

CN Lab Report Week 8

PES1UG19CS582

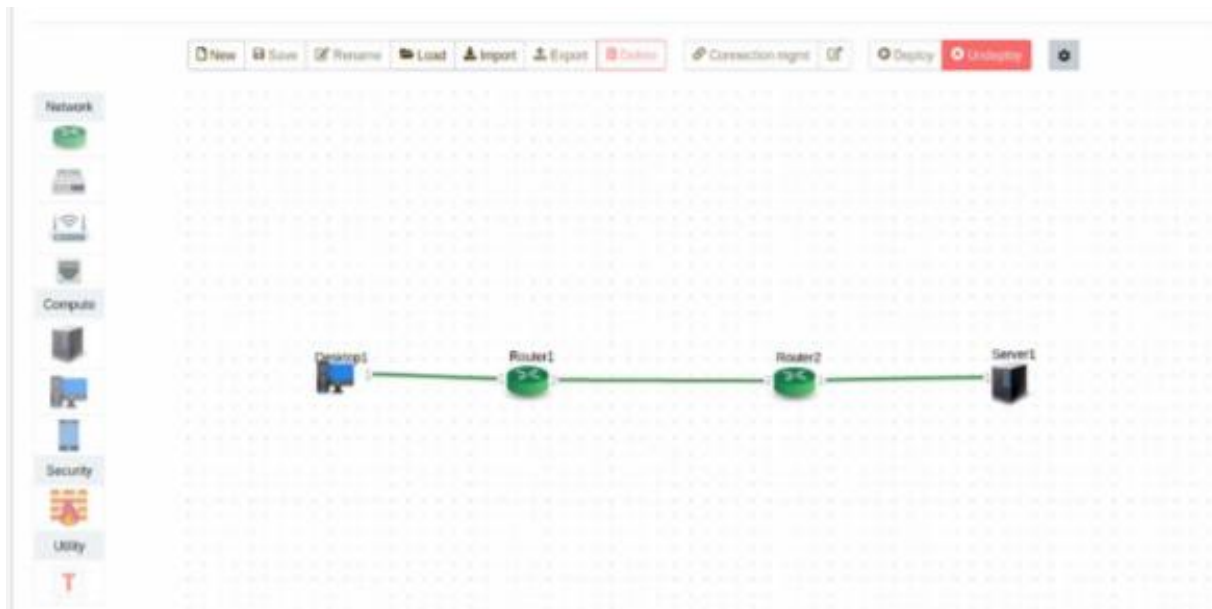
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1. IPv4 Addressing and Topology Creation

The following topology is created and deployed on ClayNet.



The configuration of all the end-system devices is shown below.

End System	IP Address	Gateway
Desktop1	10.10.10.2/24	10.10.10.1
	4	
Server1	30.30.30.2/24	30.30.30.1
	4	

Similarly, the routers are configured in the same manner.

Router	Interface Number (port)	IP Address
Router1	1	10.10.10.1/24
		4

Router1	2	20.20.20.1/24
Router2	1	30.30.30.1/24
Router2	2	20.20.20.2/24

```

test@Lubuntu-vm:~$ ping 10.10.10.1
PING 10.10.10.1 (10.10.10.1) 56(84) bytes of data:
64 bytes from 10.10.10.1: icmp_seq=1 ttl=64 time=0.774 ms
64 bytes from 10.10.10.1: icmp_seq=2 ttl=64 time=0.364 ms
64 bytes from 10.10.10.1: icmp_seq=3 ttl=64 time=0.353 ms
64 bytes from 10.10.10.1: icmp_seq=4 ttl=64 time=0.330 ms
64 bytes from 10.10.10.1: icmp_seq=5 ttl=64 time=0.410 ms
64 bytes from 10.10.10.1: icmp_seq=6 ttl=64 time=0.451 ms
64 bytes from 10.10.10.1: icmp_seq=7 ttl=64 time=0.449 ms
64 bytes from 10.10.10.1: icmp_seq=8 ttl=64 time=0.244 ms
64 bytes from 10.10.10.1: icmp_seq=9 ttl=64 time=0.287 ms
64 bytes from 10.10.10.1: icmp_seq=10 ttl=64 time=0.306 ms
64 bytes from 10.10.10.1: icmp_seq=11 ttl=64 time=0.286 ms
64 bytes from 10.10.10.1: icmp_seq=12 ttl=64 time=0.216 ms
64 bytes from 10.10.10.1: icmp_seq=13 ttl=64 time=0.262 ms
64 bytes from 10.10.10.1: icmp_seq=14 ttl=64 time=0.423 ms
64 bytes from 10.10.10.1: icmp_seq=15 ttl=64 time=0.338 ms
^C
--- 10.10.10.1 ping statistics ---
15 packets transmitted, 15 received, 0% packet loss, time 14335ms
rtt min/avg/max/mdev = 0.216/0.366/0.774/0.130 ms
test@Lubuntu-vm:~$ ping 10.10.10.2
PING 10.10.10.2 (10.10.10.2) 56(84) bytes of data:
64 bytes from 10.10.10.2: icmp_seq=1 ttl=64 time=0.058 ms
64 bytes from 10.10.10.2: icmp_seq=2 ttl=64 time=0.025 ms
64 bytes from 10.10.10.2: icmp_seq=3 ttl=64 time=0.017 ms
64 bytes from 10.10.10.2: icmp_seq=4 ttl=64 time=0.017 ms
64 bytes from 10.10.10.2: icmp_seq=5 ttl=64 time=0.017 ms
64 bytes from 10.10.10.2: icmp_seq=6 ttl=64 time=0.016 ms
^C
--- 10.10.10.2 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5118ms
rtt min/avg/max/mdev = 0.016/0.025/0.058/0.015 ms
test@Lubuntu-vm:~$

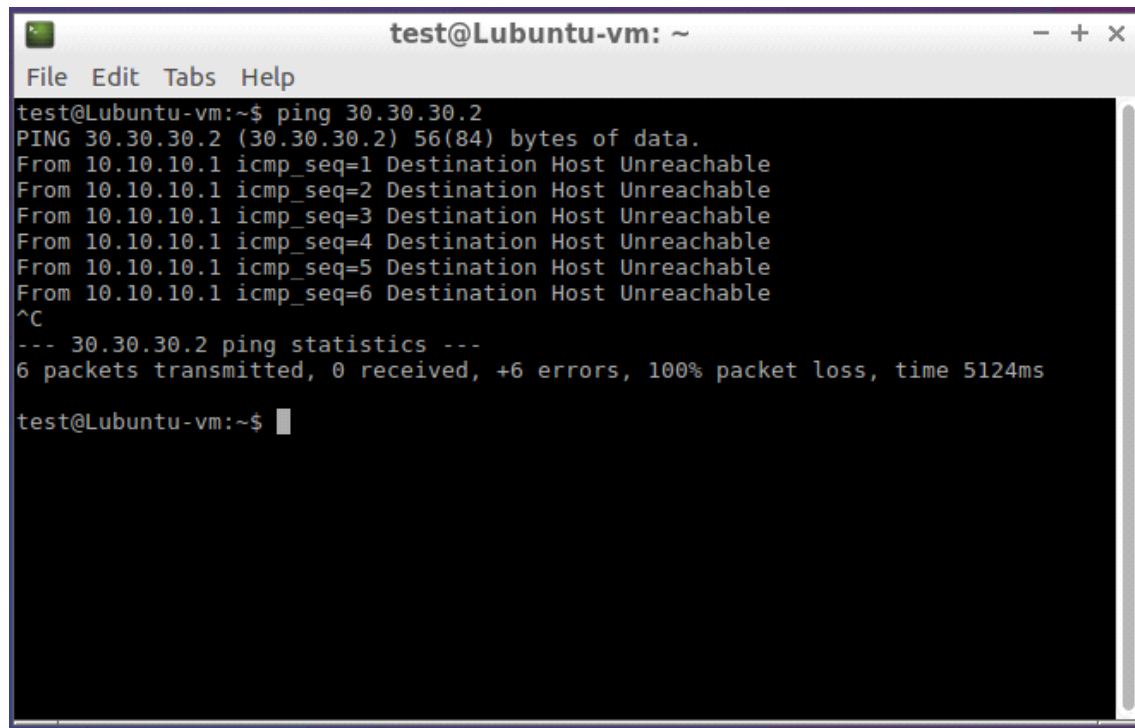
```

2. Ping Command

From Desktop1, a ping command is made to Server1.

However, this ping command fails because the routing table entries have not been configured yet for Router1 and Router2.

We obtain a Destination Host Unreachable status.

A terminal window titled 'test@Lubuntu-vm: ~' with a menu bar (File, Edit, Tabs, Help). The terminal shows a ping command being executed: 'test@Lubuntu-vm:~\$ ping 30.30.30.2'. The output indicates that the destination is unreachable for all six attempts. The statistics show 6 packets transmitted, 0 received, and 100% packet loss. The window has a standard Ubuntu window title bar with minimize, maximize, and close buttons.

```
test@Lubuntu-vm:~$ ping 30.30.30.2
PING 30.30.30.2 (30.30.30.2) 56(84) bytes of data.
From 10.10.10.1 icmp_seq=1 Destination Host Unreachable
From 10.10.10.1 icmp_seq=2 Destination Host Unreachable
From 10.10.10.1 icmp_seq=3 Destination Host Unreachable
From 10.10.10.1 icmp_seq=4 Destination Host Unreachable
From 10.10.10.1 icmp_seq=5 Destination Host Unreachable
From 10.10.10.1 icmp_seq=6 Destination Host Unreachable
^C
--- 30.30.30.2 ping statistics ---
6 packets transmitted, 0 received, +6 errors, 100% packet loss, time 5124ms

test@Lubuntu-vm:~$
```

3. Configuration of Routing Table Entries

3.1 Router 1

The Routing Table entries for Router 1 are configured using the below commands in the console window.

```
ClayNet™ | Home x clayroot@ClayNet: ~ x You are signed in as PES x +
10.1.10.10:8000/wetty/ssh/clayroot/127.0.0.1/58390
Most Visited Getting Started Internet Captive Portal
Entering configuration mode with exclusive access.
configure> create parameter-group ip-route to-n30
Info: Parameter group instance created.
configure> set enable yes
configure> set router data
configure> set destination 30.30.30.0/24
configure> set next-hop gateway 20.20.20.2
configure> save
Info: Parameter group ip-route "to-n30" saved
configure> exit
operational> show route summary -s active data

> IPv4 active routes

>> Destination : 10.10.10.0/24
Gateway(s) : { if-port-1
              0.0.0.0 }
Source      : direct
Flags      : -

>> Destination : 20.20.20.0/24
Gateway(s) : { if-port-2
              0.0.0.0 }
Source      : direct
Flags      : -

>> Destination : 30.30.30.0/24
Gateway(s) : { if-port-2
              20.20.20.2 }
Source      : static
Flags      : -

>> Destination : 127.0.0.0/8
Gateway(s) : { ^loopback-1
Line : 1-23, Press 'q' to quit.
```

3.1 Router 2

The Routing Table entries for Router 2 are configured using the below commands in the console window.

```
clayroot@ClayNet:~$ telnet 127.0.0.1 53694
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.

Login: test
Password:

operational> configure
Entering configuration mode with exclusive access.
configure> set enable yes
Error: No parameter group instance loaded for processing
configure> create parameter-group ip-route to-n30
Info: Parameter group instance created.
configure> set enable yes
configure> set router data
configure> set destination 10.10.10.0/24
configure> set next-hop gateway 20.20.20.1
configure> save
Info: Parameter group ip-route "to-n30" saved
configure> exit
operational>
```

```

Login: test
Password:

operational> configure
Entering configuration mode with exclusive access.
configure> set enable yes
Error: No parameter group instance loaded for processing
configure> create parameter-group ip-route to-n30
Info: Parameter group instance created.
configure> set enable yes
configure> set router data
configure> set destination 10.10.10.0/24
configure> set next-hop gateway 20.20.20.1
configure> save
Info: Parameter group ip-route "to-n30" saved
configure> exit
operational> show route summary -s active data

> IPv4 active routes

>> Destination : 10.10.10.0/24
   Gateway(s)  : { if-port-2
                  20.20.20.1 }
   Source      : static
   Flags       : -

>> Destination : 20.20.20.0/24
   Gateway(s)  : { if-port-2
                  0.0.0.0 }
   Source      : direct
   Flags       : -

>> Destination : 30.30.30.0/24
   Gateway(s)  : { if-port-1
                  0.0.0.0 }
   Source      : direct
   Flags       : -

>> Destination : 127.0.0.0/8
   Gateway(s)  : { ^loopback-1
Line : 1-23, Press 'q' to quit.

```

4. Observations

Desktop1 and Server1 are now reachable from each other.

To verify this, the ping command is again used to ICMP request packets to the other.

Since there are 2 hops between the systems, the TTL value is decremented by 2. Hence the value is decremented from its default value of 64 to 62

The following Wireshark Packet Capture shows ICMP request packets being sent from Desktop1 to Server1.

Capturing from any

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

icmp Expression... +

No.	Time	Source	Destination	Protocol	Length	Info
2	0.482124630	10.10.10.2	30.30.30.2	ICMP	100	Echo (ping) request id=0x07dd, seq=1/256, ttl=64 (re...
3	0.483071850	30.30.30.2	10.10.10.2	ICMP	100	Echo (ping) reply id=0x07dd, seq=1/256, ttl=62 (re...
4	1.483198574	10.10.10.2	30.30.30.2	ICMP	100	Echo (ping) request id=0x07dd, seq=2/512, ttl=64 (re...
5	1.484161232	30.30.30.2	10.10.10.2	ICMP	100	Echo (ping) reply id=0x07dd, seq=2/512, ttl=62 (re...
7	2.484277666	10.10.10.2	30.30.30.2	ICMP	100	Echo (ping) request id=0x07dd, seq=3/768, ttl=64 (re...
8	2.485022600	30.30.30.2	10.10.10.2	ICMP	100	Echo (ping) reply id=0x07dd, seq=3/768, ttl=62 (re...
9	3.493366553	10.10.10.2	30.30.30.2	ICMP	100	Echo (ping) request id=0x07dd, seq=4/1024, ttl=64 (r...
10	3.494161894	30.30.30.2	10.10.10.2	ICMP	100	Echo (ping) reply id=0x07dd, seq=4/1024, ttl=62 (r...
14	4.517367190	10.10.10.2	30.30.30.2	ICMP	100	Echo (ping) request id=0x07dd, seq=5/1280, ttl=64 (r...
15	4.518100738	30.30.30.2	10.10.10.2	ICMP	100	Echo (ping) reply id=0x07dd, seq=5/1280, ttl=62 (r...

test@Lubuntu-vm: ~

File Edit Tabs Help

```
test@Lubuntu-vm:~$ ping 30.30.30.2
PING 30.30.30.2 (30.30.30.2) 56(84) bytes of data:
64 bytes from 30.30.30.2: icmp_seq=1 ttl=62 time=0.987 ms
64 bytes from 30.30.30.2: icmp_seq=2 ttl=62 time=0.986 ms
64 bytes from 30.30.30.2: icmp_seq=3 ttl=62 time=0.772 ms
64 bytes from 30.30.30.2: icmp_seq=4 ttl=62 time=0.820 ms
64 bytes from 30.30.30.2: icmp_seq=5 ttl=62 time=0.755 ms

--- 30.30.30.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4035ms
rtt min/avg/max/mdev = 0.755/0.864/0.987/0.102 ms
test@Lubuntu-vm:~$
```

id: 10 (47.6%) Profile: Default