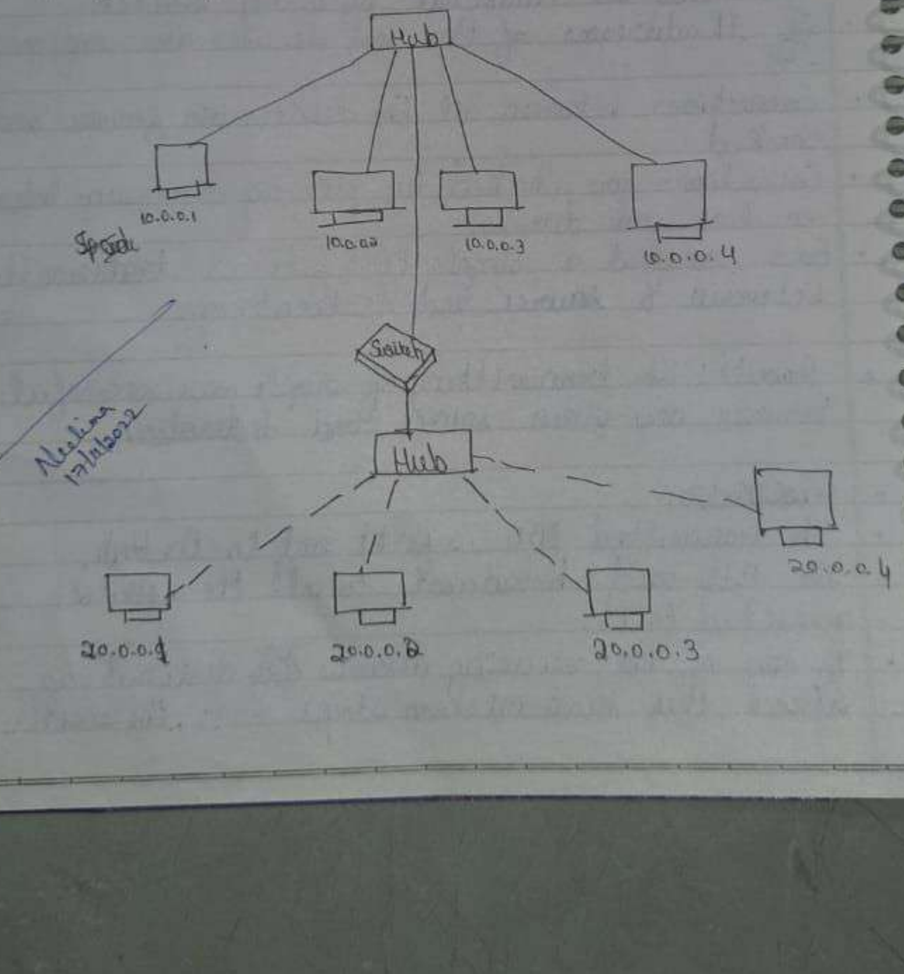
- Result: The transmitting of simple was successful between any given source and destination.

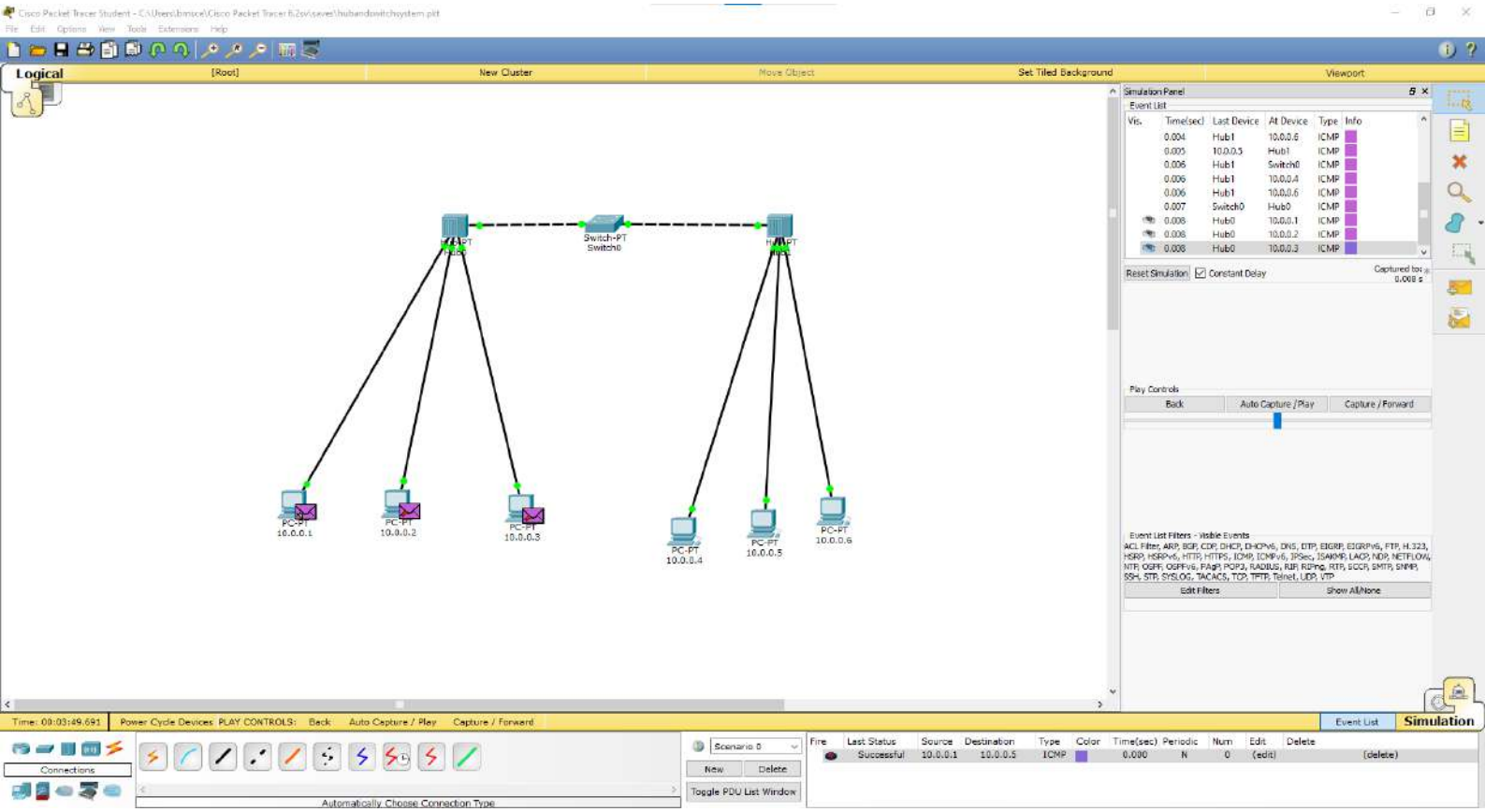
- Observation:
  - The transmitted PDU is first sent to the Hub.
  - The Hub will broadcast to all the devices connected to it.
  - If any of the receiving devices are destination device, then transmission stops, Else, the unit.

The switch will initially broadcast to the hubs connected to it / and devices connected to it. A ping message is sent by the destination device giving details about its mac address to the switch, which is stored for further transmissions.

The transmission is said to be successful if the PDU file returns through the network and a ✓ appears at the source.

Topalogy diagram:-




Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Switch-PT
Switch0
PC-PT
10.0.0.1
PC-PT
10.0.0.2
PC-PT
10.0.0.3
PC-PT
10.0.0.4
PC-PT
10.0.0.5
PC-PT
10.0.0.6
Simulation Panel
Event List
Reset Simulation
Constant Delay
Play Controls
Back
Auto Capture / Play
Capture / Forward
Edit Filters
Show All/None
Time: 00:03:49.691
Power Cycle Devices
PLAY CONTROLS:
Back
Auto Capture / Play
Capture / Forward
Event List
Simulation
Connections
Automatically Choose Connection Type
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
Successful
10.0.0.1
10.0.0.5
ICMP
0.000
N
0
(edit)
(delete)

EXPT NO.: ..... EXPT TITLE: PAGE NO.

→ A ping is sent from end device to the connected router. Request is timed out. Hence gateway is set.

→ A ping is sent from end device to a router not connected to it. We get Destination host not reachable. So we go to each router and route it to all other networks, using command

ip route 30.0.0.0 255.0.0.0 20.0.0.2

→ A ping is sent from end device to other end device.

• Result: A successful ping message is transmitted from one end device to another end device.

Observation:

→ A ping doesn't cross the interface until a gateway has been set to the connected interface/router.

→ Once gateway has been set, the ping will not cross over to another router as the routers are not connected to other networks and they won't know which route to take and where the next hop of the signal is to be done.

→ The routers are configured with ip route where the network name, subnet mask and the next hop to reach the network is given to all the networks not directly connected to it.

→ After routing, the router will know the path in which ping travels.

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PAGE NO.

Experiment-2

Aim: To configure IP address to Routers in Packet tracer. Explore the following messages: Ping responses, Destination unreachable.

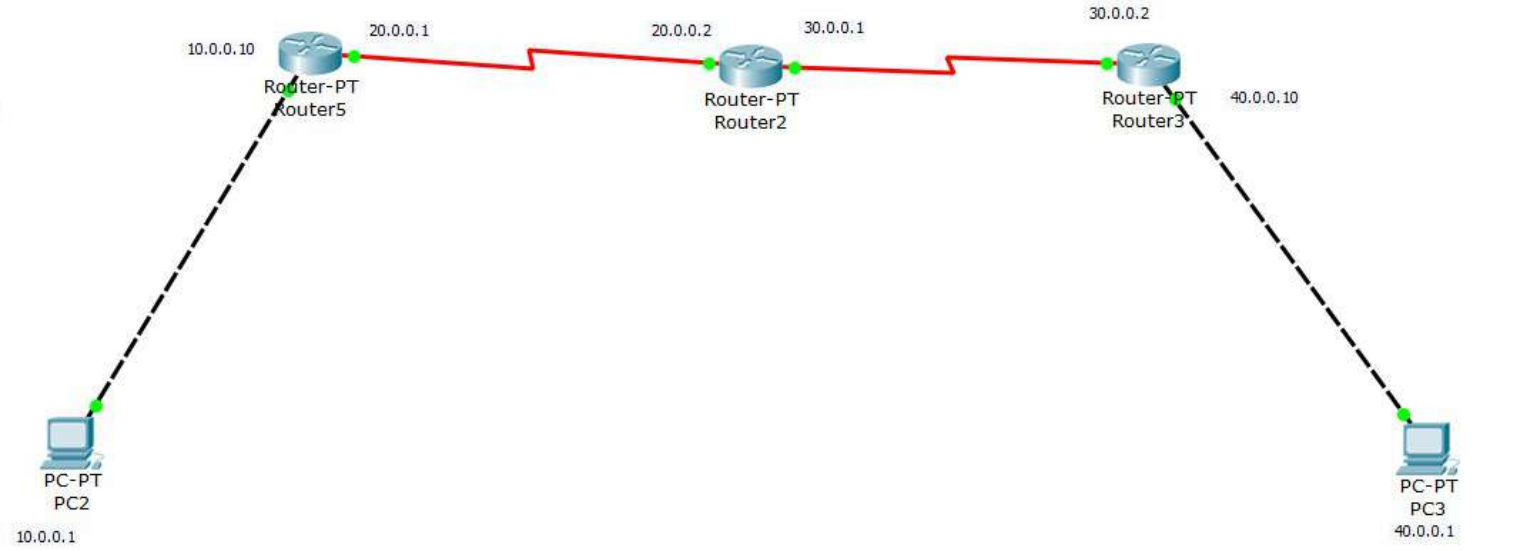
Topology: Star topology

Procedure:

- Two end devices are connected to a router.
- The ip addresses are configured for the end devices
- The CLI of router is opened and following commands are entered:

```
enable
config terminal
interface Fa0/0
ip address ipaddress subnetmask
no shutdown
exit
```

- The above commands are used to set ip address of interface of the routers.
- A ping is sent from end devices to the router interface to which it is connected
  -> The ping is accepted and recived.
- A ping is sent A ping is sent to the other end device.
- The gateway for the end devices are set.
- A ping sent from between the end devices.


10.0.0.10
20.0.0.1
20.0.0.2
30.0.0.1
30.0.0.2
40.0.0.10
Router-PT
Router5
Router-PT
Router2
Router-PT
Router3
PC-PT
PC2
10.0.0.1
PC-PT
PC3
40.0.0.1

Output:

1) PC > ping 20.0.0.1 (from 10.0.0.1)
Pinging 20.0.0.1 with 32 bytes of data:
Request timed out
Request timed out
Request timed out
Request timed out
Ping statistics for 20.0.0.1:
Packets: sent=4, Received=0, Lost=4 (100% Loss)

2) PC > ping 30.0.0.1
Pinging 30.0.0.1 with 32 bytes of data:
Destination host not reachable: error

3) PC > ping 40.0.0.1
Pinging 40.0.0.1 with 32 bytes of data:
Reply from 40.0.0.1: bytes=32 time=8ms TTL=125
Reply from 40.0.0.1: bytes=32 time=8ms TTL=125
Reply from 40.0.0.1: bytes=32 time=8ms TTL=125
Reply from 40.0.0.1: bytes=32 time=8ms TTL=125
Ping statistics for 40.0.0.1:
Packets: Sent=4, Received=4, Lost=0 (0% Loss)

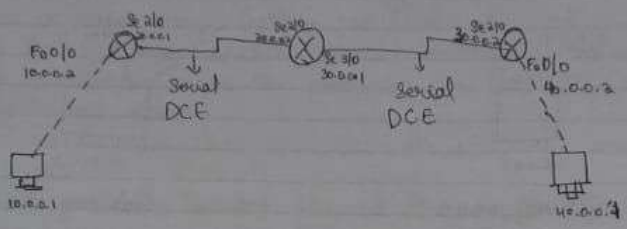
Akshina
24/11/2022

24/11/22

LAB-Experiment-3

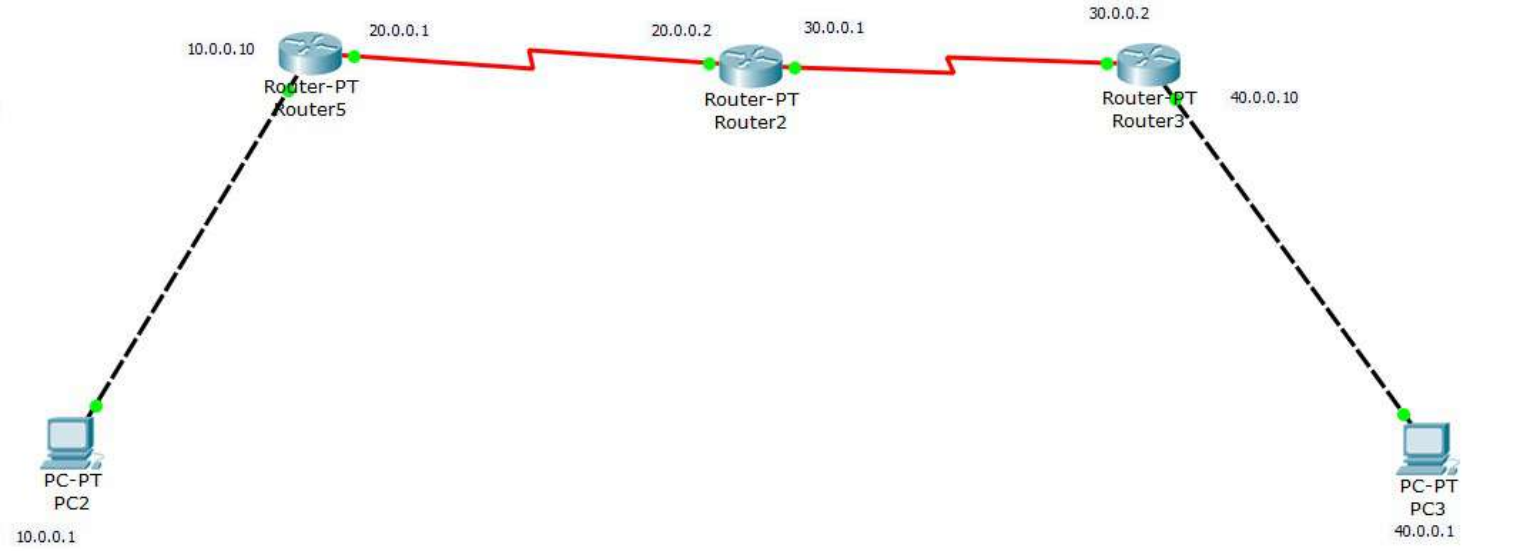
1. Aim: To configure static IP route to the routers

- Topology:-



- Procedure:-
  - The end devices are connected to routers.
  - The routers are connected to each other by using another router.
  - The ip addresses ~~and gateway~~ is set for the end devices.
  - The CLI of router is opened and the interfaces and ip addresses for each interface is set.
  - The connection is valid if there is a green light on the connection.
  - Following commands are written for configuring a router:

```
enable
config terminal
interface Se2/0
ip address 20.0.0.2 255.0.0.0
no shutdown
exit
```


10.0.0.10
20.0.0.1
20.0.0.2
30.0.0.1
30.0.0.2
40.0.0.10
Router-PT
Router5
Router-PT
Router2
Router-PT
Router3
PC-PT
PC2
10.0.0.1
PC-PT
PC3
40.0.0.1

Reply from 40.0.0.1 : bytes = 32 time = 20 ms TTL = 253
Packet statistics for 40.0.0.1
Packets: Sent = 4, Received = 4, Lost = 0 (0% Loss)

Nedima
1/12/2022

Request timed out
Request timed out
Request timed out
Ping statistics for 30.0.0.1: Packets: Sent 4, Received = 0, Loss: 4 (100% loss)

2) Gateway set up route not configured.

PC > ping 30.0.0.1
Pinging 30.0.0.1 with 32 bytes of data
Reply from 10.0.0.3: Destination host unreachable
Reply from 10.0.0.3: Destination host unreachable
Reply from 10.0.0.3: Destination host unreachable
Reply from 10.0.0.3: Destination host unreachable
Ping statistics for 30.0.0.1:
Packets: Sent = 4, Received = 0, Loss = 4 (100% loss)

3) Gateway set, up route configured.
PC > ping 40.0.0.3
Pinging 40.0.0.3 with 32 bytes of data
Request timed out
Reply from 40.0.0.3: bytes=32 time = 11 ms TTL = 253
Request timed out
Reply from 40.0.0.3: bytes = 32 time = 11ms TTL = 253
Ping statistics for 40.0.0.3:
Packets: Sent = 4, Received = 2, Loss = 2 (50% loss)

4) PC > ping 40.0.0.1
Pinging 40.0.0.1 with 32 bytes of data
Reply from 40.0.0.1: bytes = 32 time = 20ms TTL = 253
Reply from 40.0.0.1: bytes = 32 time = 20 ms TTL = 253
Reply from 40.0.0.1: bytes = 32 time = 20ms TTL = 253

Router(config)# ip route 0.0.0.0 0.00.0 30.0.0.1

→ Connections are checked by pinging packets from one end-device to another via interfaces.

• Observation:

→ The packets suffer a loss when the gateways of the end devices aren't set (request timed out)

→ When a default route isn't set but gateway is set, the packets pinged from a PC will not recognize an interface router (results in destination host unreachable)

→ Only 50% of the packets are transferred to a router in the middle. The end-device will receive all the packets. If the middle routers will have two default routes, 50% of packets are sent in both direction. Hence 30% of packet is lost, because those packets aren't returned.

→ While pinging to destination end device, one of the packets sent first via the switch, the switch receives the destination ip address of required end device. The rest of the packets are sent to the required end device. Therefore the first packet will get timed out.

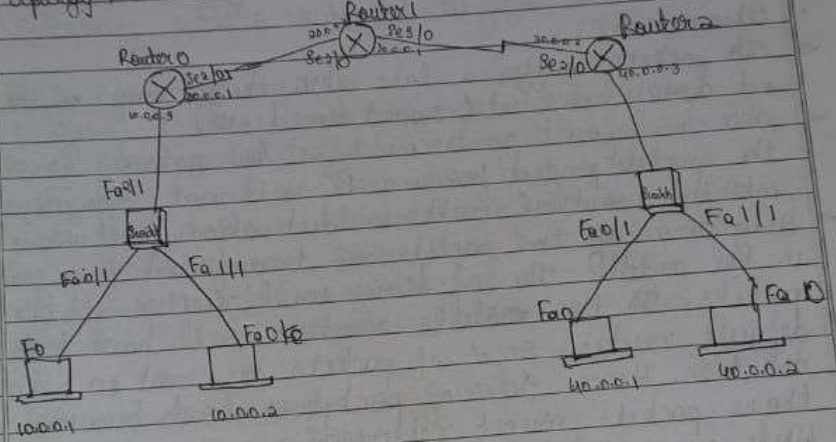
← Output:

i) Gateway not set / ip route not configured

ping PC > ping 20.0.0.1
Pinging 20.0.0.1 with 32 bytes of data
Request timed out

LAB - Experiment - 4

1. Aim : To configure default route to routers
2. Topology :



3. Procedure :

→ Construct topology using end devices, switch & routers

→ Set ip addresses of all end devices. Networks connected to same switch must have same network id.

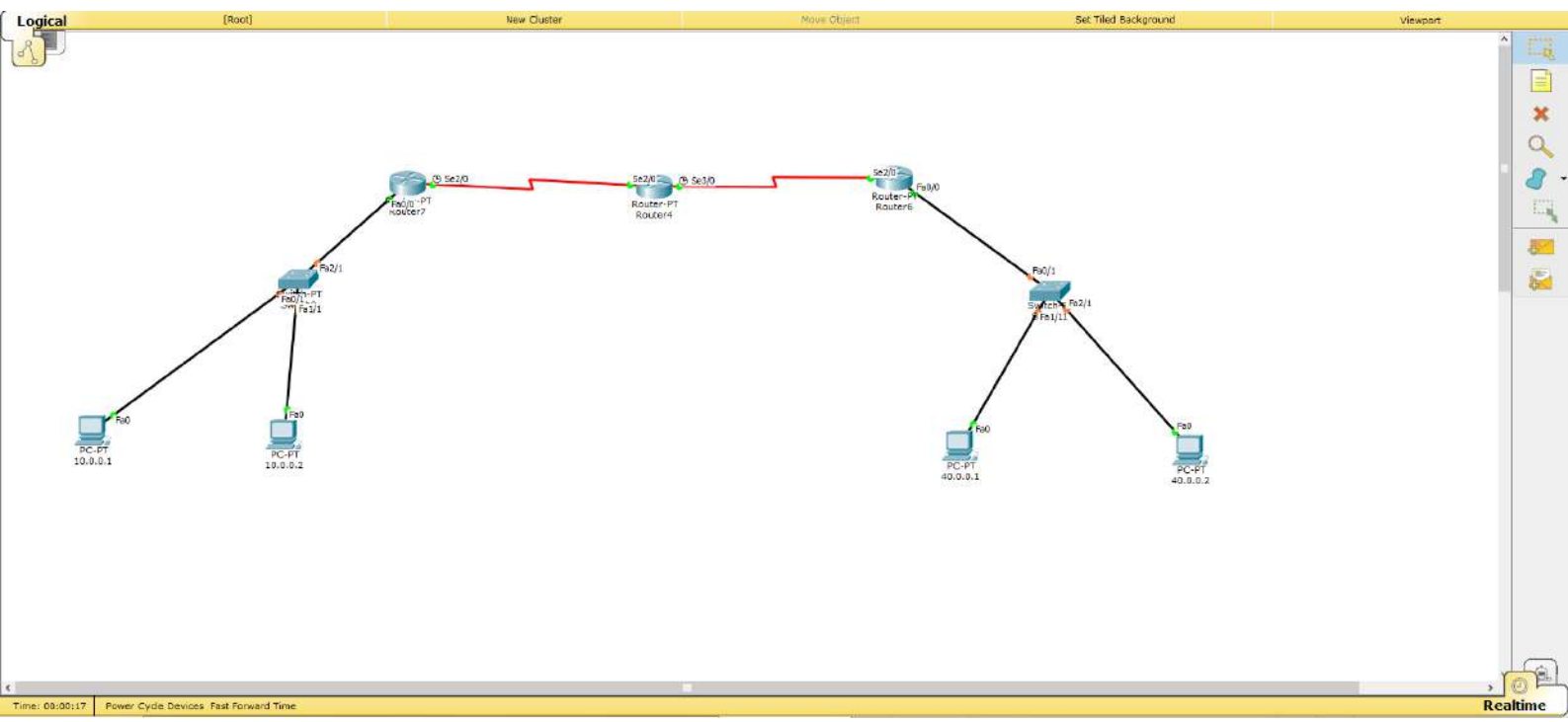
→ The gateway address of the end devices are set.

→ ~~Default route~~ Ip addresses of interfaces in routers are set

→ Default ip route is set by using following command.

Router > enable

Router # config terminal


Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Se2/0
Se2/0
Se3/0
Se2/0
Fa0/0
Router7
Router4
Router6
Fa2/1
Fa0/1
Fa3/1
Fa0/1
Fa2/1
Fa1/1
Fa0
Fa0
Fa0
Fa0
PC-PT
10.0.0.1
PC-PT
19.0.0.2
PC-PT
40.0.0.1
PC-PT
40.0.0.2
Time: 00:00:17
Power Cycle Devices
Fast Forward Time
Realtime

ip address. Once it receives ip address from the distination device, the packets are sent without any loss.

- RIP is a dynamic routing protocol that uses hop count as a routing metric to find the best path between the source and destination.

Neelima
8/9/2022

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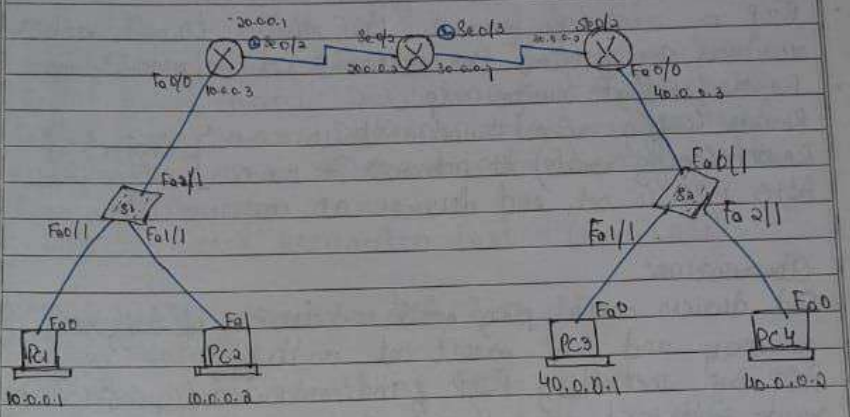
LAB - Experiment - 5

Aim: Configure RIP (Routing Information Protocol) in Routers

Top Topology:



Procedure:

- Construct a network topology as shown.
- Configure the end devices and set their ip addresses
- The routers connected to each other with a serial clock connection.
- Point to Point (PPP) protocol is used to encapsulate all network connections within routers. The routers are configured with ip addresses before this.
- Clock rate for the router is set to only those for which the serial clock connection begins.

Router(config-if)# ip address 20.0.0.1 255.0.0.0
Router(config-if)# encapsulation ppp
Router(config-if)# clock rate 64000
Router(config-if)# no shutdown

- $p route will not be set for the routers.
- RIP is used to connect the router to all other routers by giving the network id information
- Router(config)# router rip
  Router(config-router)# network 10.0.0.0 } Connected
  Router(config-router)# network 20.0.0.0 } networks
- After RIP is set, end devices can communicate.

* Observation:
- End devices cannot ping ~~each~~ end devices of different if gateway and RIP aren't set with ppp.
- ~~RIP~~ By including RIP in router configuration, ip route ~~add~~ not ~~need~~ to set because the networks will be connected
- If RIP or gateway isn't set, we get two types of responses; Request timed out and destination host unreachable

* Result:
1) When gateway or RIP isn't set:
PC > ping 20.0.0.2
Pinging 20.0.0.2 with 32 bytes of data
Request timed out
Request timed out
Request timed out

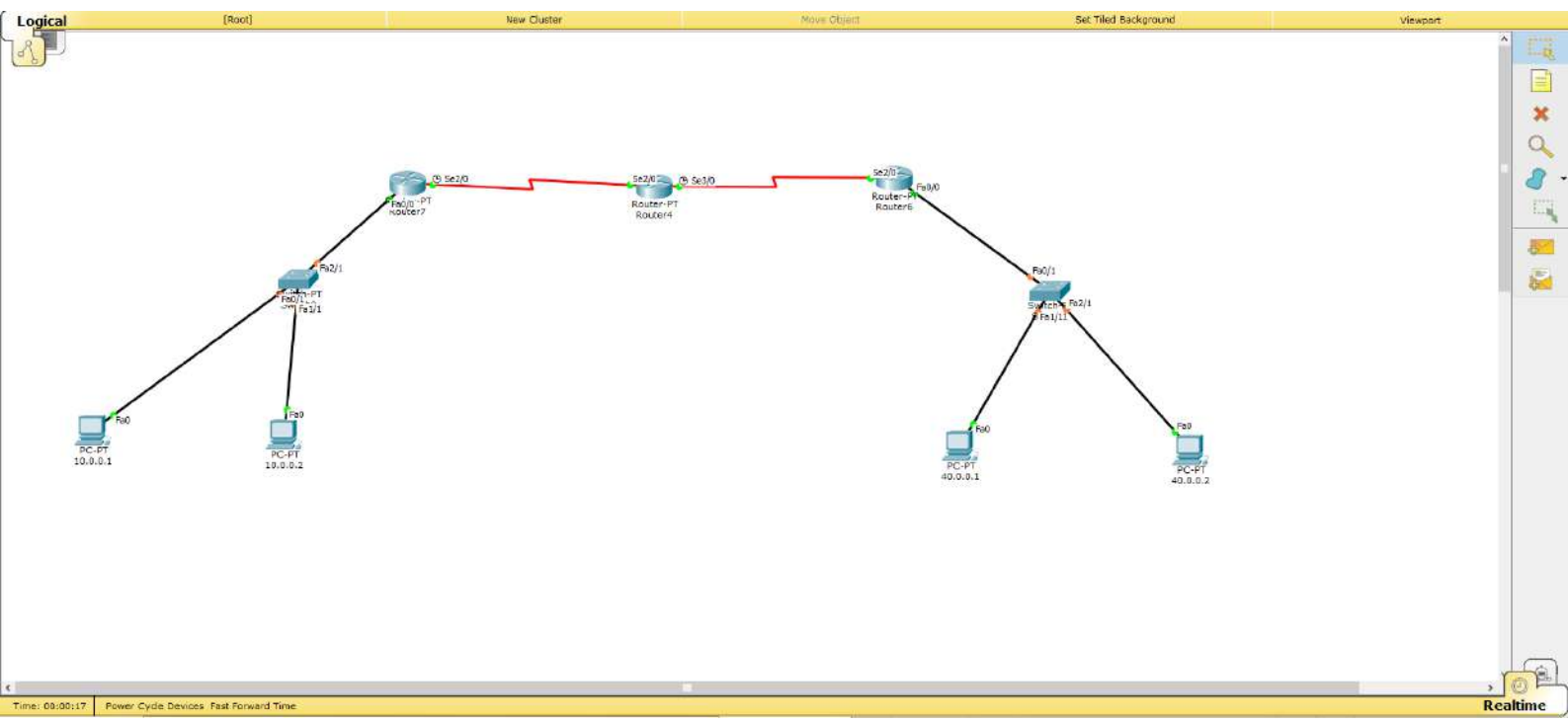
Request timed out
Ping statistics for 20.0.0.2:
Packets: Sent=4, Received = 0, Lost=4 (100% Loss)

ii) When only gateway is set & RIP isn't set (PPP is set)
> ping 30.0.0.1
Pinging 30.0.0.1 with 32 bytes of data:
Reply from 30.0.0.1: Destination host unreachable
Reply from 30.0.0.1: Destination host unreachable
Reply from 30.0.0.1: Destination host unreachable
Reply from 30.0.0.1: Destination host unreachable
Ping statistics for 30.0.0.1:
Packets: Sent=4, Received=0, Lost=4 (100% Loss)

iii) When both gateway and RIP is set:
> Ping 40.0.0.1
Pinging 40.0.0.1 with 32 bytes of data:
Reply from 40.0.0.1: bytes=32 time=19ms TTL=129
Reply from 40.0.0.1: bytes=32 time=16ms TTL=129
Reply from 40.0.0.1: bytes=32 time=30ms TTL=129
Reply from 40.0.0.1: bytes=32 time=3ms TTL=129

Ping statistics for 40.0.0.1:
Packets: Sent=4, Received=4, Lost=0 (0% loss)

Note: While pinging the end device for the first time after RIP configuration, the first packet will be lost because the switch will not know the device which is connected to the destination


Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Se2/0
Se2/0
Se3/0
Se2/0
Fa0/0
Router7
Router4
Router6
Fa2/1
Fa0/1
Fa3/1
Fa0/1
Fa2/1
Fa1/1
Fa0
Fa0
Fa0
Fa0
PC-PT
10.0.0.1
PC-PT
19.0.0.2
PC-PT
40.0.0.1
PC-PT
40.0.0.2
Time: 00:00:17
Power Cycle Devices
Fast Forward Time
Realtime

ee server.

Observation:

→ When DHCP ~~setting~~ IP configuration is set for end devices, a dynamic IP address is automatically set. This happens ~~all~~ to all the end devices.

→ Ping message from one device to another will have 0% loss

Result:

1) PC> ping 10.0.0.2
Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=0ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128
Ping statistics: Packets: Sent=4, Received=4, Lost=0(0% loss)

2) SERVER> ping 10.0.0.1
Pinging 10.0.0.1 with 32 bytes of data:

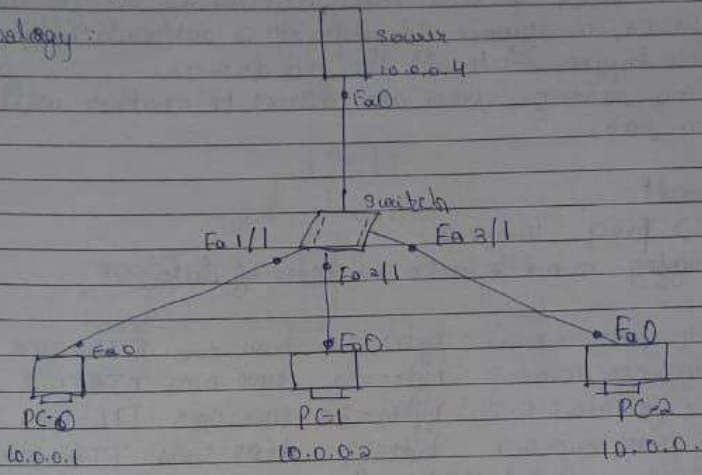
Reply from 10.0.0.1: bytes=32 time=0ms TTL=128
Reply from 10.0.0.1: bytes=32 time=0ms TTL=128
Reply from 10.0.0.1: bytes=32 time=0ms TTL=128
Reply from 10.0.0.1: bytes=32 time=0ms TTL=128
Ping statistics:
Packets: Sent=4, Received=4, Lost=0 (0% loss)

Neelima
15/12/2022

18/12/22

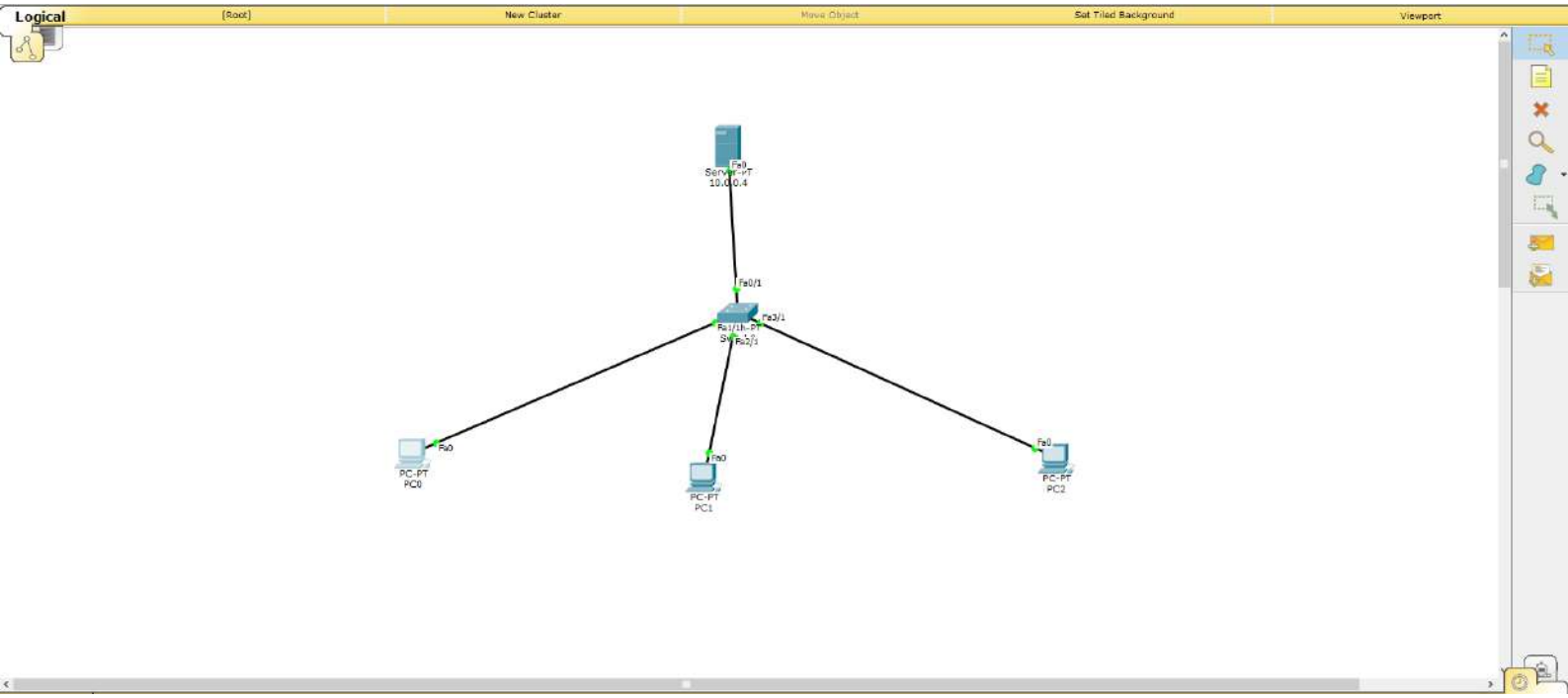
Lab Experiment-6

- Aim: Configure DHCP to server
- Topology:



- Procedure:

⇒ Construct the above topology.
⇒ Configure IP address of server as (10.0.0.4)
⇒ Open services in server and switch on DHCP service
⇒ Save a new start IP address which can't same as IP address of server.
⇒ In end device module, switch from static to DHCP in IP configuration.
⇒ Perform this operation to all the end devices connected to the switch.
⇒ Ping a message from the end devices to server


Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Fa0
Fa0/1
Fa0/2
Fa0/3
Fa0
PC-PT
PC0
Fa0
PC-PT
PC1
Fa0
PC-PT
PC2

Observation:

→ Web browser module is opened in the end device and the set domain name (www.bmsce.com) is entered.

→ If the system/server hasn't been configured properly, i.e., set DNS server and default gateway, the 'Host Unresolved' is shown.

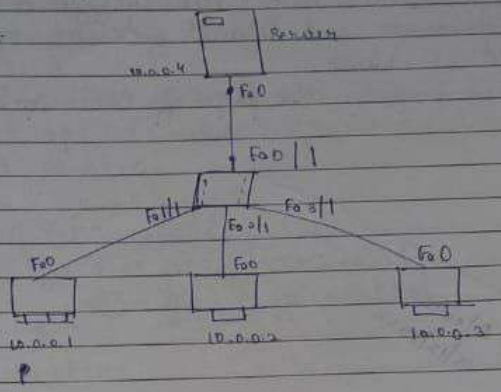
→ If configured properly, the page of Cisco Packet Tracer is opened.

Akshaya
15/12/2022

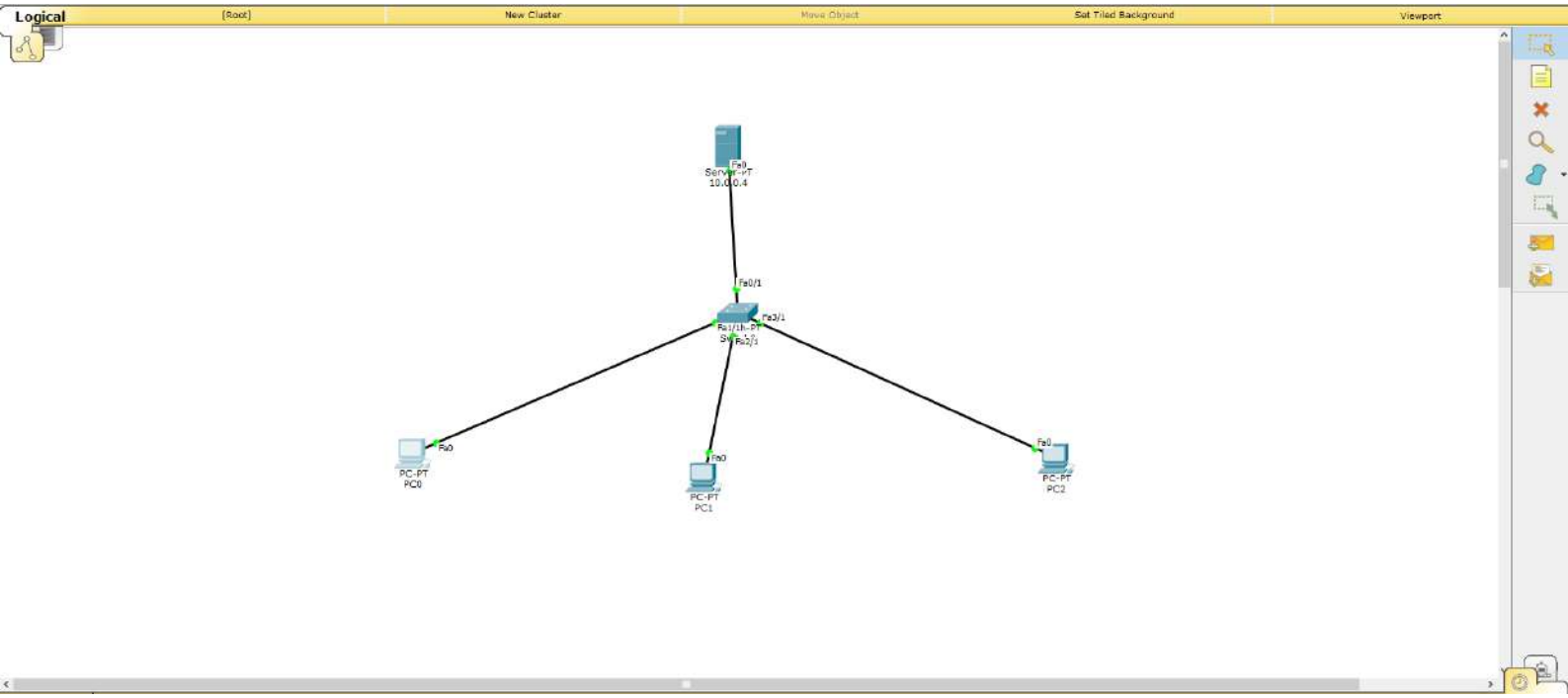
16.12.22 EXPT TITLE: PAGE NO.

Lab Experiment-7

- Aim:- To configure Web server and DNS server.
- Topology:



- Procedure:
  - → Construct the topology shown.
  - → Configure IP address of server and open services.
  - → IP server DHCP setting is switched on through which end devices get a dynamic IP address
  - → End devices are configured.
  - → In Services module, select DNS and switch on the DNS service
  - → Enter a domain name (www.bmsce.ac.com) and set address to IP address of server.
  - → Add and save the domain.
  - → In DHCP services, change the Default Gateway and DNS Server to IP address of server.


Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Fa0
Fa0/1
Fa0/2
Fa0/3
Fa0
PC-PT
PC0
Fa0
PC-PT
PC1
Fa0
PC-PT
PC2

29/12/22

LAB- Experiment 8

Write a program for error detection using CRC 16-bit

```
import java.util.*;
class CRC {
void div (int a[], int k) {
    int gp[]={1,0,0,0,1,0,0,0,0,0,0,1,0,0,0,0,1};
    int count=0;
    for (i=0; i<k; i++){
      if (a[i]==gp[0]){
        for (int j=i; j<17+i; j++){
          a[j] = g[j] ^ gp[count++];
        }
      count=0;
      }
    }
}

public static void main(String args[]){
    int a[]= new int[50];
    int b[]= new int[50];
    int len, k;
    CRC ob= new CRC();
    System.out.println("Enter data word!!!");
    Scanner sc= new Scanner(System.in);
    len= sc.nextInt();
    int flag=0;
    for (int i=0; i<len; i++){
```

```
        a[i]= sc.nextInt();
    }
    for (int i=0; i<16; i++){
      a[len++]=0;
    }
    x= len-16;
    for(int i=0; i<len; i++){
       b[i]=a[i]
    ob.div(a, x);
    for (int i=0;i<len; i++){
          a[i]=a[i] ^ b[i];
    Syst for (int i=0;i<len; i++)
          System.out.print(a[i] + " ");

     for (int i=0 ; i<len ; i++)
          a[i]= scan.nextInt();
    ob.div(a,k);
    for (int i=0; i<len;i++){
      if (a[i]!=0){
          flag=1;
          break;
    }
}

  if (flag==1){
     System.out.println("Error");
  else
     System.out.println("No error");
}
```

Output:

Enter length of data frame:
7

Enter message:
1011101
10111011000101101011000
10111011000101101011000
No error

5/11/2023

```
C:\Users\deept\OneDrive\Desktop>java CRC.java
Enter the length of Data Frame:
7
Enter the Message:
1 0 1 0 1 0 1
Data to be transmitted:
1 0 1 0 1 0 1 0 0 0 0 1 0 1 0 0 1 0 1 0 0 0 0
Enter the Reveived Data:
1 0 1 0 1 0 1 0 0 0 1 1 0 1 0 0 1 0 1 0 0 0 0
error in data
```

```
        else
            c[i][j] = G[i][j];
for(i=0; i<n; i++)
    d[i] = c[snode][i];
    p[i] = snode
    b[i] = 0;
}
f[snode] = 0;
b[snode] = 1;
count = 1;
while (
```

```
Enter source: 1
Vertex 1 -> cost = 0   parent = 1
Vertex 2 -> cost = 6   parent = 1
Vertex 3 -> cost = 5   parent = 2
Vertex 4 -> cost = 9   parent = 3
Vertex 5 -> cost = 8   parent = 3

No negative weight cycle
```

NJ
12/1/2023

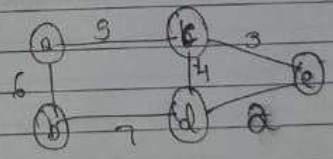
```
    return flag;
}

void main(){
int V, edge[20][20], G[20][20], i, j, k=0;
printf("Enter no of vertices: ");
scanf("%d", &V);
printf("Enter graph: \n");
for(i=0; i<V; i++){
    for(j=0; j<V; j++){
        scanf("%d", &G[i][j]);
        if(G[i][j] != 0){
            edge[k][0]=i;
            edge[k][1]=j;
        }
if(BellmanFord(G, V, k, edge))
    printf("\n No negative weight cycle \n");
else
    printf("\n Negative weight cycle exists \n");
return 0;
}
```

Output:

Bell-Enter no. of vertices: 5
Enter graph in matrix form:

```
0  6  3  10000  10000
6  0  10000  7  100000
3  10000  0  4  3
10000  7  4  0  2
10000  10000  3  2  0
```



12/1/23

Lab experiment - 10

```
#include <stdio.h>
#include <stdlib.h>
int Bellman_Ford (int G[20][20], int V, int e, int edge[20][20])
{
int i, u, v, k, d[20], p[20], o, flag=1;
for(i=0; i<V; i++){
   d[i] = 1000;
   p[i] = -1;
}printf("Enter source:");
scanf("%d", &o);
d[o-1] = 0;
for(i=0; i<V-1; i++){
   for(k=0; k<e; k++){
    u = edge[k][0], v = edge[k][1];
    if (distance[u] + G[u][v] < distance[v]){
      distance[v] = distance[u] + G[u][v];
      p[v] = u;
   }
}
for(k=0; k<e; k++){
   u=edge[k][0], v=edge[k][1];
   if (d[u] + G[u][v] < d[v])
       flag=0;
}
if (flag){
 for(i=0; i<V; i++){
   printf("Vertex %d -> cost = %d , parent = %d\n",
       i+1, d[i], p[i]);
```

```
Enter the number of vertices: 4
Enter the source vertex of the graph: 1

Enter no. of edges: 5

For edge 1=>
Enter source vertex :1
Enter destination vertex :2
Enter weight :4

For edge 2=>
Enter source vertex :1
Enter destination vertex :3
Enter weight :5

For edge 3=>
Enter source vertex :3
Enter destination vertex :2
Enter weight :7

For edge 4=>
Enter source vertex :2
Enter destination vertex :4
Enter weight :7

For edge 5=>
Enter source vertex :4
Enter destination vertex :3
Enter weight :-15


NEGATIVE CYCLE PRESENT..!!
```

```
    j = i;
    do{
      j = pred[j];
      printf(" <- %d", j);
    }while(j != source);
  }
}
```

Output:

Enter no. of vertices : 5

Enter adjacency matrix:

0 6 5 0 0

6 0 0 7 0

5 0 0 4 3

0 7 4 0 2

0 0 3 2 0

Enter starting node : 1

Distance of 0 = 6

Path 0 <- 1

Distance of 2 = 11

Path = 2 <- 0 <- 1

Distance of 3 = 7

Path = 3 <- 1

Distance of 4 = 9

Path = 4 <- 3 <- 1

NP
12/12/2023

Date: 12/1/23 EXPT TITLE: PAGE NO. P.NO.

Lab Experiment -11

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

void dijkstra(int G[MAX][MAX], int n, int snode);
int main(){
 int G[MAX][MAX], i, j, n, u;
 printf("Enter no. of vertices: ");
 scanf("%d", &n);
 printf("\n Enter adjacency matrix: \n");
 for(i=0; i<n; i++){
  for(j=0; j<n; j++)
   scanf("%d", &G[i][j]);
 printf("Enter starting node ");
 scanf("%d", &u);
 dijkstra(G, n, u);
 return 0;
}

void dijkstra(int G[MAX][MAX], int n, int snode){
 int C[MAX][MAX], d[MAX], p[MAX];
 int v[MAX], count, mindis, nextnode, i, j;
 for(i=0; i<n; i++){
  for(j=0, j<n; j++){
   if (G[i][j]==0)
    C[i][j]= INFINITY;
```

```
    else
      c[i][j] = G[v][j];
  for(i=0; i<n; i++){
    d[i] = c[source][i];
    p[i] = source;
    v[i] = 0;
  }
  d[source] = 0;
  v[source] = 1;
  count = 1;
  while(count < n-1){
    mindis = INFINITY;
    for(i=0; i<n; i++){
      if(d[i] < mindis && !v[i]){
        mindis = d[i];
        nextnode = i;
      }
    }
    v[nextnode] = 1;
    for(i=0; i<n; i++){
      if(!v[i]){
        if(mindis + c[nextnode][i] < d[i]){
          d[i] = mindis + c[nextnode][i];
          p[i] = nextnode;
        }
      }
    count++;
  }}
  for(i=0; i<n; i++){
    if(i != source){
      printf("\n Distance of %d = %d", i, d[i]);
      printf("\nPath = %d", i);
```

```
Enter the no. of vertices: 5

Enter the adjacency matrix:
0 3 1 0 0
3 0 7 5 1
1 7 0 2 0
0 5 2 0 7
0 1 0 7 0

Enter the starting node: 0

Distance of 1 = 3
Path = 1 <-0
Distance of 2 = 1
Path = 2 <-0
Distance of 3 = 3
Path = 3 <-2 <-0
Distance of 4 = 4
Path = 4 <-1 <-0
```