Experiment 1:- Analyze the Computer Network Design using SWITCH and HUB in GNS3.

Switch Configure:

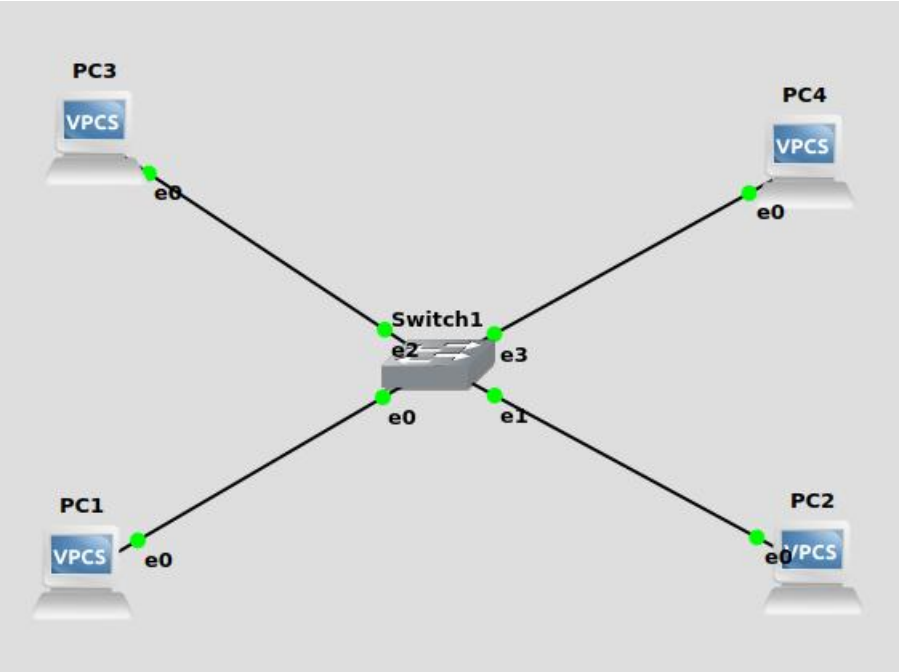


Fig: Switch

1. Drag &Drop 4 VPCs and make the required connections and click on start option to run all devices.

2. Set ip address for all VPCs as follows:
   PC1>192.168.1.1/24 192.168.1.254
   PC2>192.168.1.2/24 192.168.1.254
   PC3>192.168.1.3/24 192.168.1.254
   PC4>192.168.1.4/24 192.168.1.254

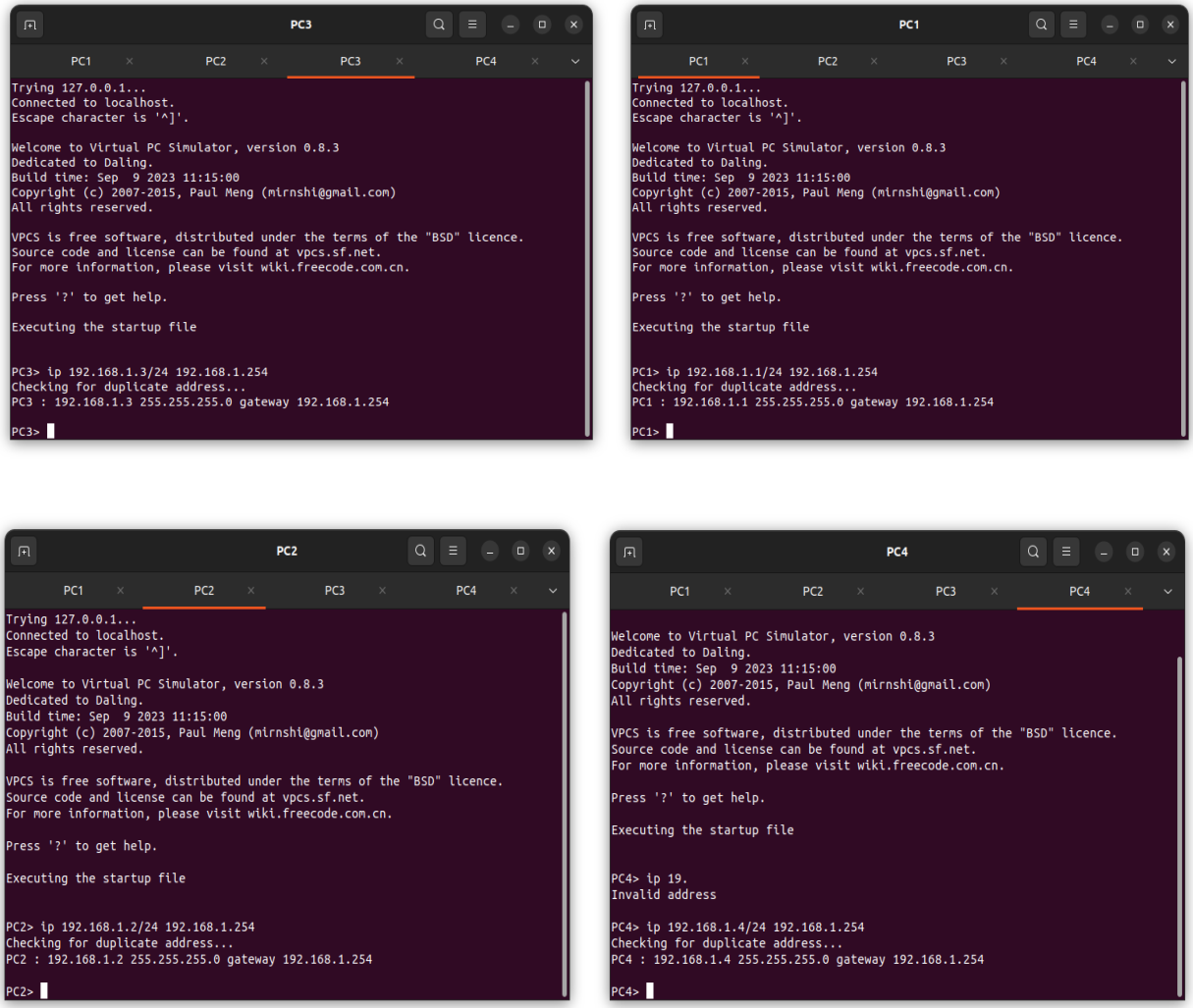


Fig: IP address for all 4 PC's.

3. Right click on PC4 & give start capture.

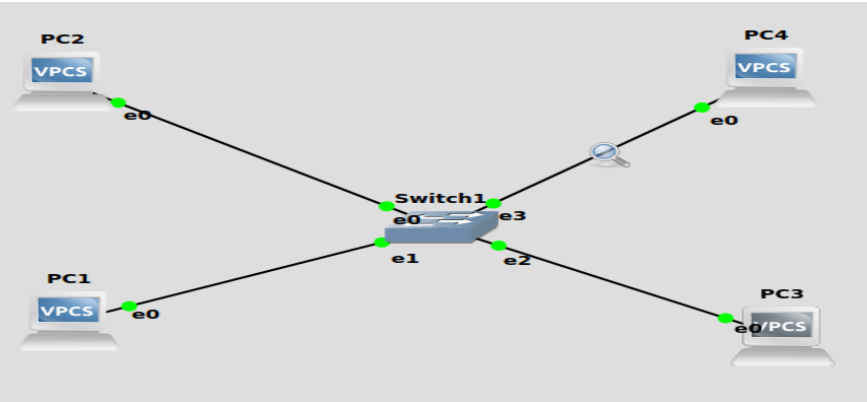
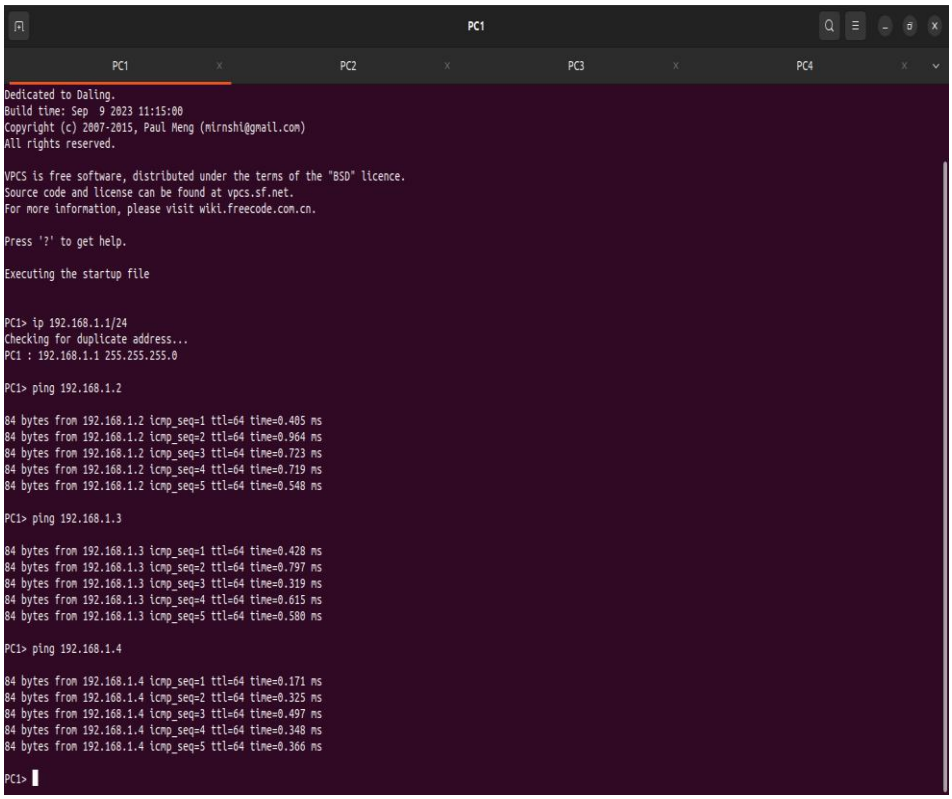


Fig: PC4 Start Capture Picture

4. PC1>ping 192.168.1.2 ->no data transfer
5. PC1>ping 192.168.1.3 ->no data transfer
6. PC1>ping 192.168.1.4 ->data transfer



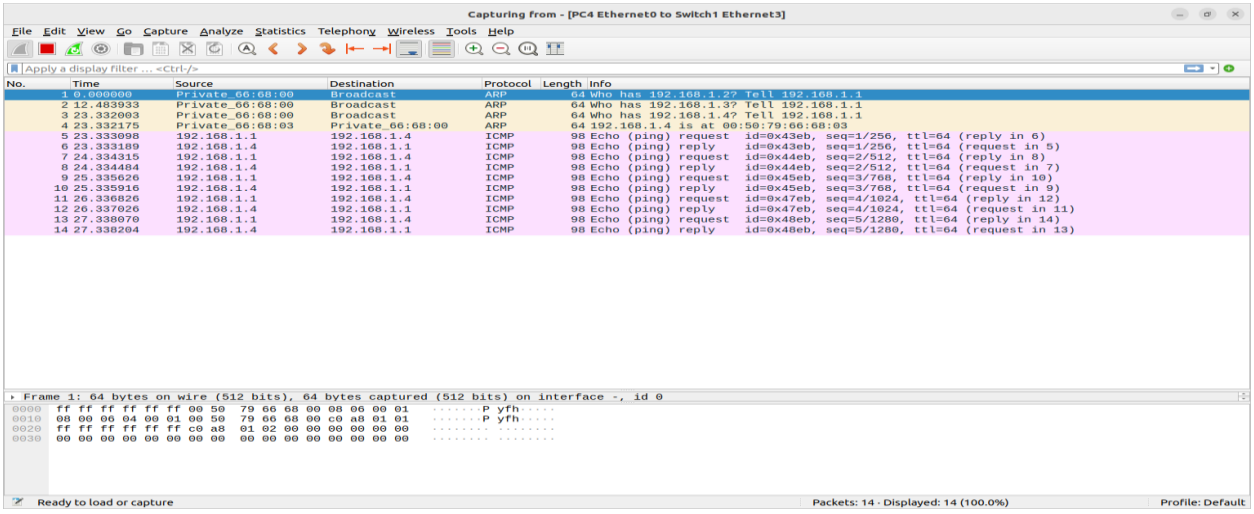


Fig: Wireshark Displaying the request reply through the connected VPCs and Captured PC.

HUB Configuration:-

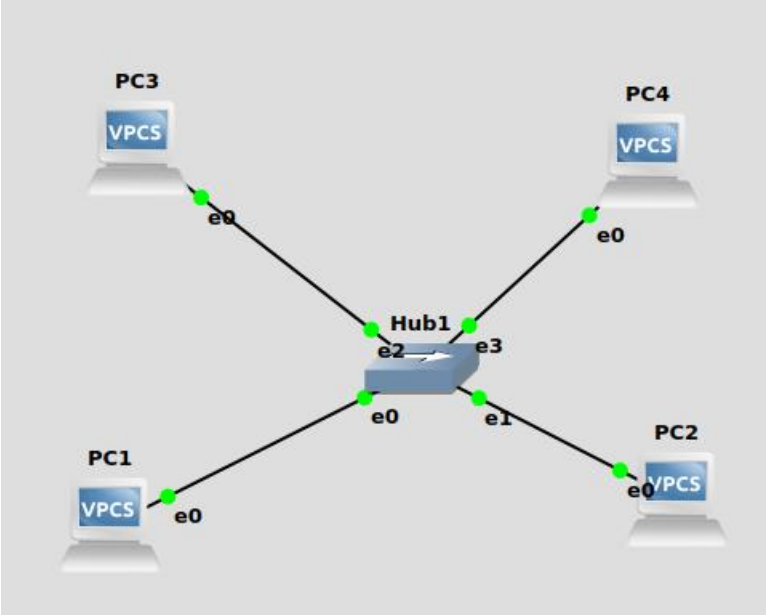
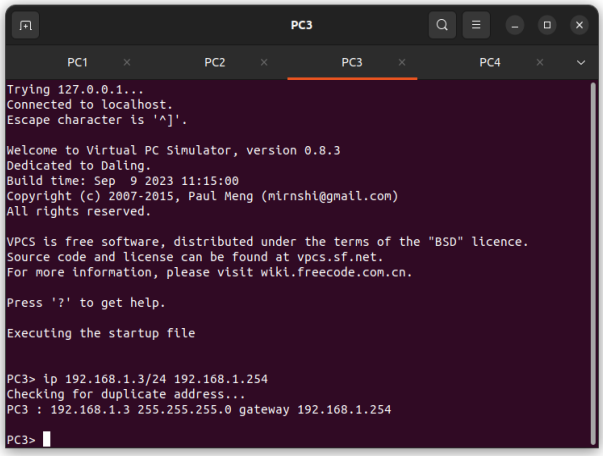
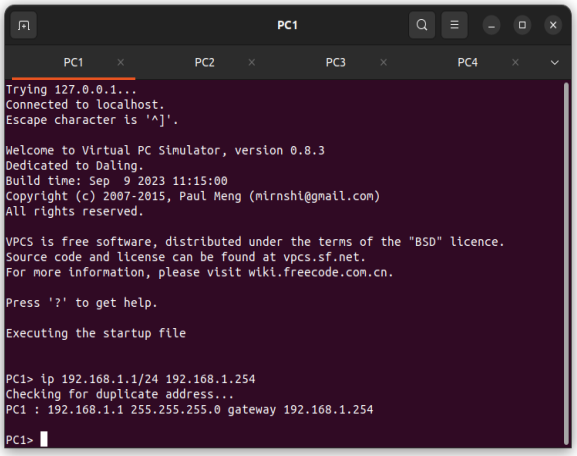


Fig: Hub

1. Drag & Drop 4 VPCs
2. Add Ethernet Hub and make a connection..
3. Set IP Address for all the VPCs.





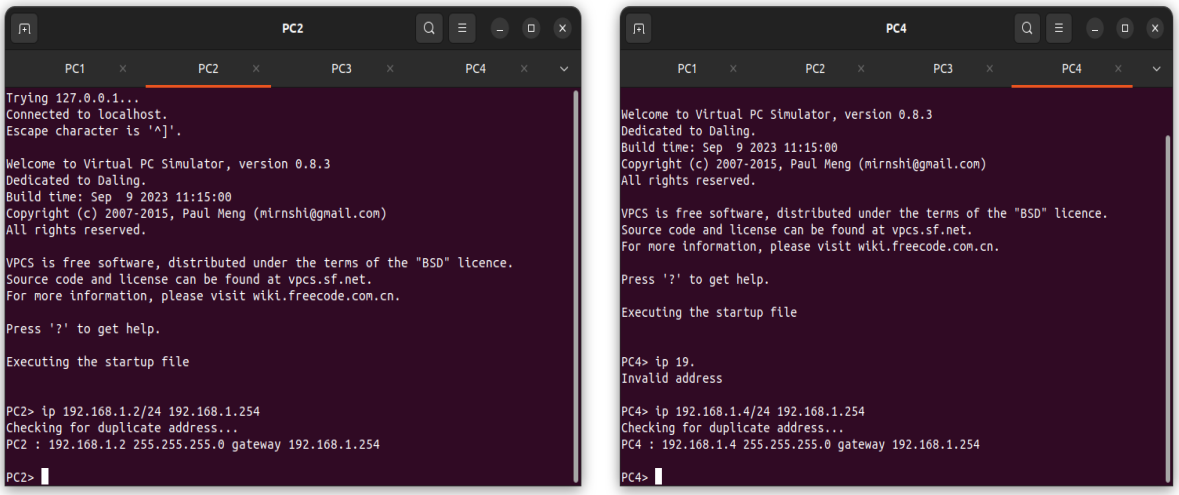


Fig: setting IP address for all VPCs.

4. Right click on PC4 and give Start Capture.

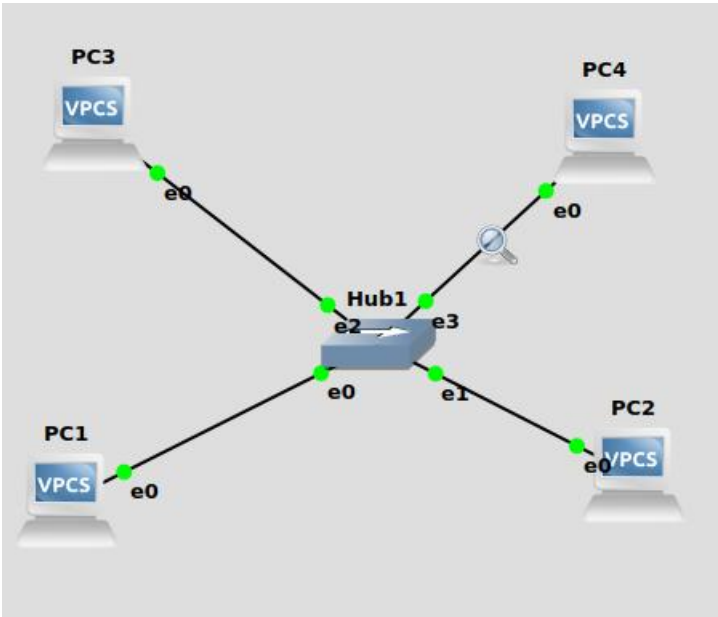
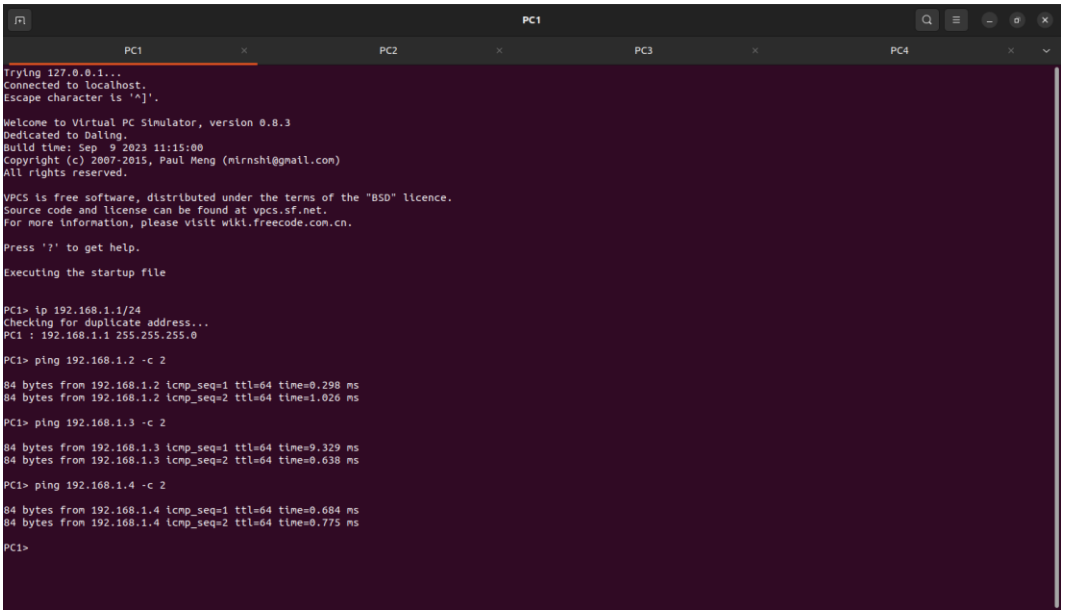


Fig: - PC4 Start Capture Picture

5. Ping all the VPCs using ping command
6. PC1>ping 192.168.1.2
7. PC1>ping 192.168.1.3
8. PC1>ping 192.168.1.4

Output:-



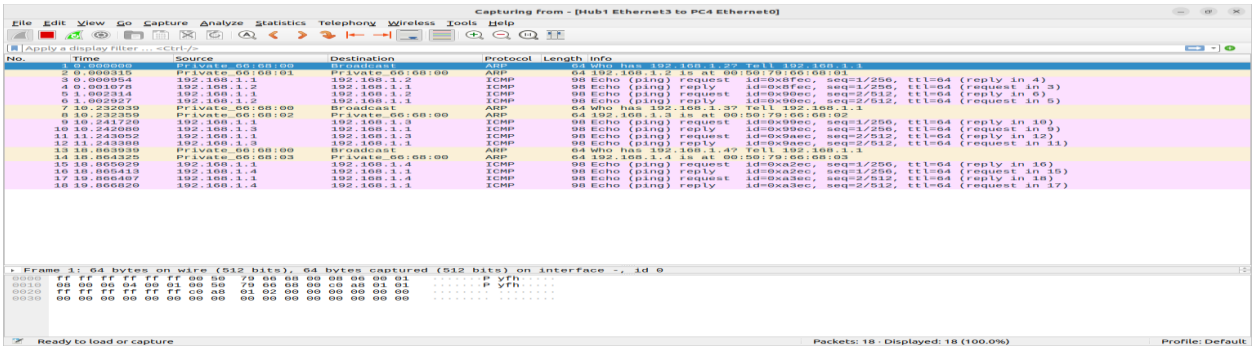


Fig: - Wireshark is displaying the request reply through the connected VPCs and Captured PC.

Experiment 2: - Analyze the Router in Computer Network Design using GNS3.

Objectives:

- To Learn about IP address Assignment for different sub networks
- To study the functions of ROUTER device
- To study the functions of SWITCH device

To start with the Lab exercise, create a topology as shown in Figure below.

Single router:-

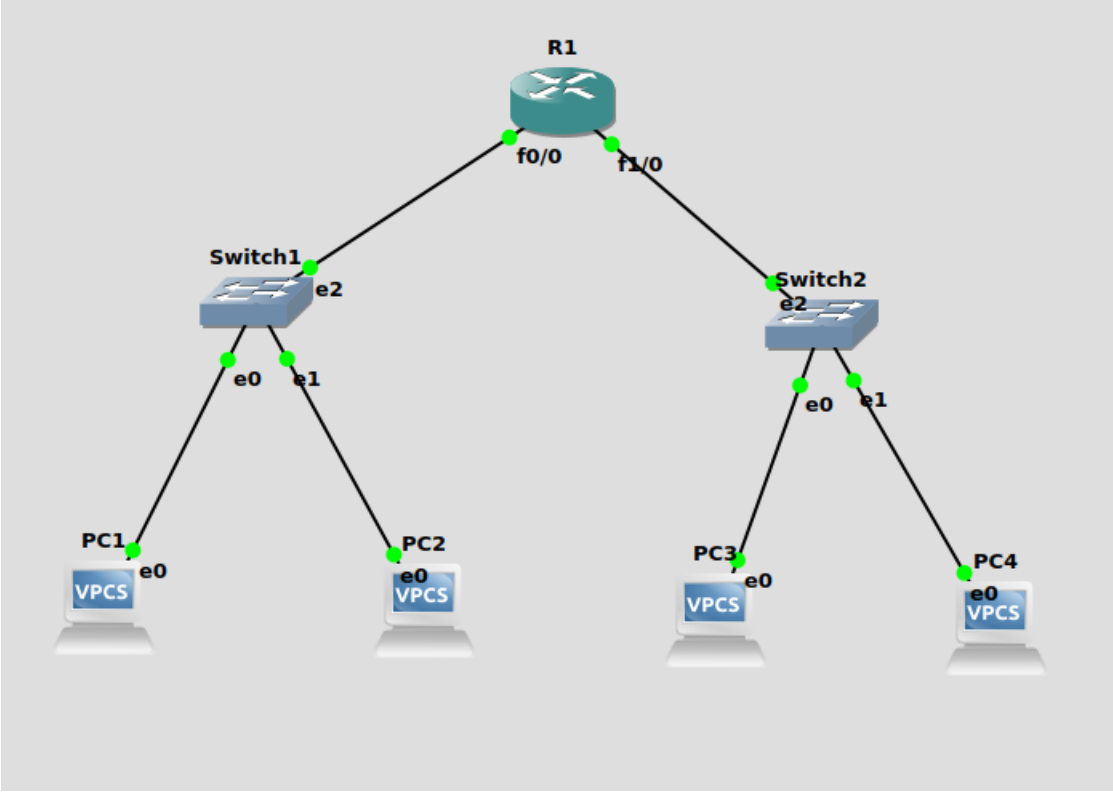


Fig:- Single Router Configuration

1. Drag & Drop 4 VPCs, 2 Switches, 1 Router
2. Make all the required connections and click on start button to start all the devices.
3. Set IP Address for all the VPCs as follows:
   PC1>192.168.1.1/24 192.168.1.254
   PC2>192.168.1.2/24 192.168.1.254
   PC3>192.168.2.1/24 192.168.2.254
   PC4>192.168.2.2/24 192.168.2.254

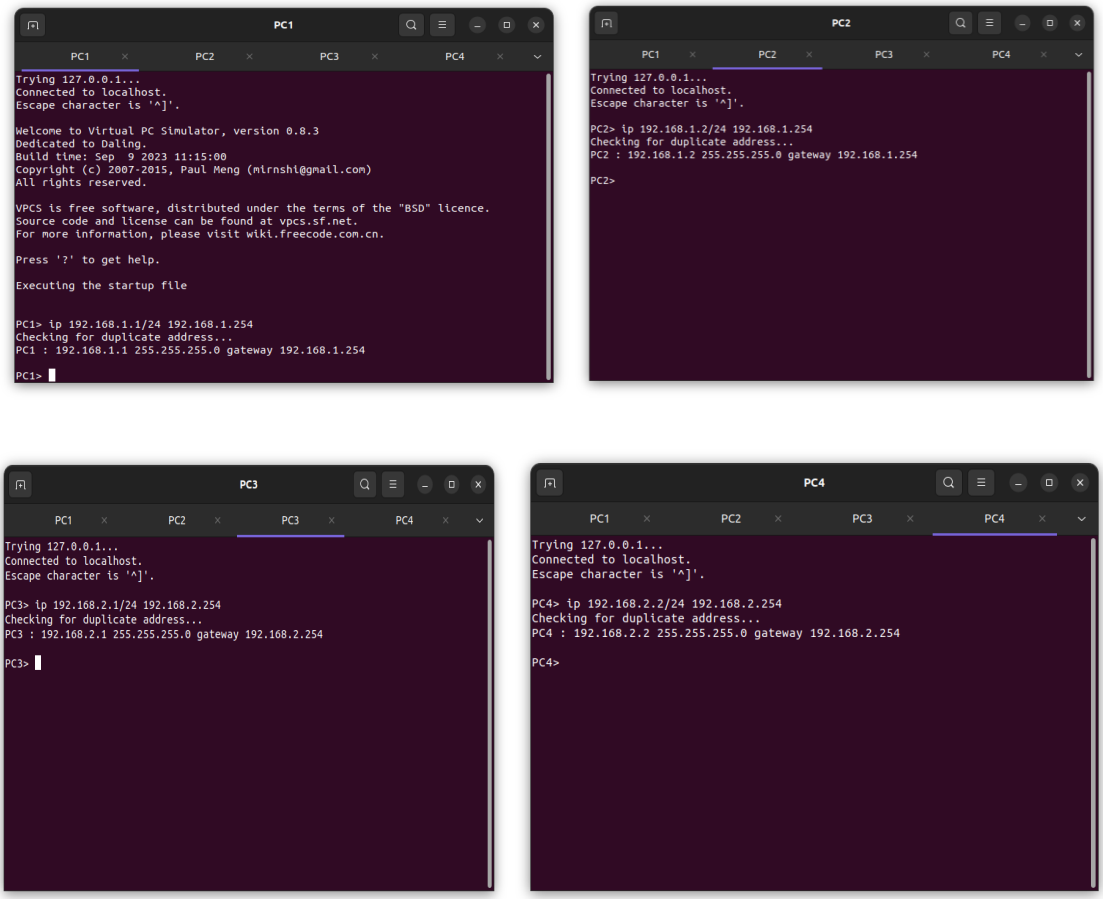
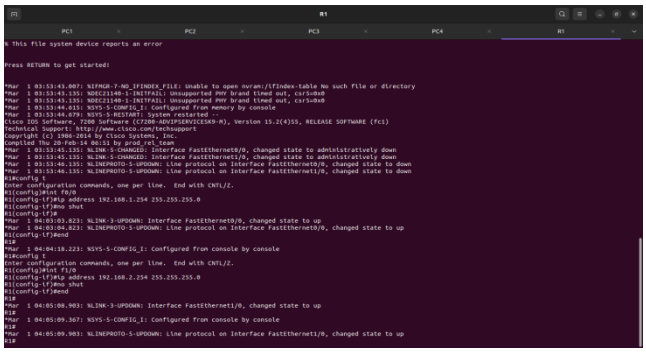


Fig:- Showing PC's IP address.

4. Click on PC1 and start capture
5. PC1>ping 192.168.1.1 ->data transfer takes place
6. PC1>ping 192.168.2.1 ->Host not reachable

Fig: Ping PC1 to PC3.

Router Configuration:-



Router Configuration Commands:

R1# config t
R1 (config)#int f0/0
R1 (config)#ip address 192.168.1.254 255.255.255.0
R1 (config)#no shut
R1 (config)#exit
R1 (config)#int f1/0
R1 (config)# ip address 192.168.2.254 255.255.255.0
R1 (config)#no shut
R1 (config)#exit

7. Ping PC1 to PC3.

   PC1> ping 192.168.2.1

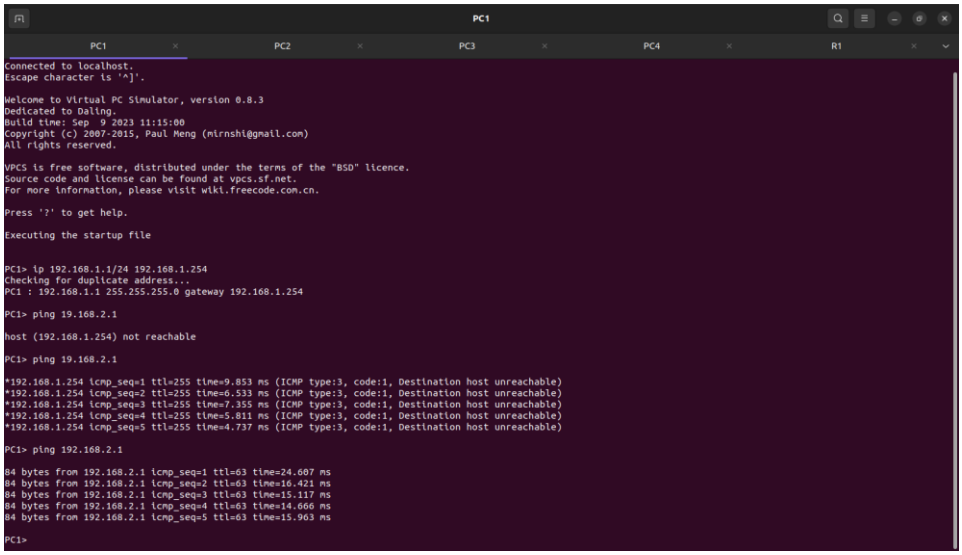


Fig: Data Packets transfer from PC1 to PC3.

Experiment 3:- Analyze the Computer Network Design using Two Routers in GNS3.

Double Router Configuration:

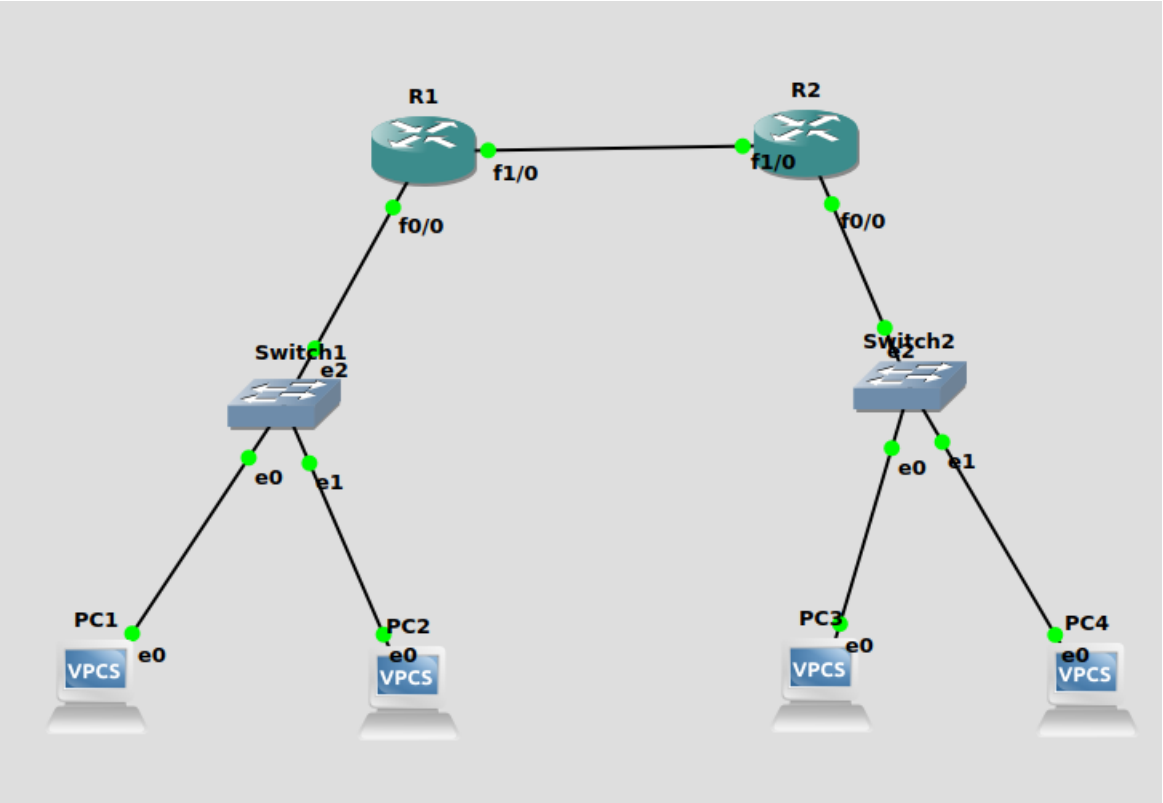


Fig: - Double Router Configuration

1. Drag & Drop 4 VPCs and 2 Switch and also add 2 Routers and make connection is shown in above figure.
2. Click on start button to start all devices.
3. Set Ip Address for all the VPCs as follows:

   PC1>192.168.1.1/24 192.168.1.254
   PC2>192.168.1.2/24 192.168.1.254
   PC3>192.168.2.1/24 192.168.2.254
   PC4>192.168.2.2/24 192.168.2.254

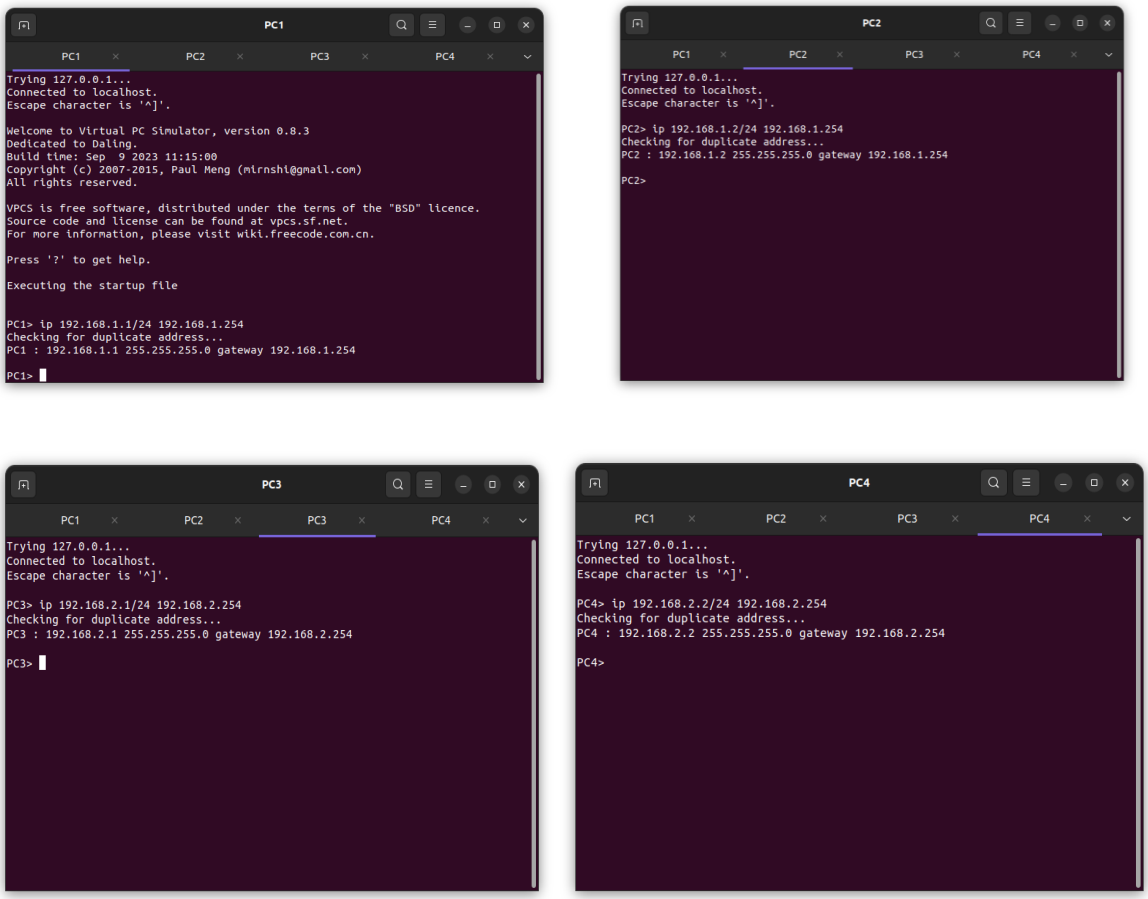


Fig:- Showing PC's IP address.

4. Click on PC1 and start capture
5. PC1>ping 192.168.1.1 ->data transfer takes place
6. PC1>ping 192.168.2.1 ->Host not reachable

7. Click on Router R1 and Write the below commands
   R1#config t
   R1 (config)#int f0/0
   R1 (config)#ip address 192.168.1.254 255.255.255.0
   R1 (config)#no shut
   R1 (config)#exit

   R1 (config)#int f1/0
   R1 (config)#ip address 192.168.5.1 255.255.255.0
   R1 (config)#no shut
   R1 (config)#exit

8. Click on Router R2 and write below commands.
   R2#config t

R2 (config)#int f0/0
R2 (config)#ip address 192.168.2.254 255.255.255.0
R2 (config)#no shut
R2 (config)#exit

R2 (config)#int f1/0
R2 (config)#ip address 192.168.5.2 255.255.255.0
R2 (config)#no shut
R2 (config)#exit

9. After the configuration, PC1>ping 192.168.2.1

```
PC1> ping 192.168.2.1

host (192.168.1.254) not reachable
```

PC1>ping 192.168.1.2

```
PC1> ping 192.168.1.2

84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=0.215 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=0.361 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=0.374 ms
```

10. Now give the Route for transferring the data through the 2 switches using below commands.
For Router R1:

R1#ip route 192.168.2.0 255.255.255.0 192.168.5.2

```
R1(config)#ip route 192.168.2.0 255.255.255.0 192.168.5.2
R1(config)#
```

For Router R2:
R2#ip route 192.168.1.0 255.255.255.0 192.168.5.1

```
R2(config-if)#ip route 192.168.1.0 255.255.255.0 192.168.5.1
R2(config)#
```

Now ping the VPCs.
PC1>ping 192.168.2.1

```
PC1> ping 192.168.2.1

84 bytes from 192.168.2.1 icmp_seq=1 ttl=63 time=24.607 ms
84 bytes from 192.168.2.1 icmp_seq=2 ttl=63 time=16.421 ms
84 bytes from 192.168.2.1 icmp_seq=3 ttl=63 time=15.117 ms
84 bytes from 192.168.2.1 icmp_seq=4 ttl=63 time=14.666 ms
84 bytes from 192.168.2.1 icmp_seq=5 ttl=63 time=15.963 ms
```

Experiment 4: -Analyze the Dynamic Host Configuration Protocol (DHCP) using GNS3.

Objectives: -

- Understand DHCP Service
- Analyzing DHCP Packets
- Understanding significance of Netmask value

DHCP Overview: -

The Dynamic Host Configuration Protocol (DHCP) is a network protocol that automatically assigns IP addresses to devices on a network.

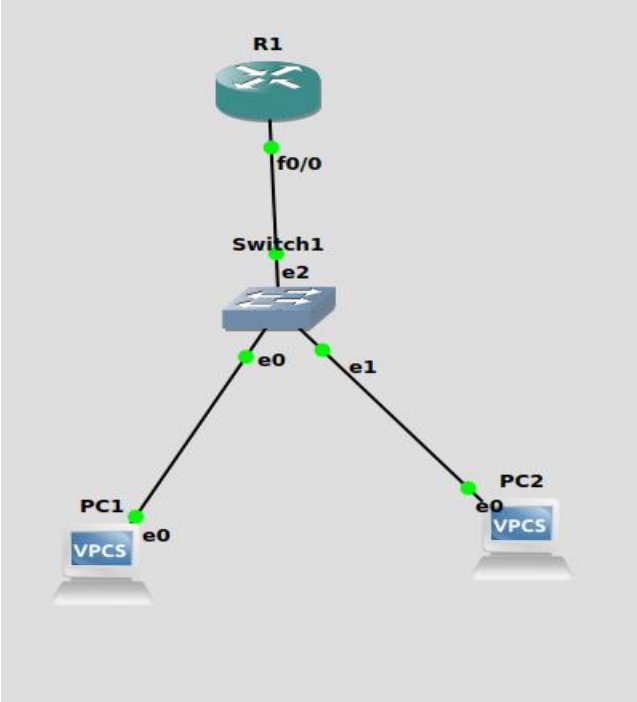


Fig:- Network Topology for DHCP Configuration

1. Drag and drop 2 VPCs, 1 Switch, 1 Router and make the connections as shown above.
2. Start all the devices.
3. In order to configure our router as a DHCP server the following commands are used.

Router Configuration:-

R1#config t

R1(config)#int f0/0

R1(config)#ip address 192.168.1.254 255.255.255.0

R1(config)#no shut

R1(config)#exit

R1(config)#ip dhcp pool formation

R1(dhcp-config) #network 192.168.1.0 255.255.255.0

R1(dhcp-config) #default-router 192.168.1.254

R1(dhcp-config) #dns-server 192.168.1.254

R1(dhcp-config) #class ec2lt

R1(config-dhcp-pool-class) #address range 192.168.1.2 192.168.1.4

R1(config-dhcp-pool-class) #exit

R1(dhcp-config) #exit

R1(dhcp-config) #do wr

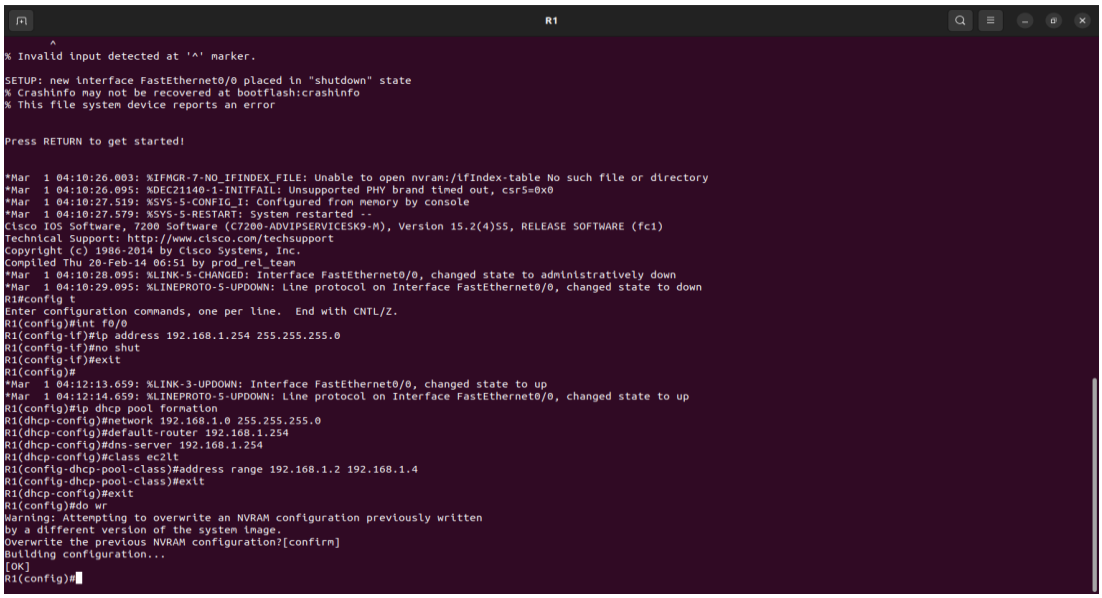


Fig: - Router Configuration

4. The commands above will turn the interface on and assign an IP address.

5. Click the VPCS.

PC1>ip dhcp

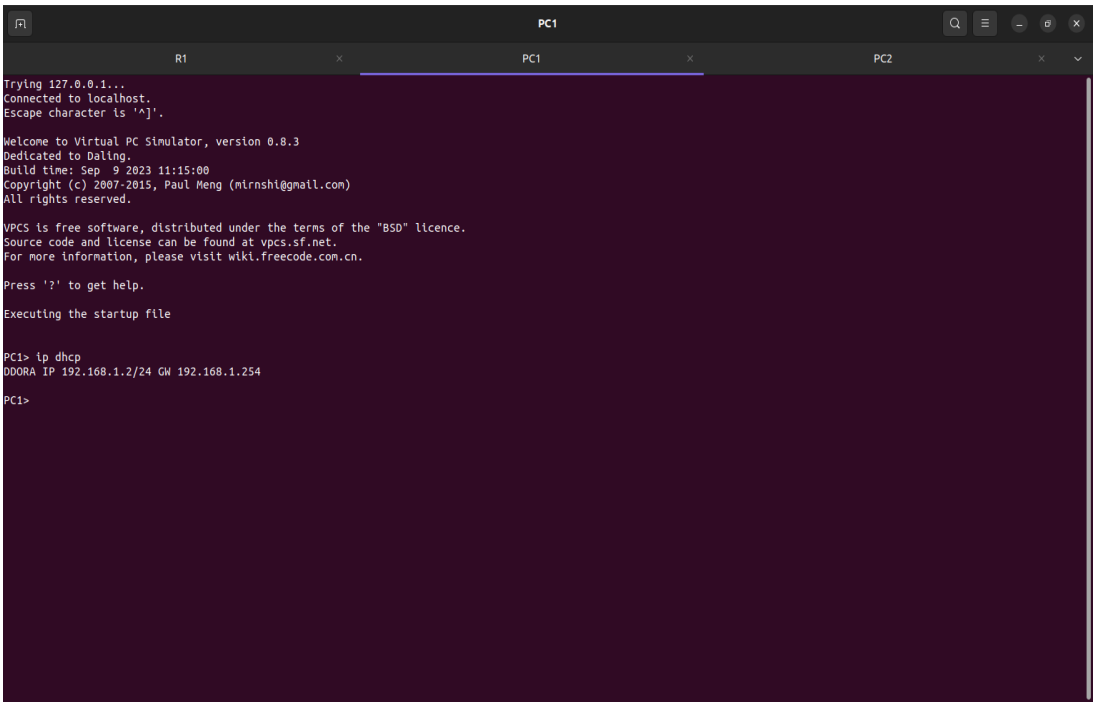


Fig:-Showing PC1 IP address.

DDOORA 192.168.1.2 192.168.1.254 is the output

PC2>ip dhcp

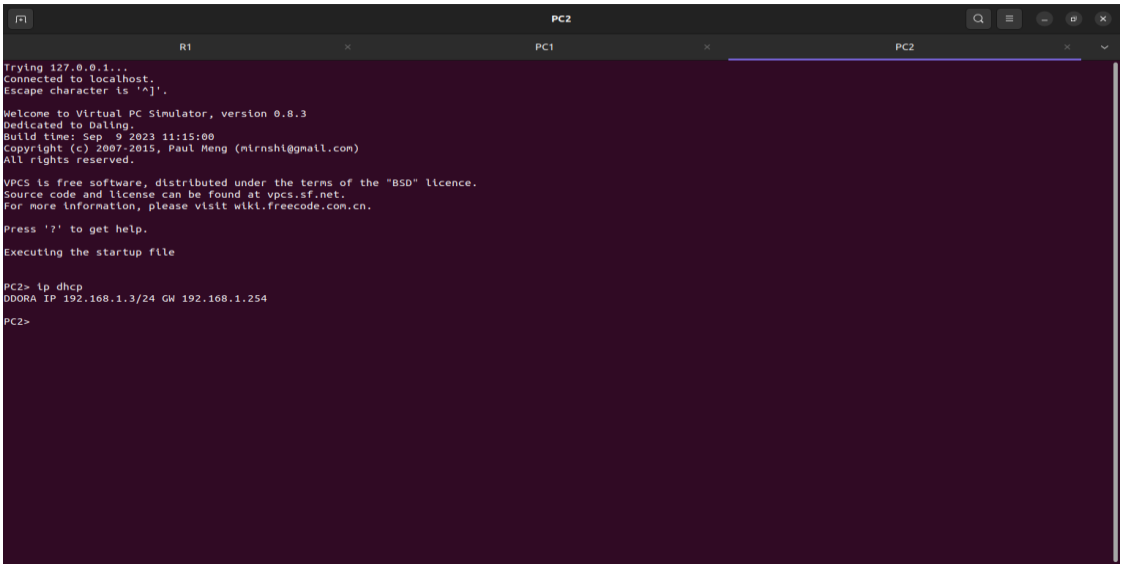


Fig:-Showing PC2 IP address.

DDOORA 192.168.1.4 192.168.1.254 is the output

Experiment 5: - Analyze the design of VLAN'S using GNS3.

Objectives:

- To understand Virtual Lan (VLAN) Concepts

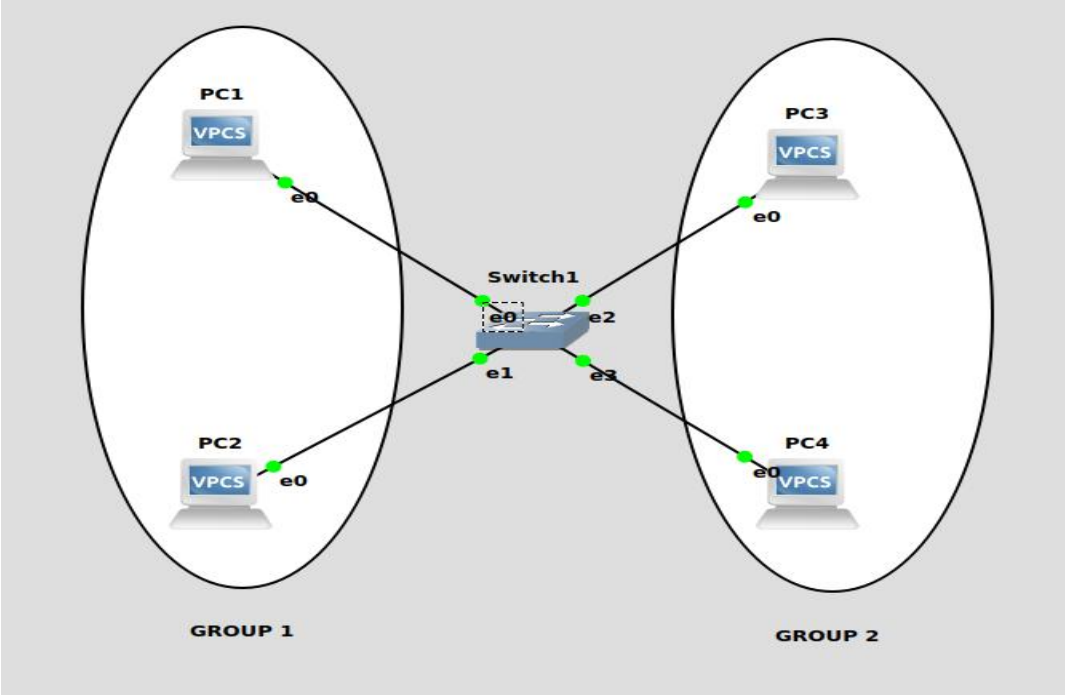


Fig: - VLANs Configuration

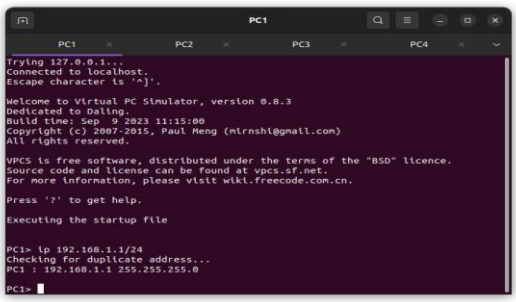
1.Set IP address for all VPCS as follows:

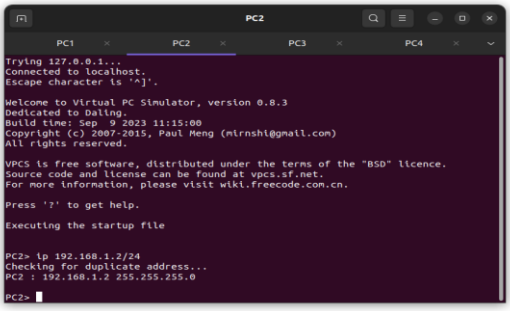
PC1>192.168.1.1/24

PC2>192.168.1.2/24

PC3>192.168.1.3/24

PC4>192.168.1.4/24





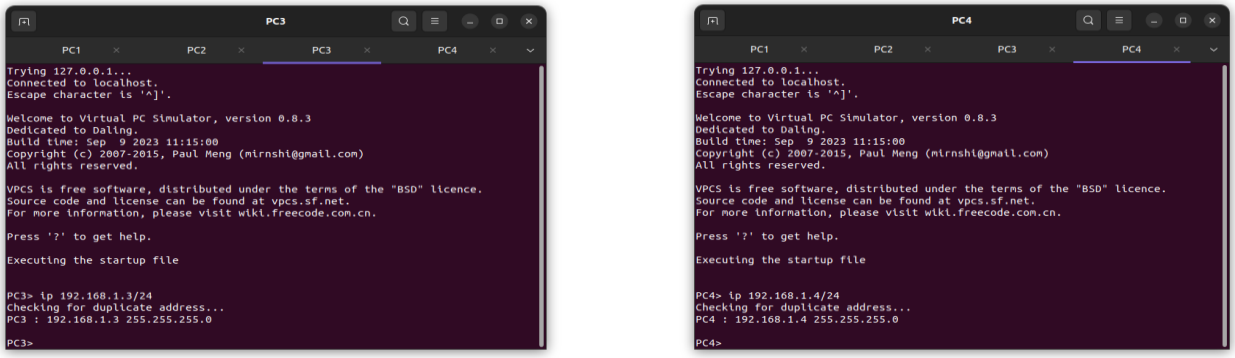


Fig:- IP address for all the PC'S.

2. After the IP address setting, ping the PC's.

PC1> ping 192.168.1.3

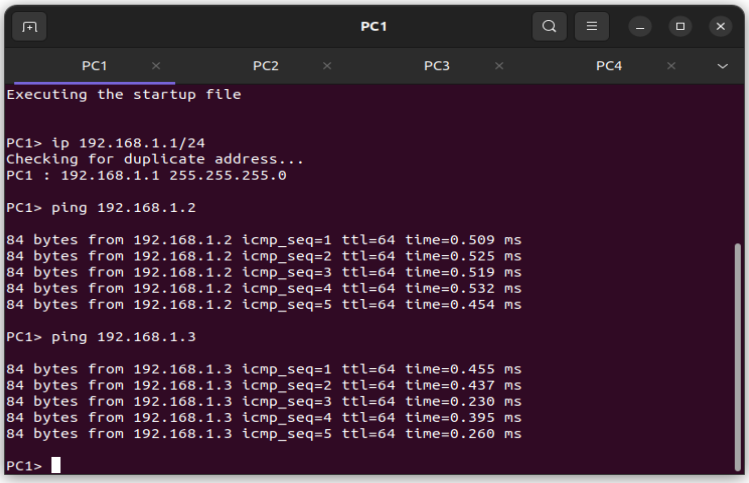


Fig: Ping PC1 to PC3

3. Before setting a LAN connection for VPCs we should remove the wired connection.

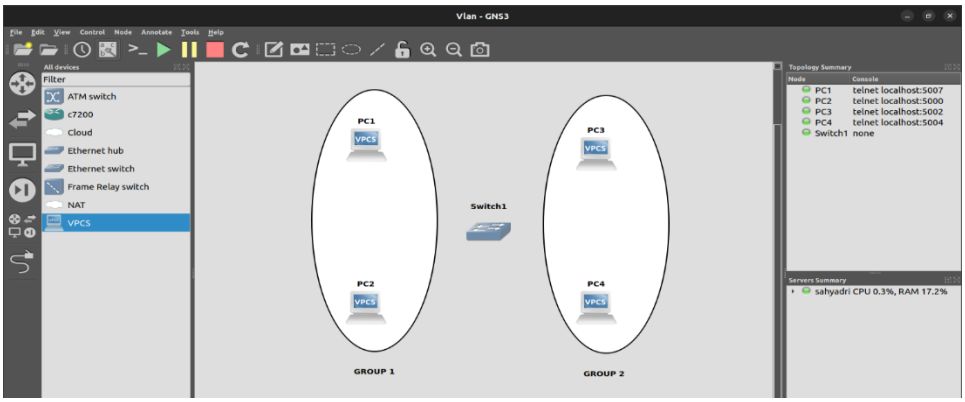
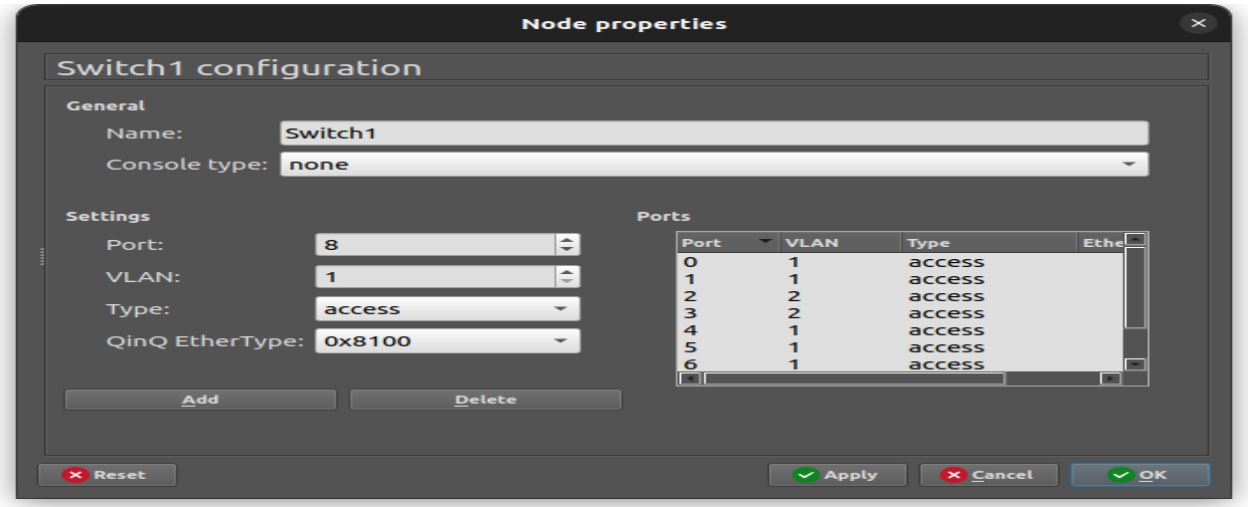


Fig: - deleting all the connections through the VPCS.

4. SWITCH Configuration: -

PORT	VLAN
0(PC1)	1-> ADD
1(PC2)	1-> ADD
2(PC3)	2-> ADD
3(PC4)	2->ADD



Check-> add-> Apply->&ok.

5. PC1>ping 192.168.1.3