VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

COMPUTER NETWORKS

Submitted by

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in partial fulfillment for the award of the degree of
BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING
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B. M. S. College of Engineering,

Bull Temple Road, Bangalore 560019

(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled "**COMPUTER NETWORKS**" carried out by **GIRIDHAR K R (1BM20CS051),** who is bonafide student of B.M. **S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2022. The Lab report has been approved as it satisfies the academic requirements in respect of a **Computer Networks- (20CS5PCCON)** work prescribed for the said degree.

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Cycle-1

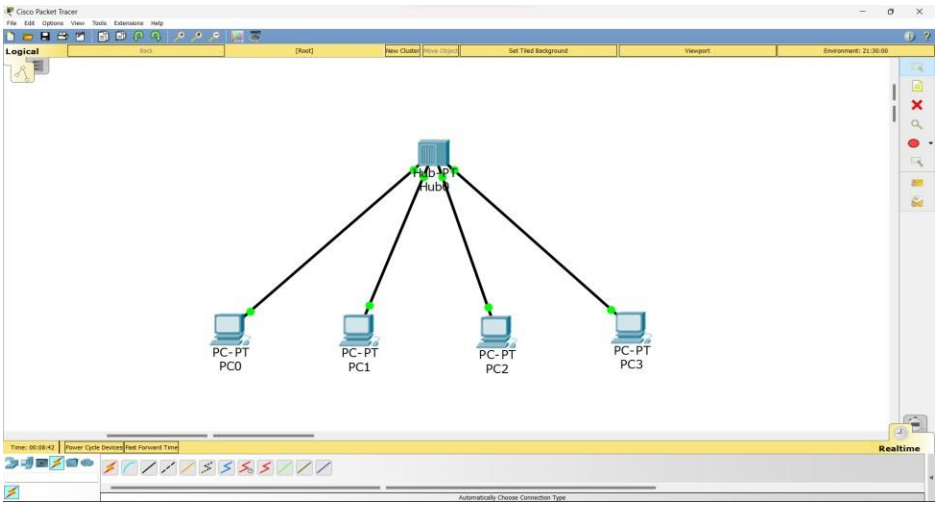
Experiment No 1

Aim of the program

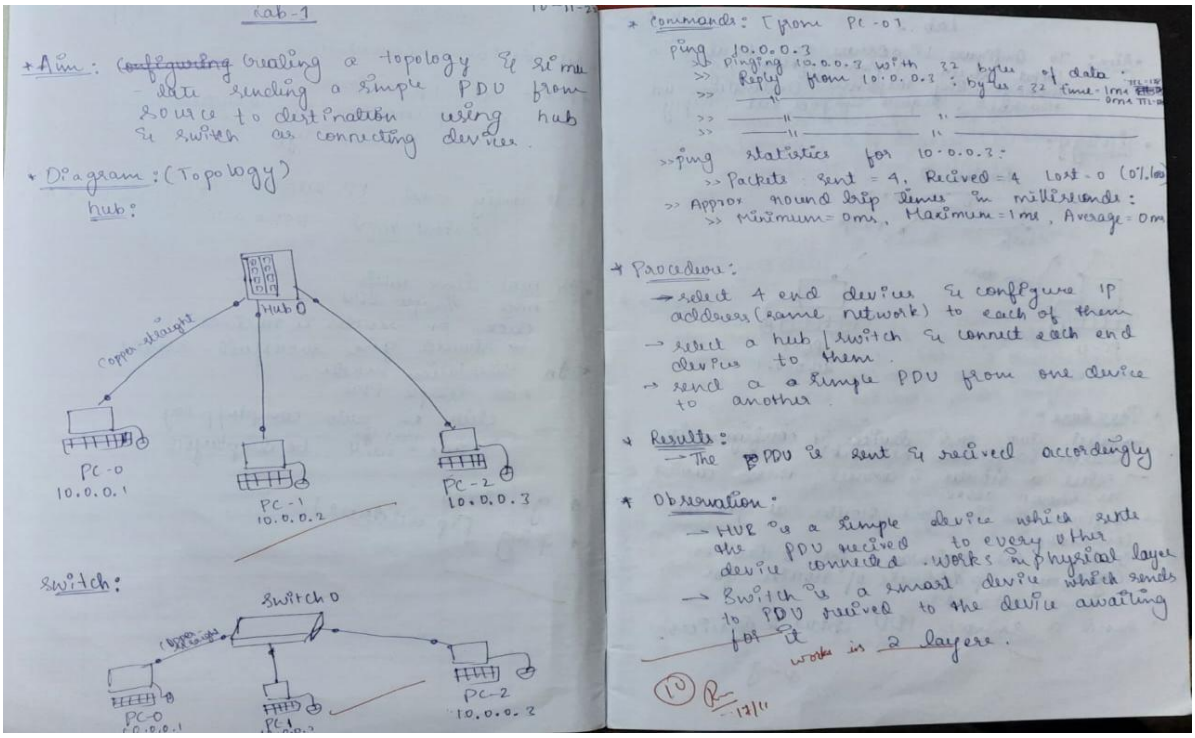
Creating a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices.

Hub

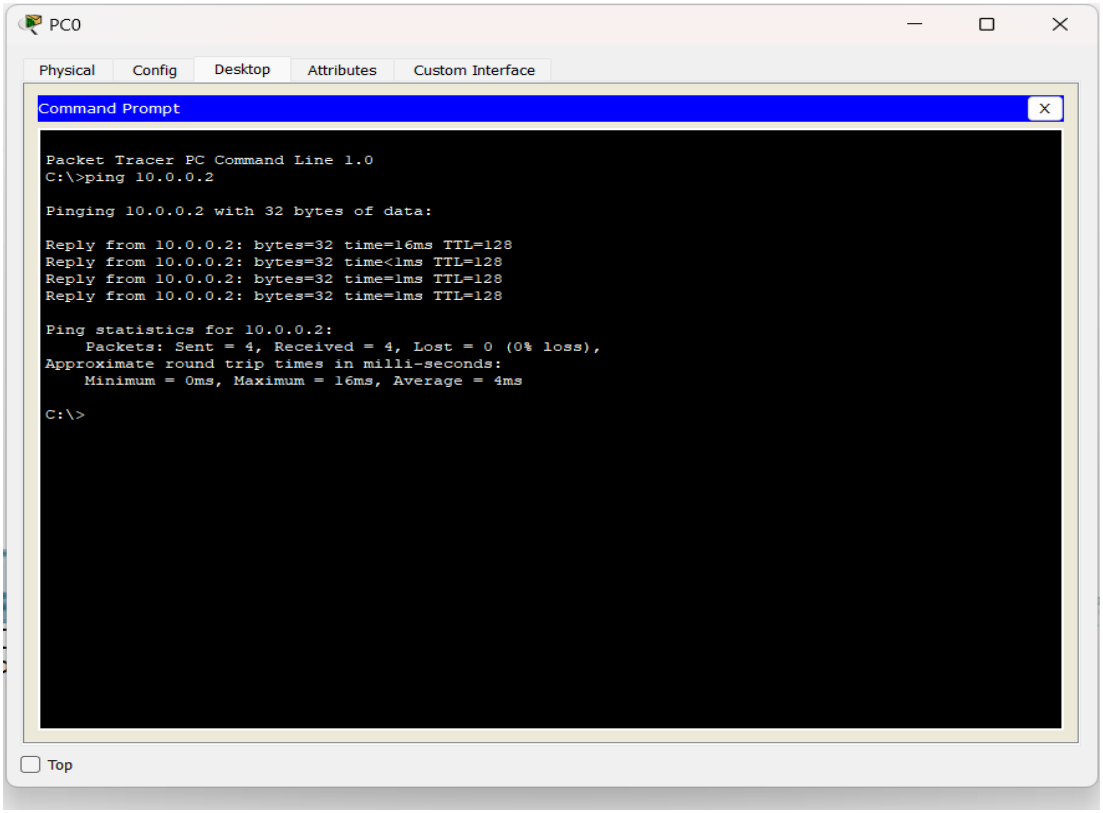
Topology



Procedure

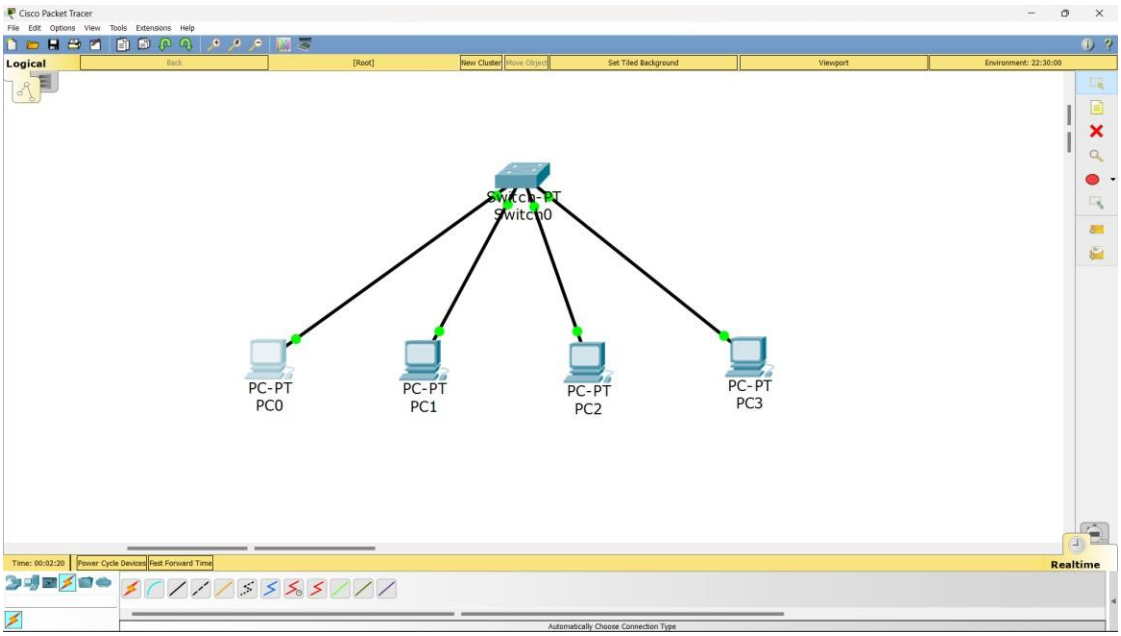


Output

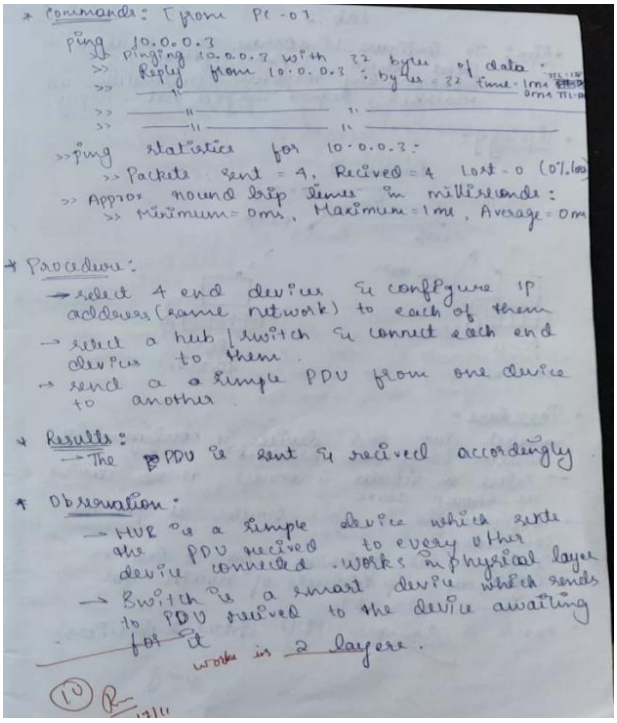


Switch

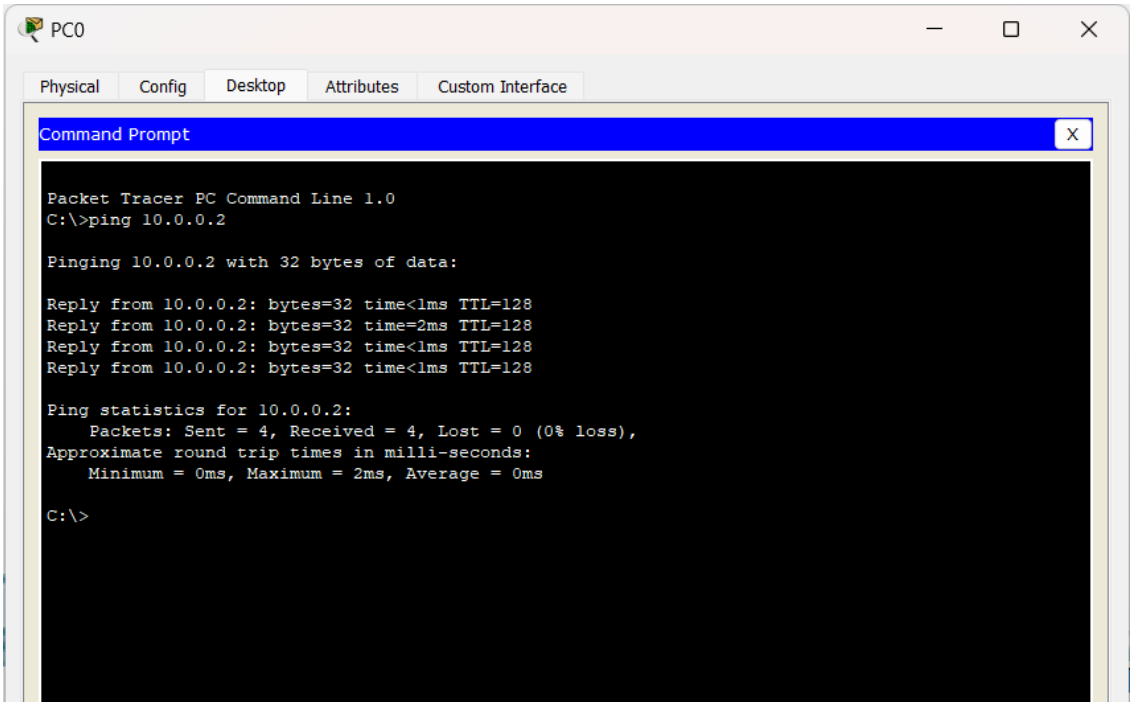
Topology



Procedure



Output

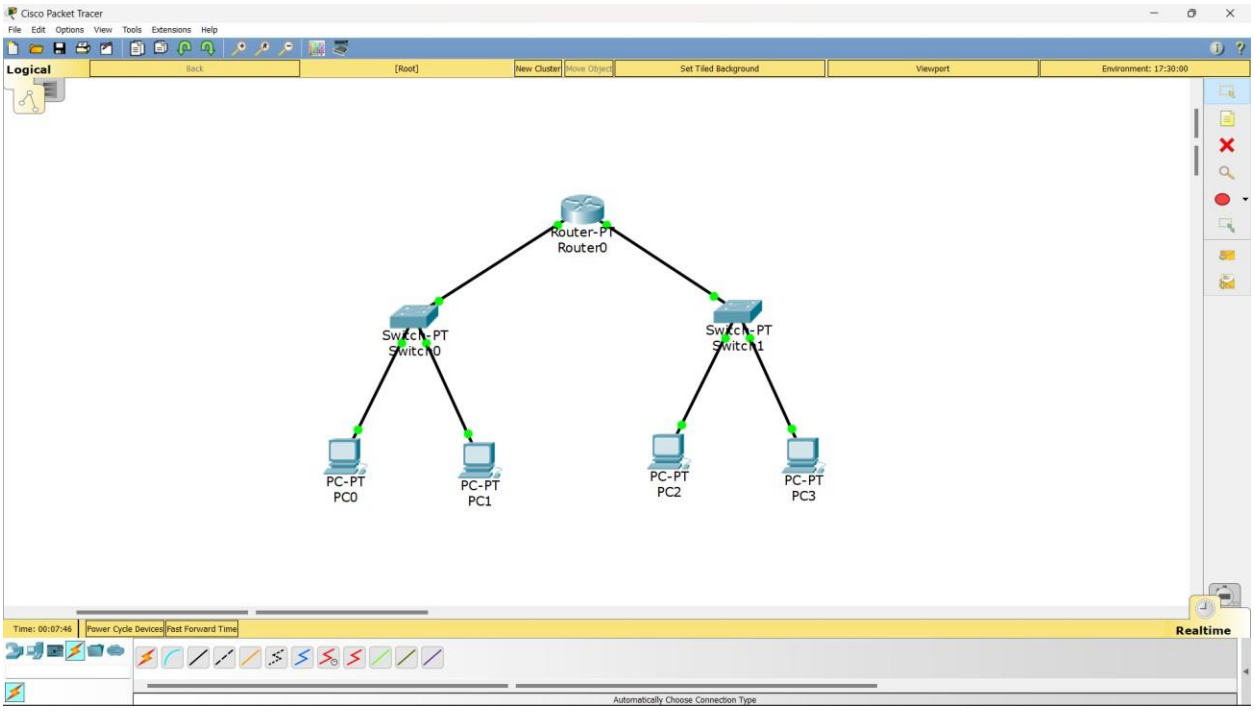


Experiment No 2

Aim of the program

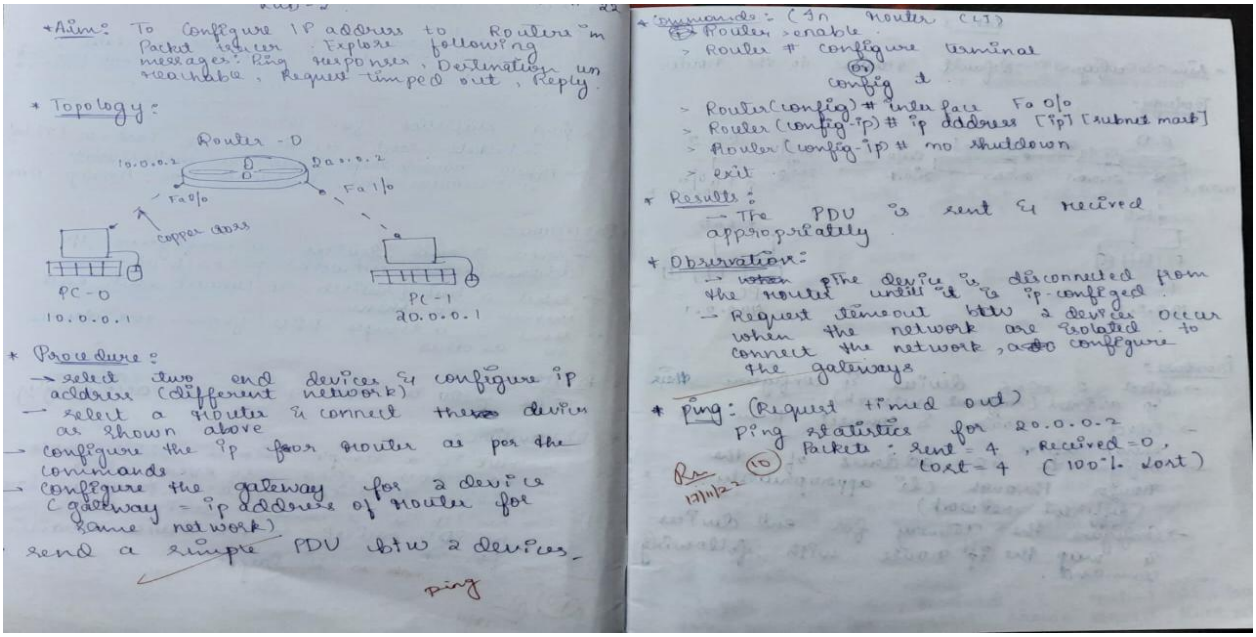
Configuring IP address to Routers in Packet Tracer. Exploring the following messages: Ping Responses, Destination unreachable, Request timed out, Reply.

Topology

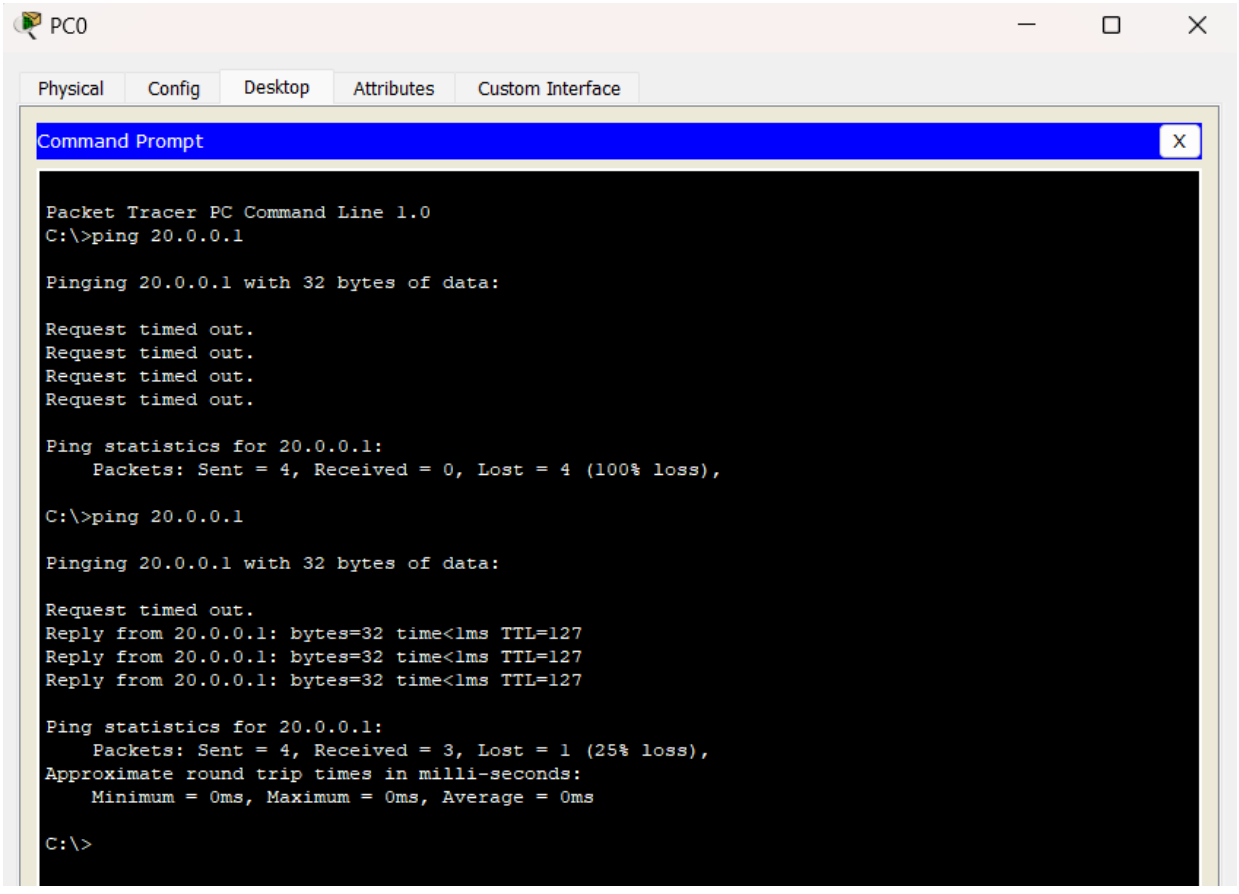


Procedure

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.10 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#ip address 20.0.0.10 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up

Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
```


*Aim: To Configure IP address to Routers in Packet tracer. Explore following messages: Ping response, Destination unreachable, Request timed out, Reply.
* Topology:
Router - D
10.0.0.2
20.0.0.2
Fa0/0
Fa1/0
copper cross
PC-0
10.0.0.1
PC-1
20.0.0.1
* Procedure:
→ select two end devices & configure ip address (different network)
→ select a router & connect these devices as shown above
→ Configure the ip for router as per the commands
→ Configure the gateway for 2 device (gateway = ip address of router for same network)
send a simple PDU btw 2 devices.
ping
* Commands: (In Router CLI)
> Router > enable
> Router # configure terminal
(or)
config t
> Router(config) # interface Fa 0/0
> Router (config-if) # ip address [ip] [subnet mask]
> Router (config-if) # no shutdown
> exit
* Results:
→ The PDU is sent & recived appropriately
* Observation:
→ When the device is disconnected from the router until it is ip-configed.
→ Request timeout btw 2 devices occur when the network are isolated. to connect the network, configure the gateways
* Ping: (Request timed out)
Ping statistics for 20.0.0.2
Packets: Sent = 4, Received = 0, Lost = 4 (100% lost)
Rm 17/11/22 (10)

Output

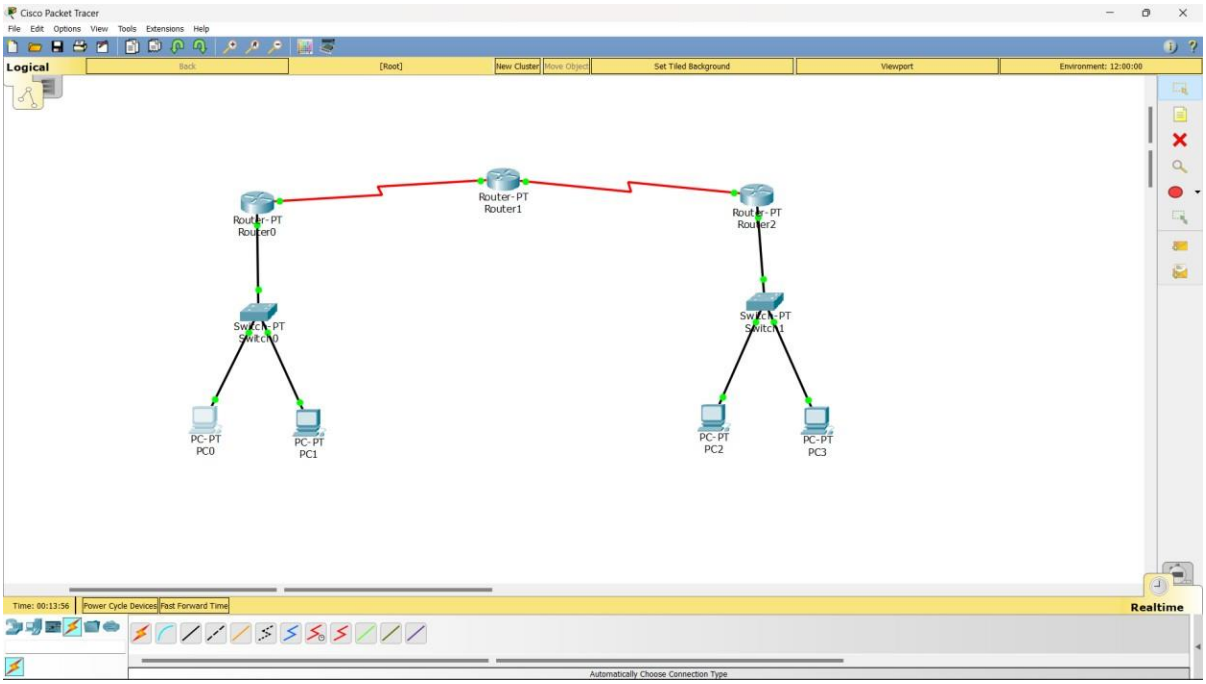

PC0
Physical
Config
Desktop
Attributes
Custom Interface
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ping 20.0.0.1
Pinging 20.0.0.1 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 20.0.0.1:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 20.0.0.1
Pinging 20.0.0.1 with 32 bytes of data:
Request timed out.
Reply from 20.0.0.1: bytes=32 time<1ms TTL=127
Reply from 20.0.0.1: bytes=32 time<1ms TTL=127
Reply from 20.0.0.1: bytes=32 time<1ms TTL=127
Ping statistics for 20.0.0.1:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>

Experiment No 3

Aim of the program

Configuring default route to the Router

Topology



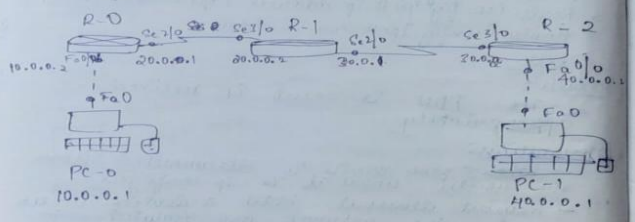
Procedure

```
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0

Router#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 20.0.0.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is 20.0.0.2 to network 0.0.0.0

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
S*   0.0.0.0/0 [1/0] via 20.0.0.2
```

Lab - 3

Aim: To configure default router to the router

Topology:



Procedure:

→ Select 2 end devices & configure their ip address (Different network)
→ Select 3 routers & connect them as shown above
→ Configure the ip address of the router through cli appropriately (Different network)
→ Configure the gateway for end devices & map the ip route with following command.

* Command

> show ip route
C 10.0.0.0/8 is directly connected
C 20.0.0.0/8 is directly connected

> enable
config t
ip route [new network] [subnet mask] [via ip address]
[eg: ip route 20.0.0.0 255.0.0.0 20.0.0.2]
exit
> show ip route
C 10.0.0.0/8 is directly connected
C 20.0.0.0/8 is directly connected
S 30.0.0.0/8 [1/0] via 20.0.0.2

* Result:
After appropriate connection, the two end devices can ping two each other

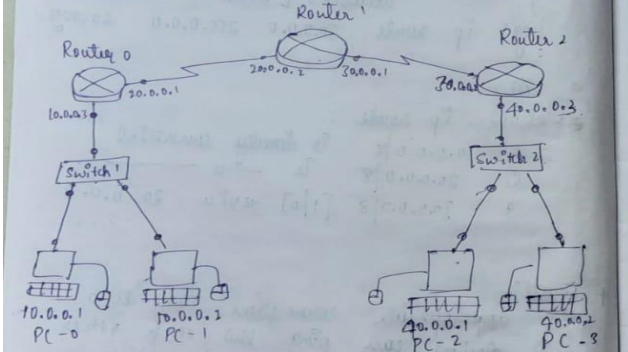
* Observation:
Since static route was not set, destination host was unreachable
After static route is set, there is a 25% loss of bytes when pinging.

Ping statistics
Packets: Sent = 4, Received = 3, Lost = 1 (25% packet shows request time

Lab - 4

Aim: ~~Configuring DHCP within a LAN in a packet~~
Default configuration between switch and router.

Topology:



Procedure:

→ Select 4 end devices & configure their ip address (2 devices for one network)
→ Select 3 router & 2 switches and connect them as shown.
→ Configure the ip address of routers through cli appropriately (Different networks)
→ Configure the gateway for end devices & map the ip route with following command.

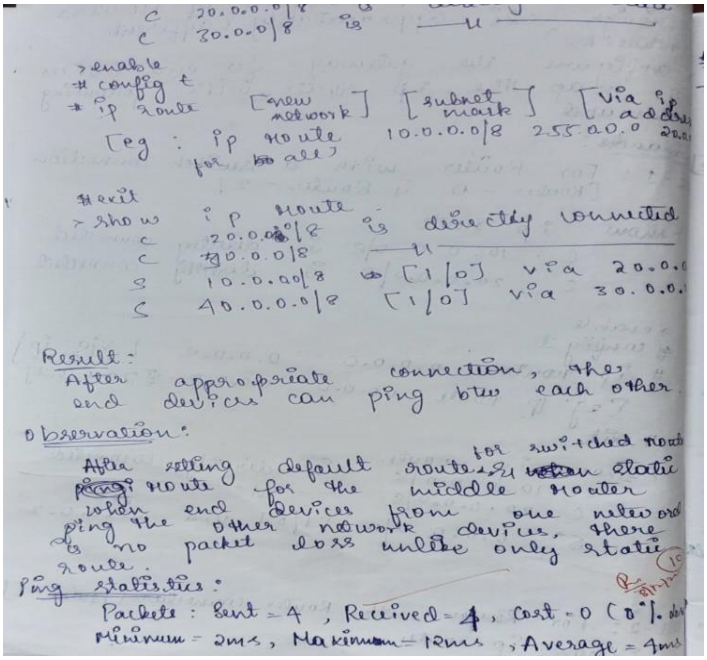
Commands:

Case - 1: For Router with a switch connection [Router - 0 & Router - 2]

> show ip route
C 10.0.0.0/8 is directly connected.
C 20.0.0.0/8 is directly connected.

> enable
config t
ip route 0.0.0.0 0.0.0.0 [via ip address]
[eg: ip route 0.0.0.0 0.0.0.0 {20.0.0.1}]
exit
> show ip route
C 10.0.0.0/8 is directly connected
C 20.0.0.0/8 is directly connected
S* 0.0.0.0/0 [1/0] via 20.0.0.2

Case-2: For Router with Router connection [Router - 1]
> show ip route



Output

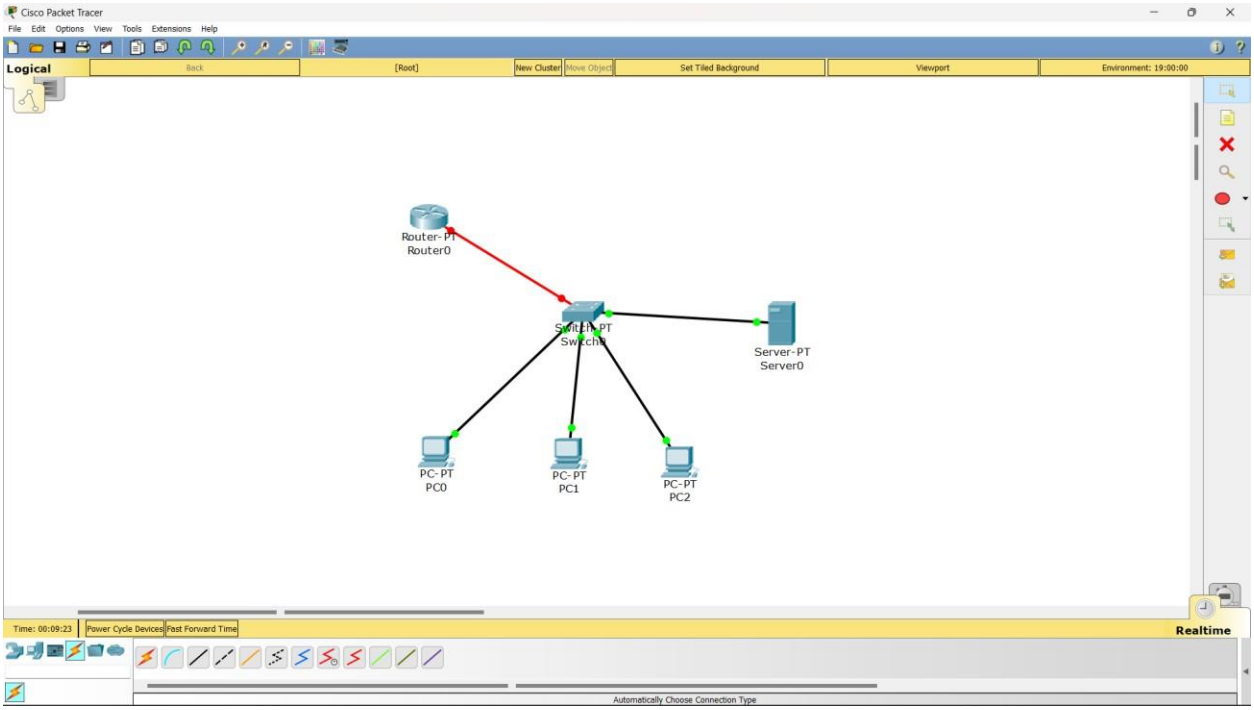
```
Packet Tracer PC Command Line 1.0
C:\>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.1: bytes=32 time=10ms TTL=125
Reply from 40.0.0.1: bytes=32 time=10ms TTL=125
Reply from 40.0.0.1: bytes=32 time=10ms TTL=125

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 10ms, Average = 10ms

C:\>
```

Experiment No 4

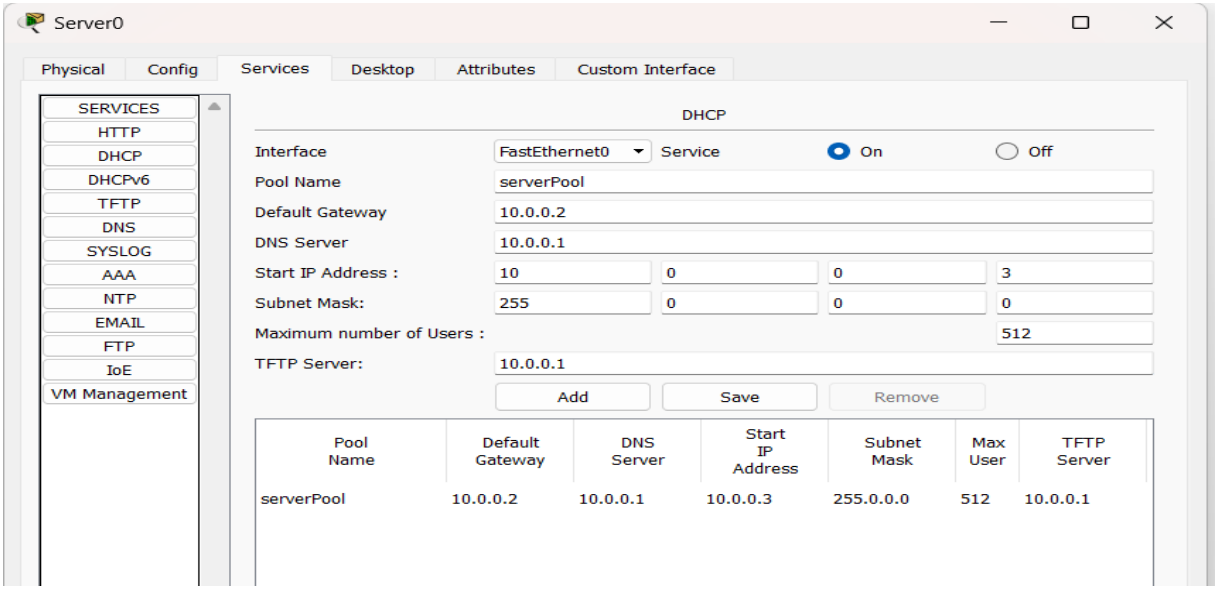
Aim of the program

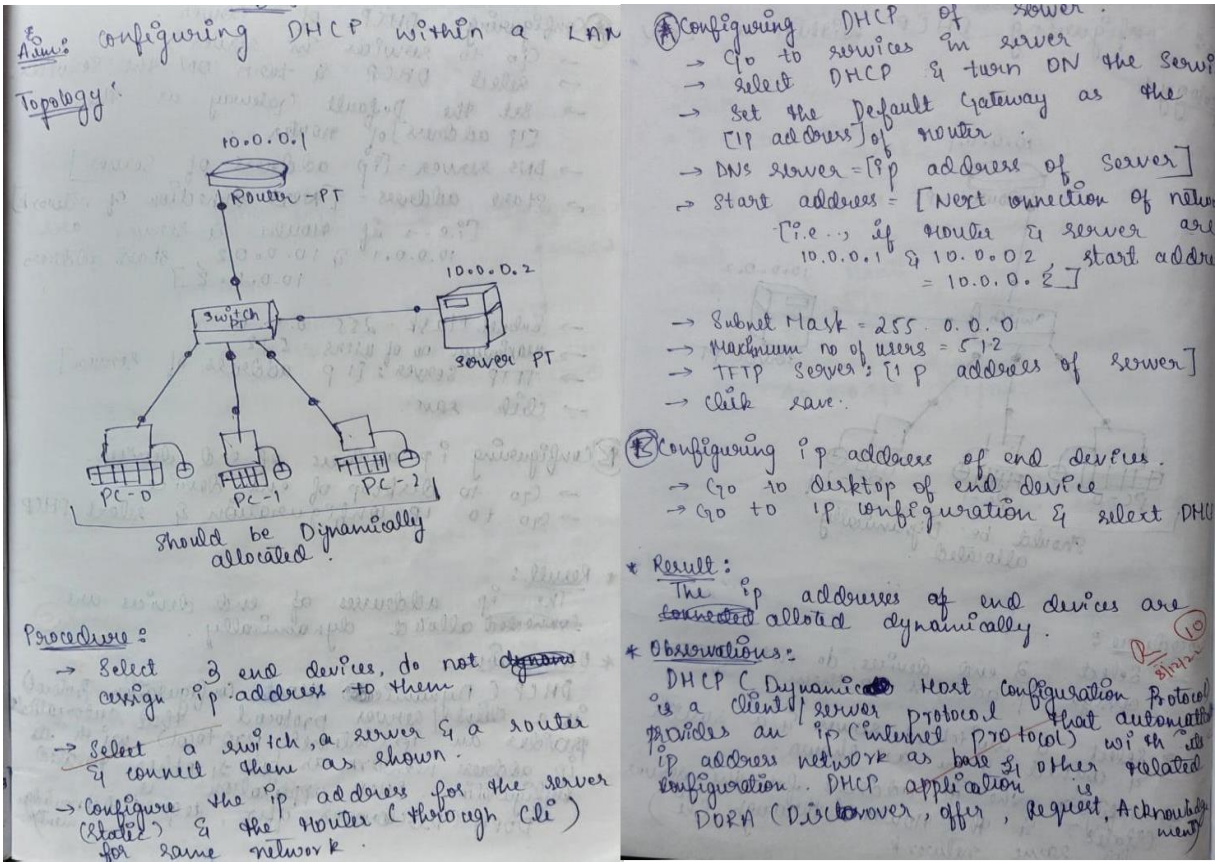
Configuring DHCP within a LAN in a packet Tracer

Topology

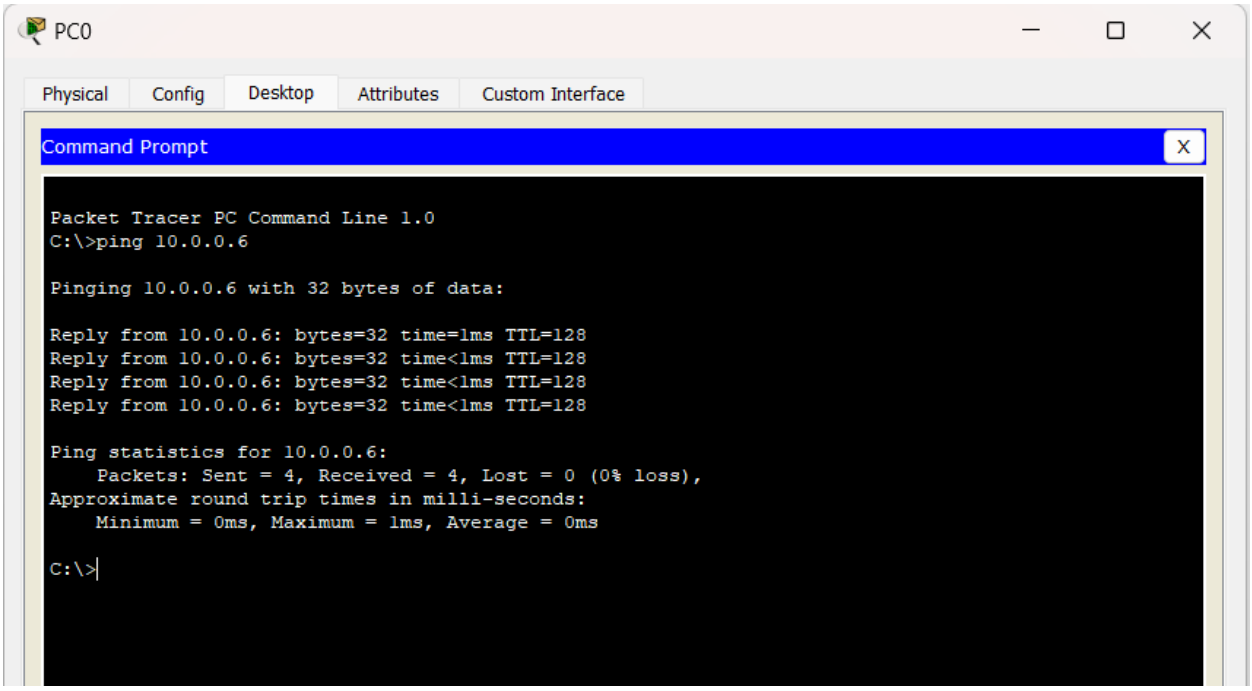


Procedure




Aim: Configuring DHCP within a LAN
Topology:
10.0.0.1
Router-PT
10.0.0.2
Switch
Server PT
PC-0
PC-1
PC-2
Should be Dynamically allocated
Procedure:
→ Select 3 end devices, do not assign ip address to them.
→ Select a switch, a server & a router & connect them as shown.
→ Configure the ip address for the server (Static) & the Router (through CLI) for same network.
Configuring DHCP of server:
→ Go to services in server
→ Select DHCP & turn ON the Servi
→ Set the Default Gateway as the [ip address] of router.
→ DNS server = [ip address of Server]
→ Start address = [Next connection of netw
[i.e., if Router & server are 10.0.0.1 & 10.0.0.2, start addr = 10.0.0.3]
→ Subnet Mask = 255.0.0.0
→ Maximum no of users = 512
→ TFTP Server: [ip address of server]
→ Click save.
Configuring ip address of end devices.
→ Go to Desktop of end device
→ Go to ip configuration & select DHC
Result:
The ip addresses of end devices are allotted dynamically.
Observations:
DHCP (Dynamic Host Configuration Protocol) is a Client/server protocol that automatic provides an ip (internet protocol) with its ip address network as base & other related configuration. DHCP application is DORA (Discover, offer, Request, Acknowledg ment)

Output

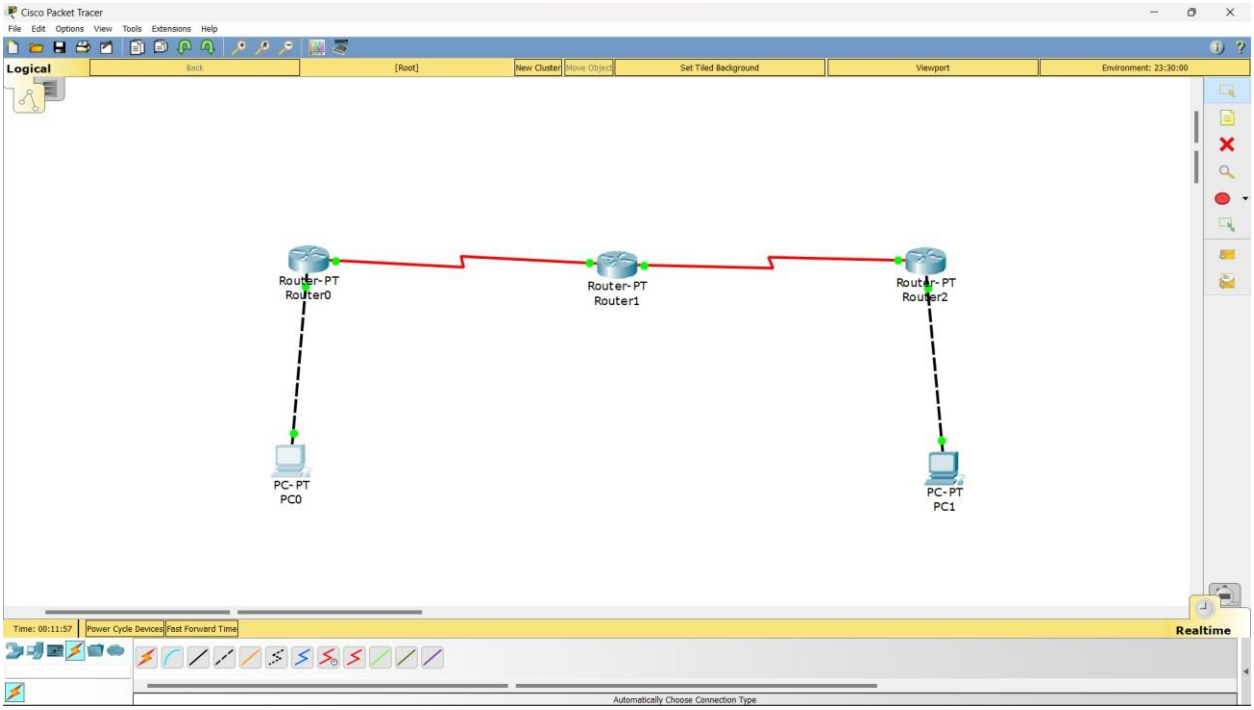

PC0
Physical
Config
Desktop
Attributes
Custom Interface
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.6
Pinging 10.0.0.6 with 32 bytes of data:
Reply from 10.0.0.6: bytes=32 time=1ms TTL=128
Reply from 10.0.0.6: bytes=32 time<1ms TTL=128
Reply from 10.0.0.6: bytes=32 time<1ms TTL=128
Reply from 10.0.0.6: bytes=32 time<1ms TTL=128
Ping statistics for 10.0.0.6:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 1ms, Average = 0ms
C:\>

Experiment No 5

Aim of the program

Configuring RIP Routing Protocol in Routers

Topology



Procedure

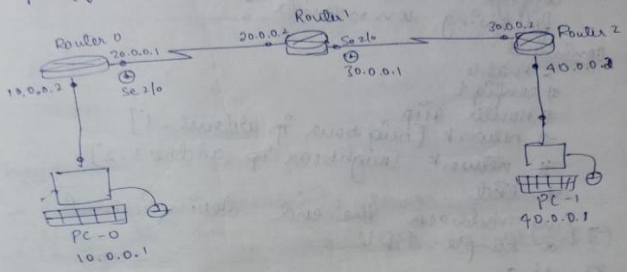
```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.10 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#exit
Router(config)#
Router(config)#interface Serial2/0
Router(config-if)#no shutdown

Router(config-if)#
```

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#clock rate 64000
This command applies only to DCE interfaces
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#
Router(config-if)#exit
Router(config)#interface serial3/0
Router(config-if)#ip address 20.0.0.2 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 30.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#exit
Router(config)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
```

Lab - 6

Aim: Configuring RIP routing Protocol in Routers

Topology:



Procedure:

→ Select 2 end devices & configure their ip addres
→ Select 3 routers & connect them as shown above. Configure the Fast ethernet with appopriate CLI commands & gateway.
→ For the Serial ports, configure them with the following commands

Commands:

- enable
- # config t
- # interface se[port]
- # ip address [ip] [subnet mask]
- # encapsulating ppp
- # clockrate 64000 (only for serial ports with clock(C) symbol)
- # no shutdown
- # exit

→ Configure the RIP for routers with following commands.

Command:

- enable
- # config t
- # router rip
- # network [neighbour ip address - 1]
- # network [neighbour ip address - 2]
- # exit

→ ping between the end device & send a simple PDU.

Result:

The devices are able to ping each other a simple PDU is passed through.

Observation:

RIP is a dynamic routing Protocol that uses hop count as a routing metric to find the best path between source & destination network. The end devices are able to ping with each other [but the first ping has 85% loss.]

Ping statistics:

Packets Sent = 4, Received = 4, Lost = 0 (0% loss)
Minimum = 4ms, Maximum = 12ms, Average = 7ms

Output:

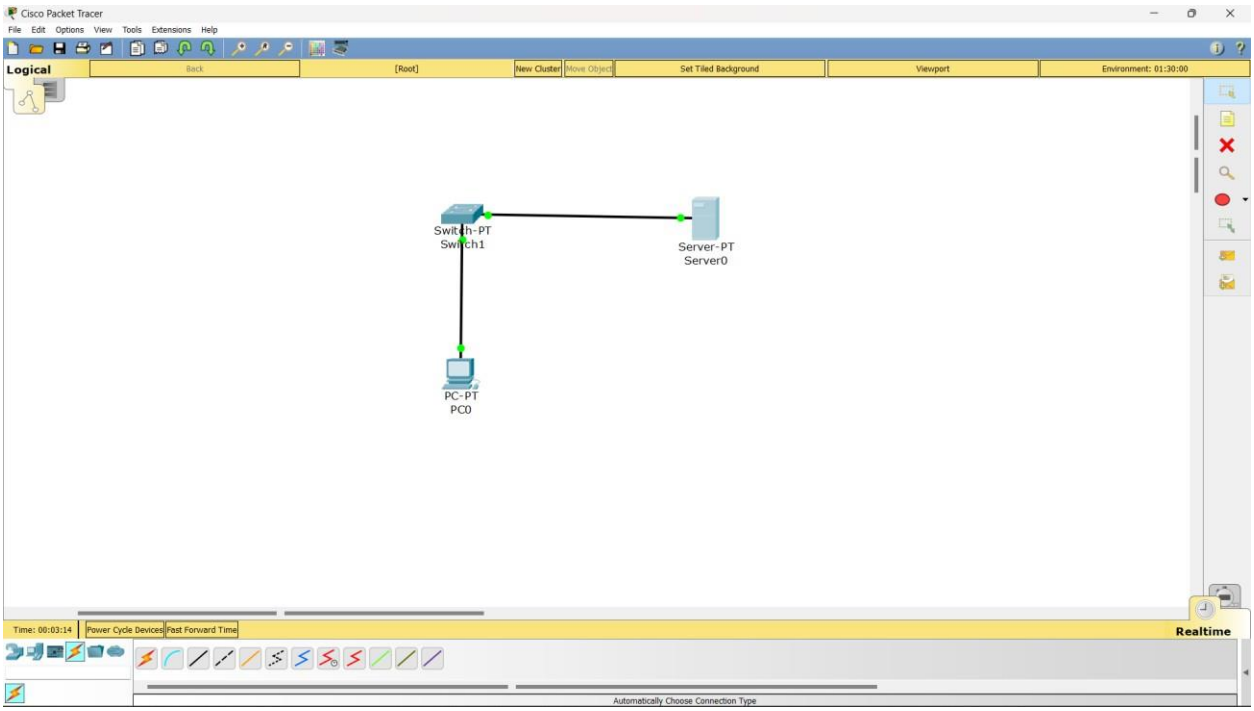
```
C:\>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.1: bytes=32 time=4ms TTL=125
Reply from 40.0.0.1: bytes=32 time=3ms TTL=125
Reply from 40.0.0.1: bytes=32 time=4ms TTL=125

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 4ms, Average = 3ms

C:\>
```

Experiment No 6

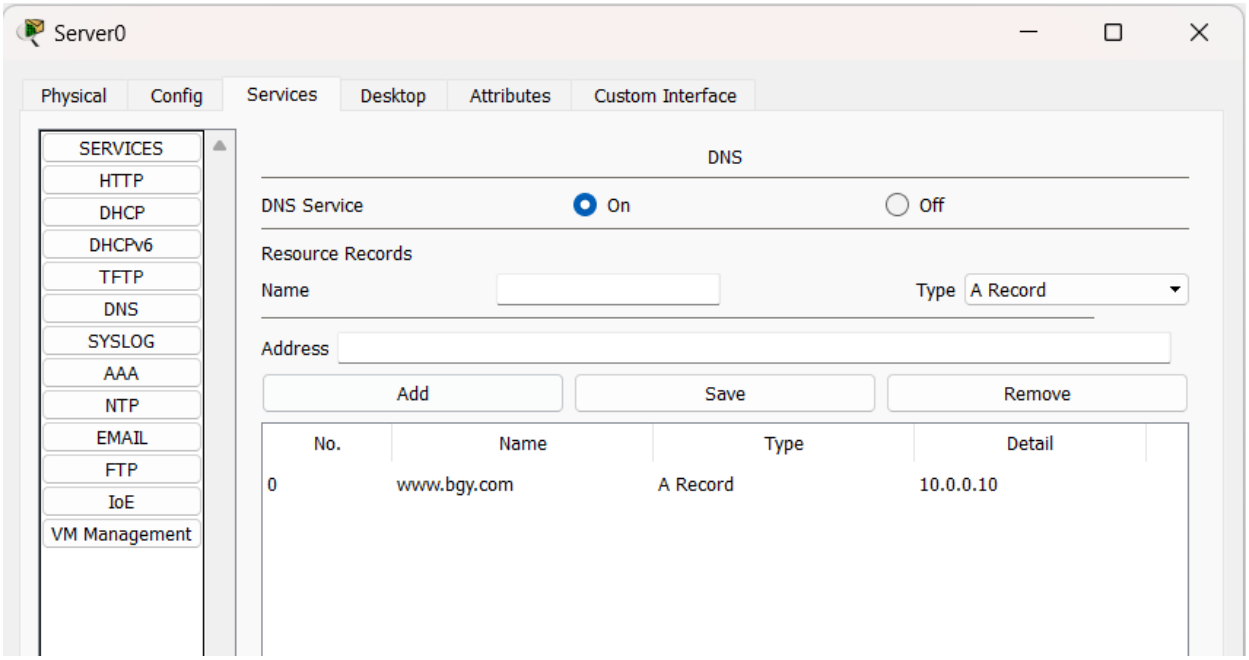
Aim of the program

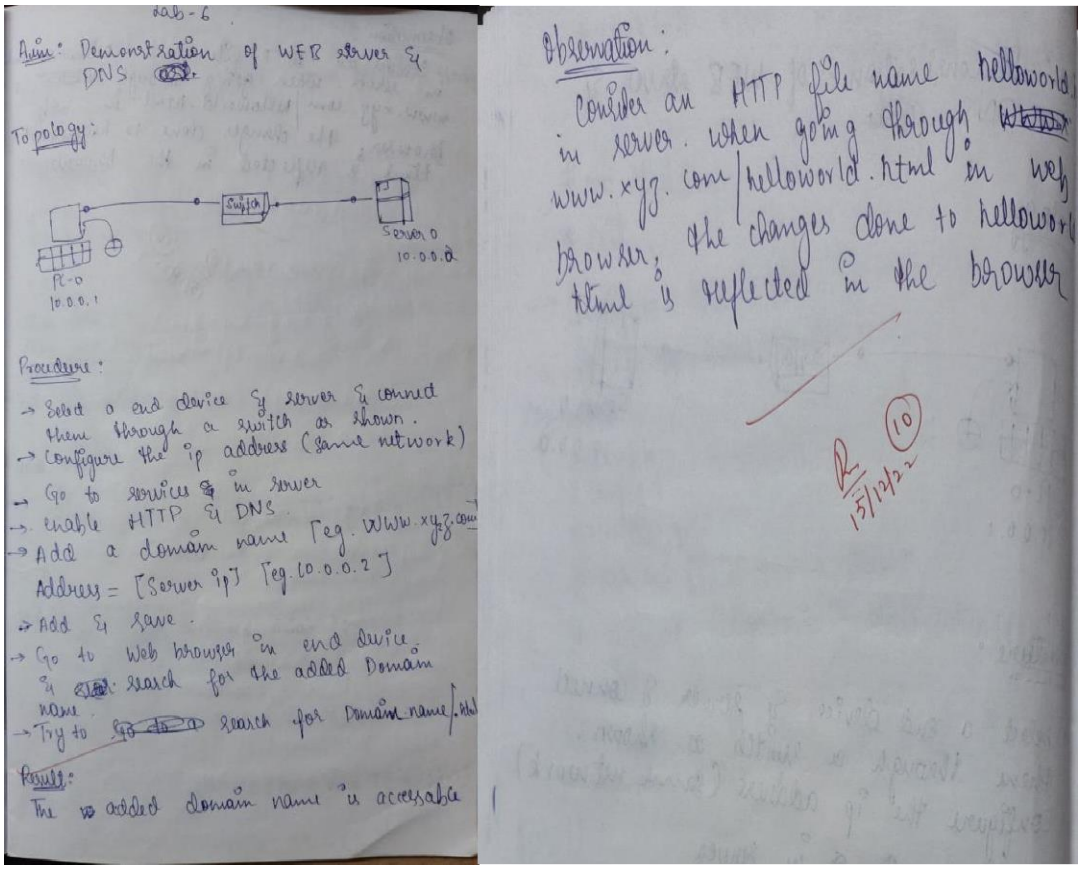
Demonstration of WEB server and DNS using Packet Tracer

Topology

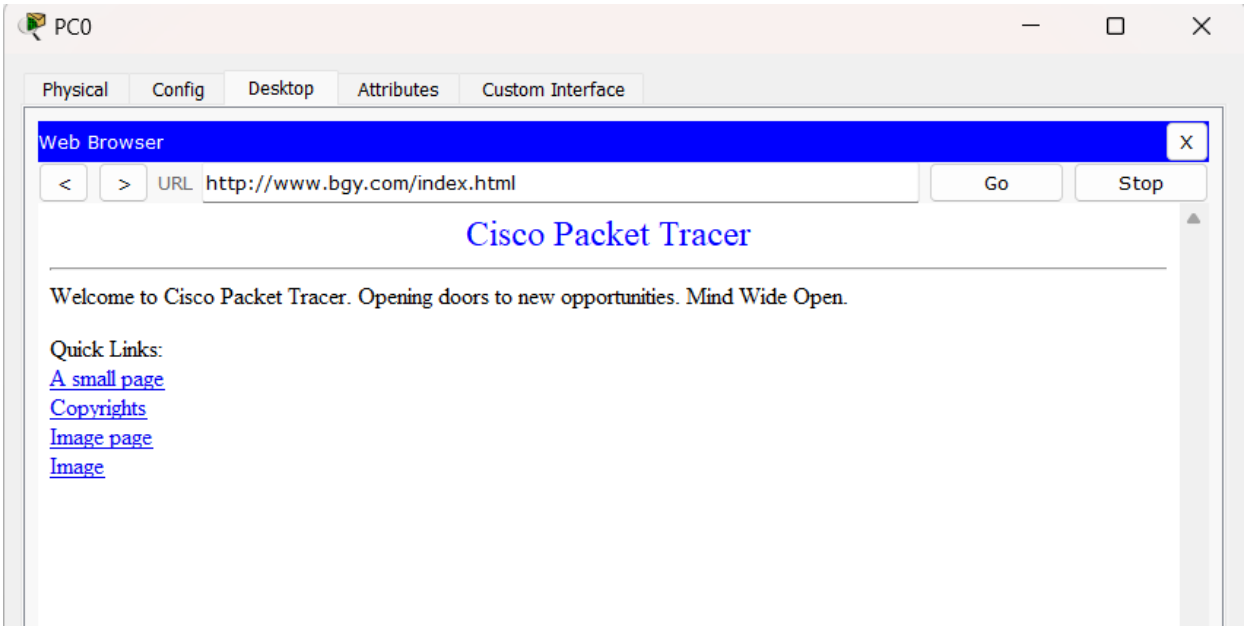


Procedure




Lab-6
Aim: Demonstration of WEB server & DNS
Topology:
Switch
Server-0
10.0.0.2
PC-0
10.0.0.1
Procedure:
→ Select a end device & server & connect them through a switch as shown.
→ Configure the ip address (same network)
→ Go to services in server
→ enable HTTP & DNS
→ Add a domain name [eg. www.xyz.com]
Address = [Server ip] [eg. 10.0.0.2]
→ Add & save.
→ Go to Web browser in end device & search for the added Domain name
→ Try to search for Domain name
Result:
The added domain name is accessable
Observation:
Consider an HTTP file name helloworld in server. when going through www.xyz.com/helloworld.html in web browser, the changes done to helloworld.html is reflected in the browser
10
15/12/22

Output


PC0
Physical
Config
Desktop
Attributes
Custom Interface
Web Browser
X
<
>
URL
http://www.bgy.com/index.html
Go
Stop
Cisco Packet Tracer
Welcome to Cisco Packet Tracer. Opening doors to new opportunities. Mind Wide Open.
Quick Links:
A small page
Copyrights
Image page
Image

Cycle-2

Experiment No 1

Aim of the Experiment

Write a program for error detecting code using CRC-CCITT (16-bits).

Code

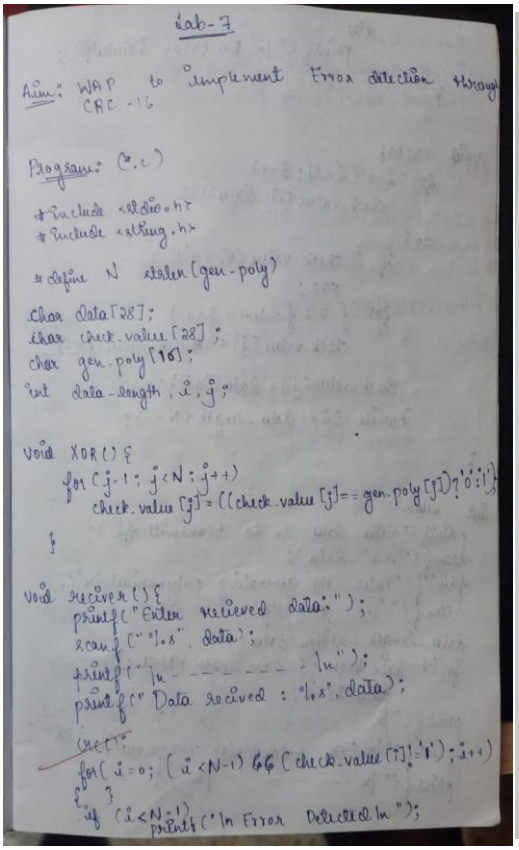
```
#include<bits/stdc++.h>
using namespace std;
void receiver(string data, string key);

string xor1(string a, string b)
{

	string result = "";

	int n = b.length();

	for(int i = 1; i < n; i++)
	{
		if (a[i] == b[i])
			result += "0";
		else
			result += "1";
	}
	return result;
}

string mod2div(string dividend, string divisor)
{
```

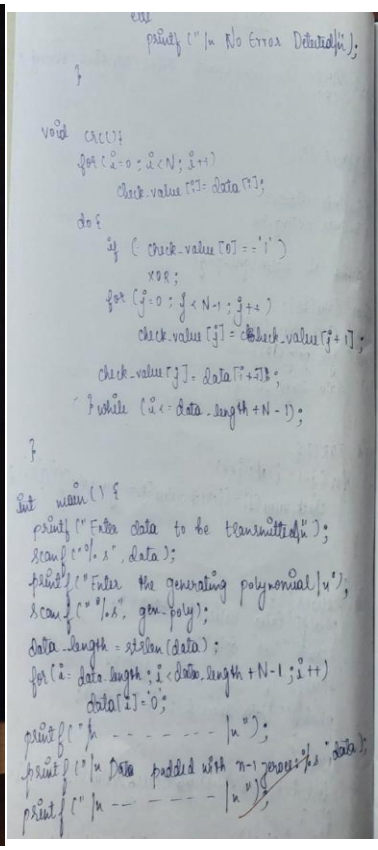
```
	int pick = divisor.length();

	string tmp = dividend.substr(0, pick);

	int n = dividend.length();

	while (pick < n)
	{
		if (tmp[0] == '1')
			tmp = xor1(divisor, tmp) + dividend[pick];
		else
			tmp = xor1(std::string(pick, '0'), tmp) +
				dividend[pick];

		pick += 1;
	}
	if (tmp[0] == '1')
		tmp = xor1(divisor, tmp);
	else
		tmp = xor1(std::string(pick, '0'), tmp);

	return tmp;
}

void encodeData(string data, string key)
{
	int l_key = key.length();
```

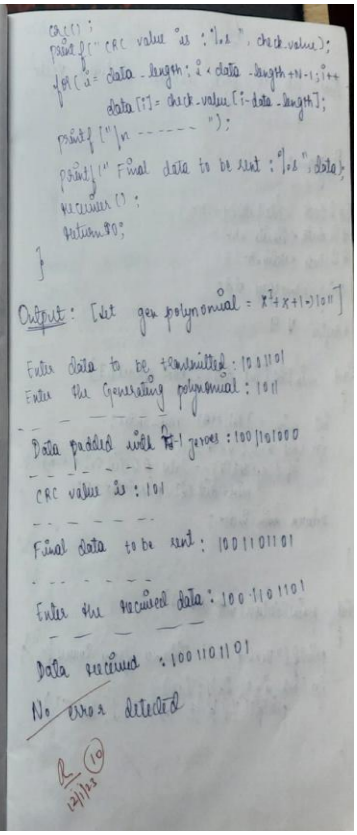
```
	string appended_data = (data +std::string(l_key - 1, '0'));

	string remainder = mod2div(appended_data, key);

	string codeword = data + remainder;
	cout << "Remainder : "
		<< remainder << "\n";
	cout << "Encoded Data (Data + Remainder) :"
		<< codeword << "\n";
	receiver(codeword, key);
}
void receiver(string data, string key)
{
	string currxor = mod2div(data.substr(0, key.size()), key);
	int curr = key.size();
	while (curr != data.size())
	{
		if (currxor.size() != key.size())
		{
			currxor.push_back(data[curr++]);
		}
		else
		{
			currxor = mod2div(currxor, key);
		}
	}
	if (currxor.size() == key.size())
	{
```

```
            currxor = mod2div(currxor, key);
        }
        if (currxor.find('1') != string::npos)
        {
            cout << "there is some error in data" << endl;
        }
        else
        {
            cout << "correct message recieved" << endl;
        }
}
int main()
{

        string data = "1011101";
        string key = "100010000001";

        encodeData(data, key);

        return 0;
}
```

Observation:







Output

```
Remainder : 10001011000
Encoded Data (Data + Remainder) :10111011000101100 0
correct message recieved


...Program finished with exit code 0
Press ENTER to exit console.
```

Experiment No 2

Aim of the Experiment

Write a program for distance vector algorithm to find suitable path for transmission.

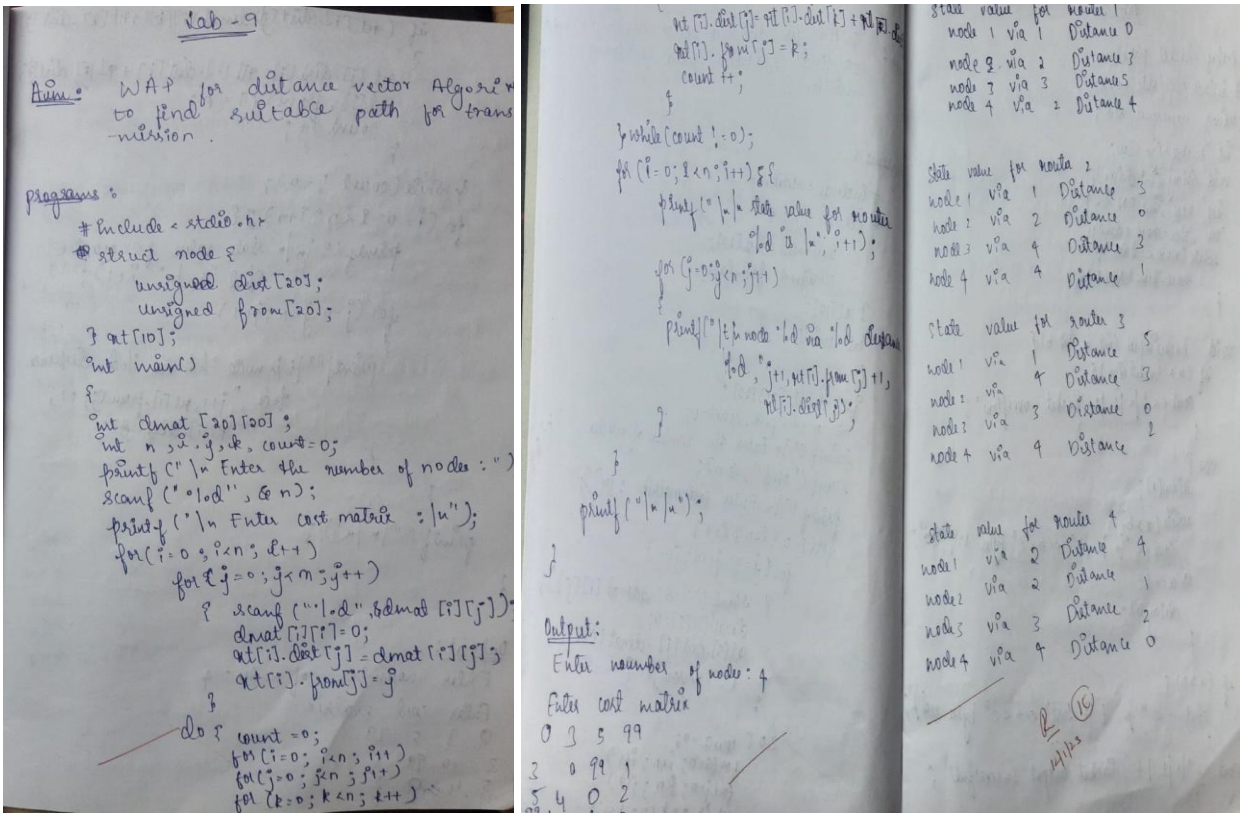
Code

```
#include<stdio.h>


#define INF  99999
#define n 5


void printSolution(int g[n])
{
   printf("Hop count         : ");
   for(int j=0;j<n;j++)
   {
      if(g[j] == INF)
         printf("INF\t");
      else
         printf("%d\t",g[j]);
   }
   printf("\n");
}


void findShortestPath(int dist[][n])
{


   for(int k=0;k<n;k++)
   {
      for(int i=0;i<n;i++)
```

```
        {
            for(int j=0;j<n;j++)
            {
                if(dist[i][j] > dist[i][k] + dist[k][j]
                &&(dist[i][k] != INF && dist[k][j] != INF))
                {
                    dist[i][j] = dist[i][k] + dist[k][j];
                }
            }
        }
    }

    char c = 'A';
    for(int i=0; i<n; i++ )
    {
        printf("Router table entries for router %c:\n", c);
        printf("Destination router: A\tB\tC\tD\tE\n");
        printSolution(dist[i]);
        c++;
    }
}

int main()
{
    int graph[][n] = { {0,  1,  1, INF, INF},
                       {1,  0,  INF,  INF, INF},
                       {1, INF, 0, 1,  1},
                       {INF, INF, 1, 0, INF},
```

```
        {INF, INF, 1, INF, 0}};

    findShortestPath(graph);
    return 0;
}
```

Observation:



Output:

```
Router table entries for router A:
Destination router: A   B       C       D       E
Hop count         : 0   1       1       2       2
Router table entries for router B:
Destination router: A   B       C       D       E
Hop count         : 1   0       2       3       3
Router table entries for router C:
Destination router: A   B       C       D       E
Hop count         : 1   2       0       1       1
Router table entries for router D:
Destination router: A   B       C       D       E
Hop count         : 2   3       1       0       2
Router table entries for router E:
Destination router: A   B       C       D       E
Hop count         : 2   3       1       2       0


...Program finished with exit code 0
Press ENTER to exit console.
```

Experiment No 3

Aim of the Experiment

Implement Dijkstra's algorithm to compute the shortest path for a given topology.

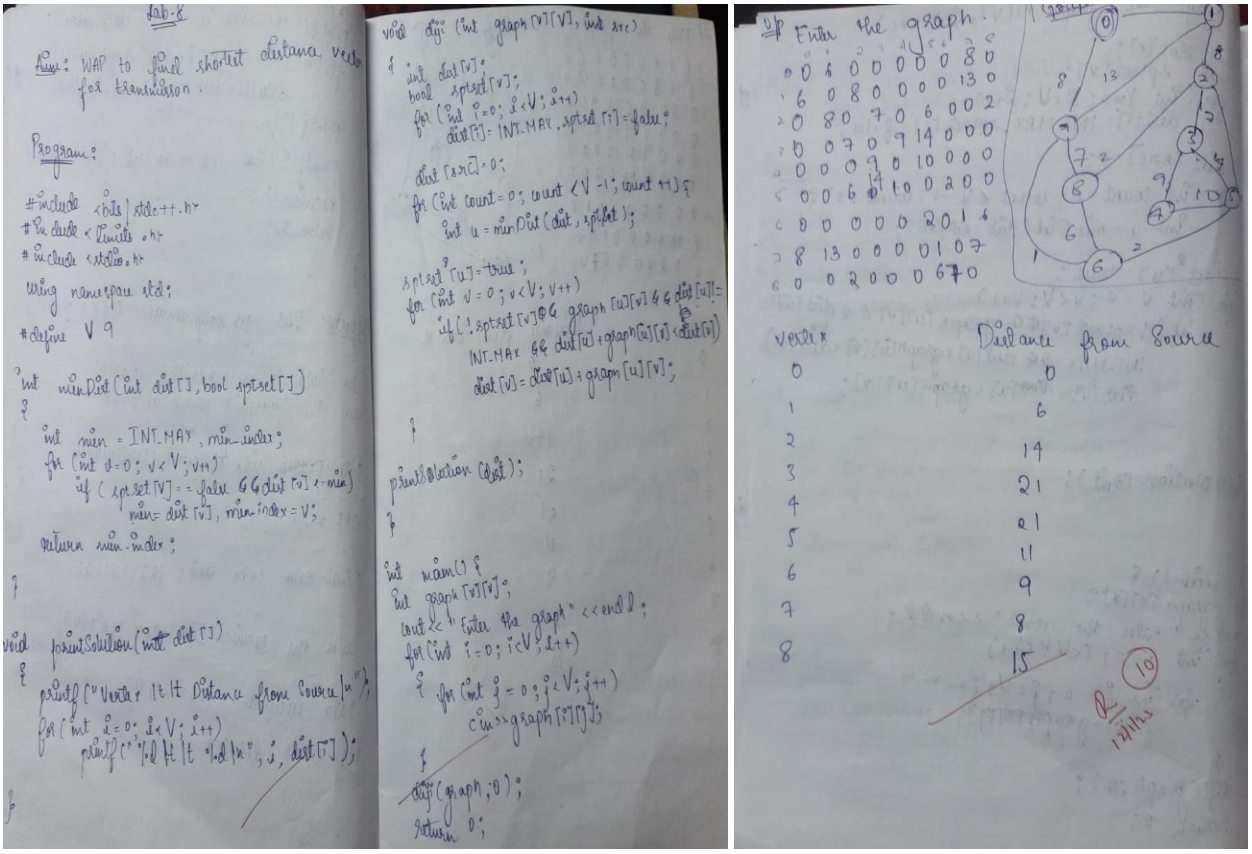
Code

```
#include <stdio.h>
#include <stdlib.h>



void dijkstra(int graph[10][10],int V)
{
   int distance[V], predefine[V], visited[V];
   int startnode, count, min_distance, nextnode, i, j;
   printf("\nEnter the start node: ");
   scanf("%d", &startnode);
   for(i=0; i<V; i++) {
      distance[i] = graph[startnode][i];
      predefine[i] = startnode;
      visited[i] = 0;
   }
   distance[startnode] = 0;
   visited[startnode] = 1;
   count = 1;
   while(count<V-1) {
      min_distance = 99;
      for(i=0; i<V; i++) {
         if(distance[i] < min_distance && visited[i]==0)
         {
            min_distance = distance[i];
```

```
            nextnode = i;
        }
    }
    visited[nextnode] = 1;
    for(i=0;i<V;i++)
    {
        if(visited[i] == 0)
        {
            if((min_distance + graph[nextnode][i]) < distance[i])
            {
                distance[i] = min_distance + graph[nextnode][i];
                predefine[i] = nextnode;
            }
        }
    }
    count = count + 1;
}
for(i=0;i<V;i++) {
    if(i!=startnode) {
        printf("\nDistance of node %d = %d", i, distance[i]);
        printf("\nPath = %d",i);
        j = i;
        do
        {
            j = predefine[j];
            printf(" <- %d",j);
        } while (j != startnode);
    }
```

```
    }
}
int main()
{
    int i, j;
    int V;
    printf("Enter the number of vertices: ");
    scanf("%d", &V);
    int graph[V][V];
    printf("\nEnter the cost/weight matrix: \n");
    for(i=0; i<V; i++) {
        for(j=0;j<V;j++) {
            scanf("%d", &graph[i][j]);
        }
    }
    dijkstra(graph, V);
    return 0;
}
```

Observation:



Output:

```
Enter the number of vertices: 5

Enter the cost/weight matrix:
0 10 99 5 7
10 0 1 2 99
99 1 0 9 4
5 2 9 0 99
7 99 4 99 0

Enter the start node: 0

Distance of node 1 = 5
Path = 1 <- 4 <- 3 <- 0
Distance of node 2 = 5
Path = 2 <- 4 <- 3 <- 0
Distance of node 3 = 5
Path = 3 <- 0
Distance of node 4 = 5
Path = 4 <- 3 <- 0

...Program finished with exit code 0
Press ENTER to exit console.
```

Experiment No 4

Aim of the Experiment

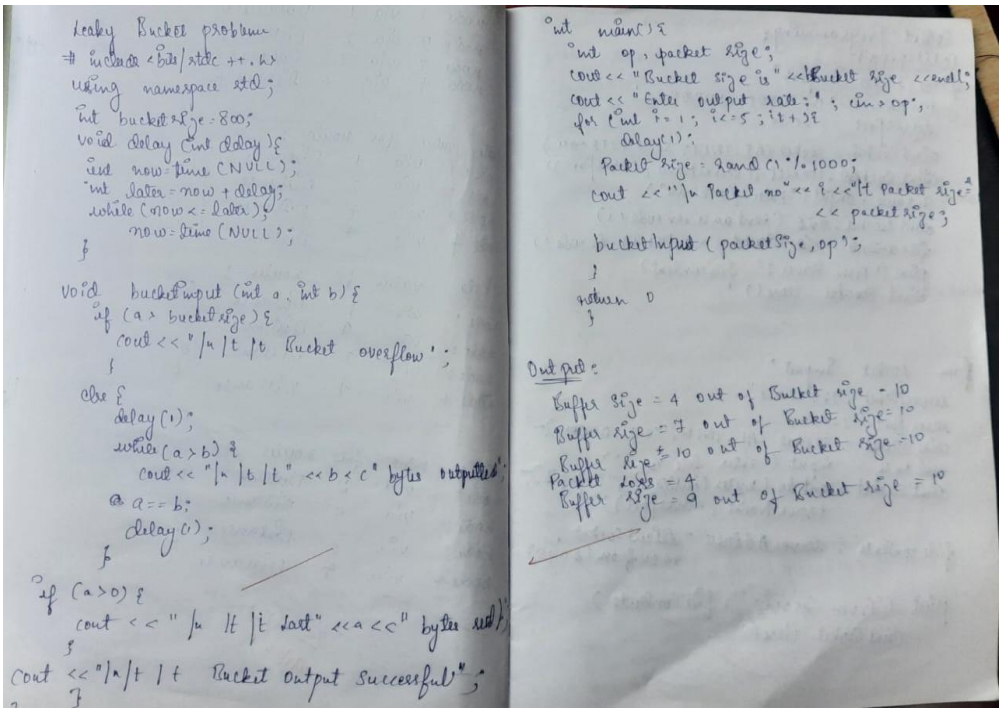
Write a program for congestion control using Leaky bucket algorithm

Code

```
#include <bits/stdc++.h>
using namespace std;
int main()
{
	int no_of_queries, storage, output_pkt_size;
	int input_pkt_size, bucket_size, size_left;
	storage = 0;
	no_of_queries = 4;
	bucket_size = 10;
	input_pkt_size = 4;
	output_pkt_size = 1;
	for (int i = 0; i < no_of_queries; i++) //
	{
		size_left = bucket_size - storage;
		if (input_pkt_size <= size_left) {
			// update storage
			storage += input_pkt_size;
		}
		else {
			printf("Packet loss = %d\n", input_pkt_size);
		}
		printf("Buffer size= %d out of bucket size= %d\n",
			storage, bucket_size);
```

```
        storage -= output_pkt_size;
    }
    return 0;}
```

Observation:



Output:

```
Buffer size= 4 out of bucket size= 10
Buffer size= 7 out of bucket size= 10
Buffer size= 10 out of bucket size= 10
Packet loss = 4
Buffer size= 9 out of bucket size= 10
```

Experiment No 5

Aim of the Experiment

Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.

Code

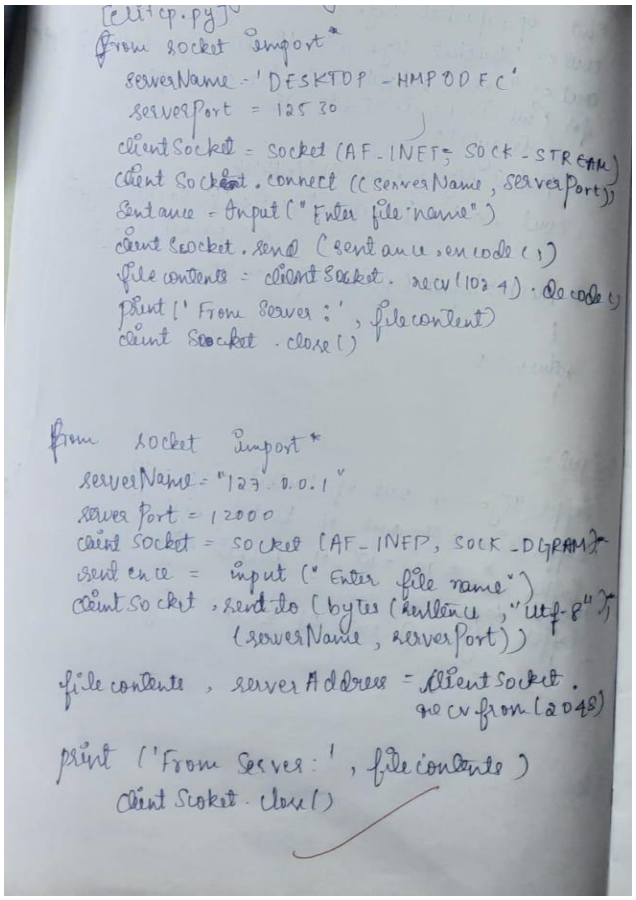
Server:

```
from socket import *
serverName = ''
serverPort = 12530
serverSocket = socket(AF_INET,SOCK_STREAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1)
print("The server is ready to receive")
while 1:
    connectionSocket, addr = serverSocket.accept()
    sentence = connectionSocket.recv(1024).decode()
    try:
        file = open(sentence,"r")
        l = file.read(1024)
        connectionSocket.send(l.encode())
        file.close()
    except Exception as e:
        message = "No such file exist"
        connectionSocket.send(message.encode())
    connectionSocket.close()
```

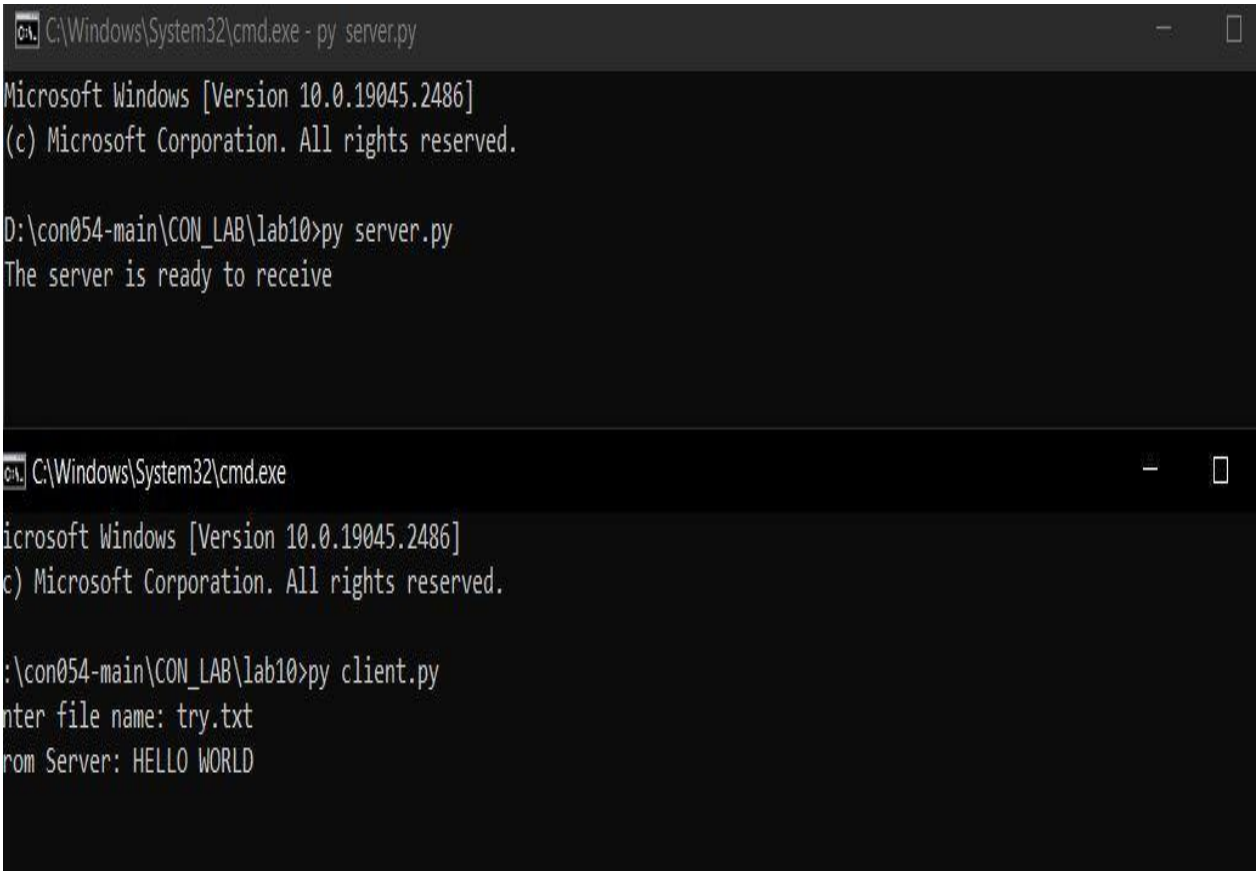
Client:

```
from socket import *
serverName = '192.168.1.104'
serverPort = 12530
clientSocket = socket(AF_INET, SOCK_STREAM)
clientSocket.connect((serverName,serverPort))
sentence = input("Enter file name")
clientSocket.send(sentence.encode())
filecontents = clientSocket.recv(1024).decode()
print ('From Server:', filecontents)
clientSocket.close()
```

Observation:



Output


C:\Windows\System32\cmd.exe - py server.py
Microsoft Windows [Version 10.0.19045.2486]
(c) Microsoft Corporation. All rights reserved.
D:\con054-main\CON_LAB\lab10>py server.py
The server is ready to receive
C:\Windows\System32\cmd.exe
icrosoft Windows [Version 10.0.19045.2486]
c) Microsoft Corporation. All rights reserved.
:\con054-main\CON_LAB\lab10>py client.py
nter file name: try.txt
rom Server: HELLO WORLD

Experiment No 5

Aim of the Experiment

Using UDP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.

Code

Server:

```
from socket import *
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_DGRAM)
serverSocket.bind(("127.0.0.1", serverPort))
print("The server is ready to receive")
while 1:
    sentence,clientAddress = serverSocket.recvfrom(2048)

    file=open(sentence,"r")
    l=file.read(2048)

    serverSocket.sendto(bytes(l,"utf-8"),clientAddress)
    print("sent back to client",l)
    file.close()
```

Client:

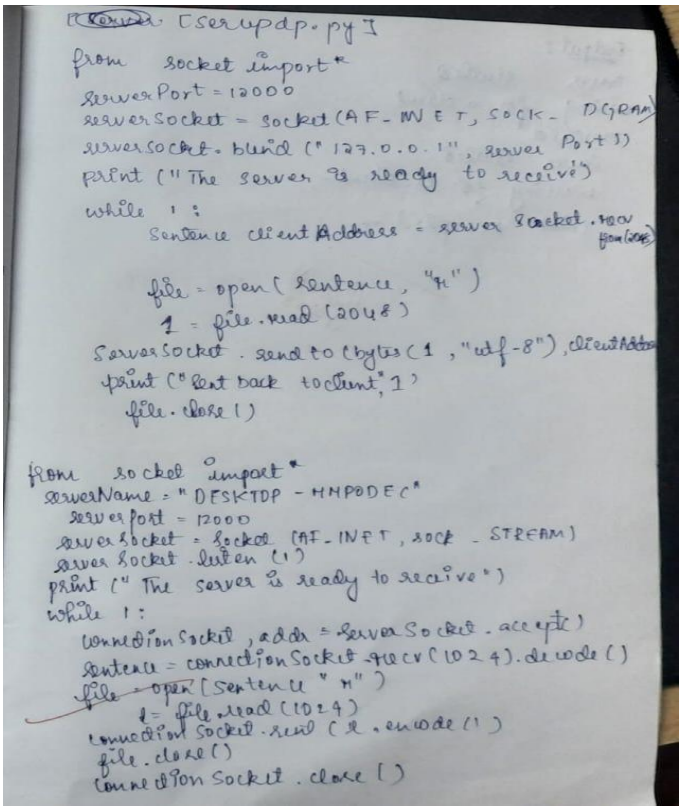
```
from socket import *
serverName = "127.0.0.1"
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)

sentence = input("Enter file name")
clientSocket.sendto(bytes(sentence,"utf-8"),(serverName, serverPort))
```

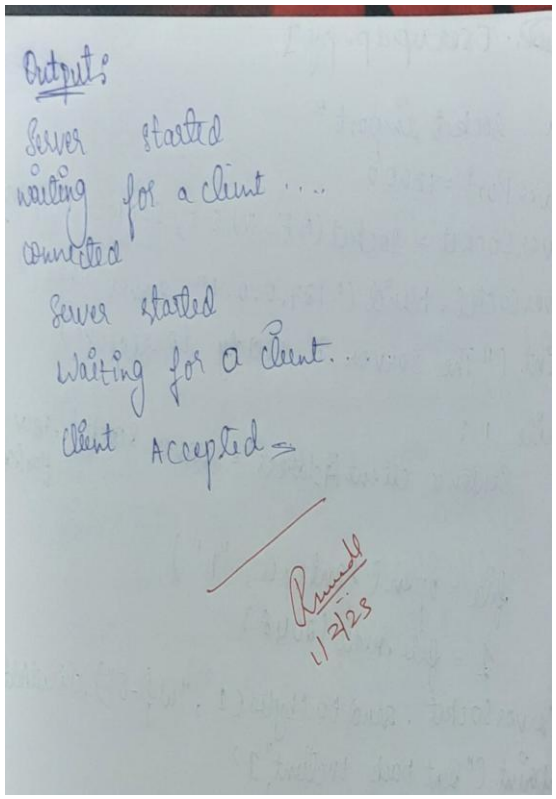
filecontents,serverAddress = clientSocket.recvfrom(2048)

print ('From Server:', filecontents)

clientSocket.close()

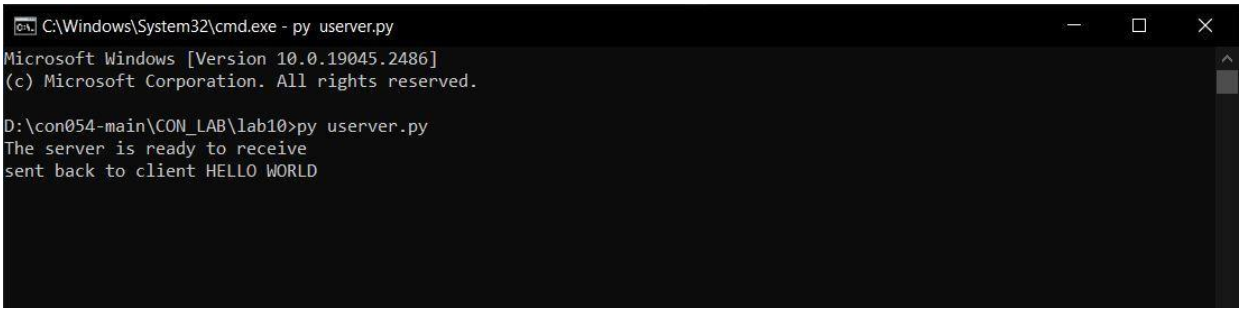
Observation:





Output


C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19045.2486]
(c) Microsoft Corporation. All rights reserved.
D:\con054-main\CON_LAB\lab10>py uclient.py
Enter file name: try.txt
From Server: b'HELLO WORLD\n\n'
D:\con054-main\CON_LAB\lab10>


C:\Windows\System32\cmd.exe - py userver.py
Microsoft Windows [Version 10.0.19045.2486]
(c) Microsoft Corporation. All rights reserved.
D:\con054-main\CON_LAB\lab10>py userver.py
The server is ready to receive
sent back to client HELLO WORLD