

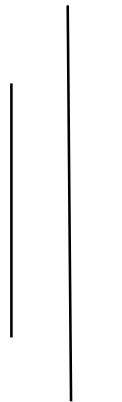
COLLEGE OF APPLIED BUSINESS AND TECHNOLOGY

Gangahity, Chabahil Kathmandu



Network and System Administration

PRACTICAL FILE-2082



Submitted by:

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College of Applied Business and Technology

B.Sc.CSIT 8th Semester

Submitted to:

Mr. Niraz Pandey

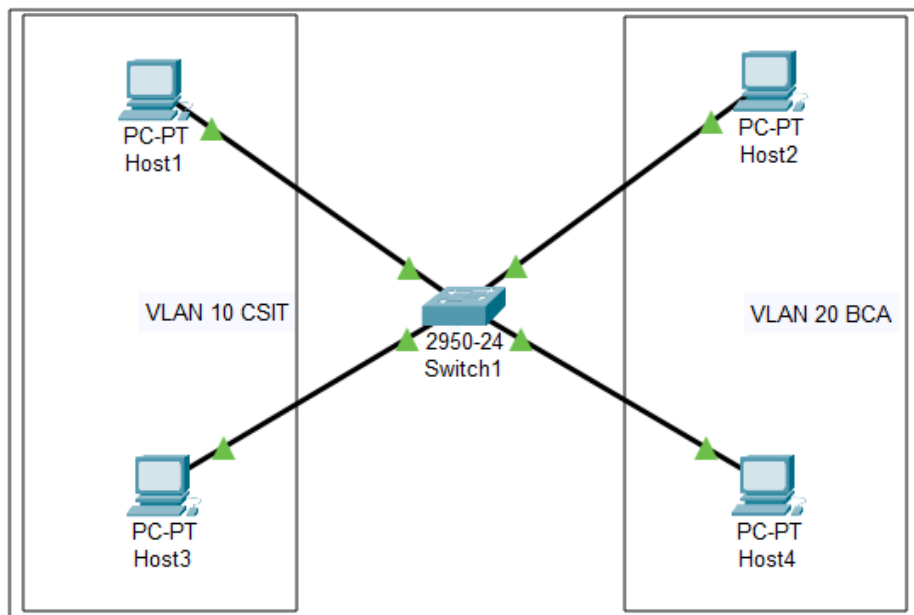
Task 1

Creation of VLAN:

Addressing Plan Table

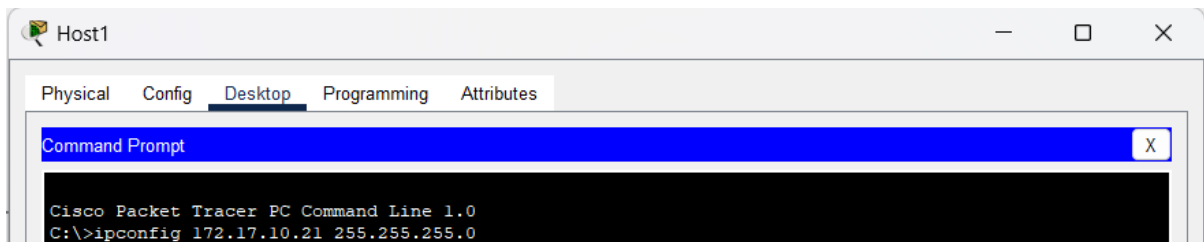
Device	Interface	IPv4 Address	Subnet Mask	Switch Port	VLAN No.	VLAN Name	Link
Host1	NIC	172.17.10.21	255.255.255.0	Fa0/1	10	CSIT	Access
Host3	NIC	172.17.10.22	255.255.255.0	Fa0/2	10	CSIT	Access
Host2	NIC	172.17.10.23	255.255.255.0	Fa0/11	20	BCA	Access
Host4	NIC	172.17.10.24	255.255.255.0	Fa0/12	20	BCA	Access

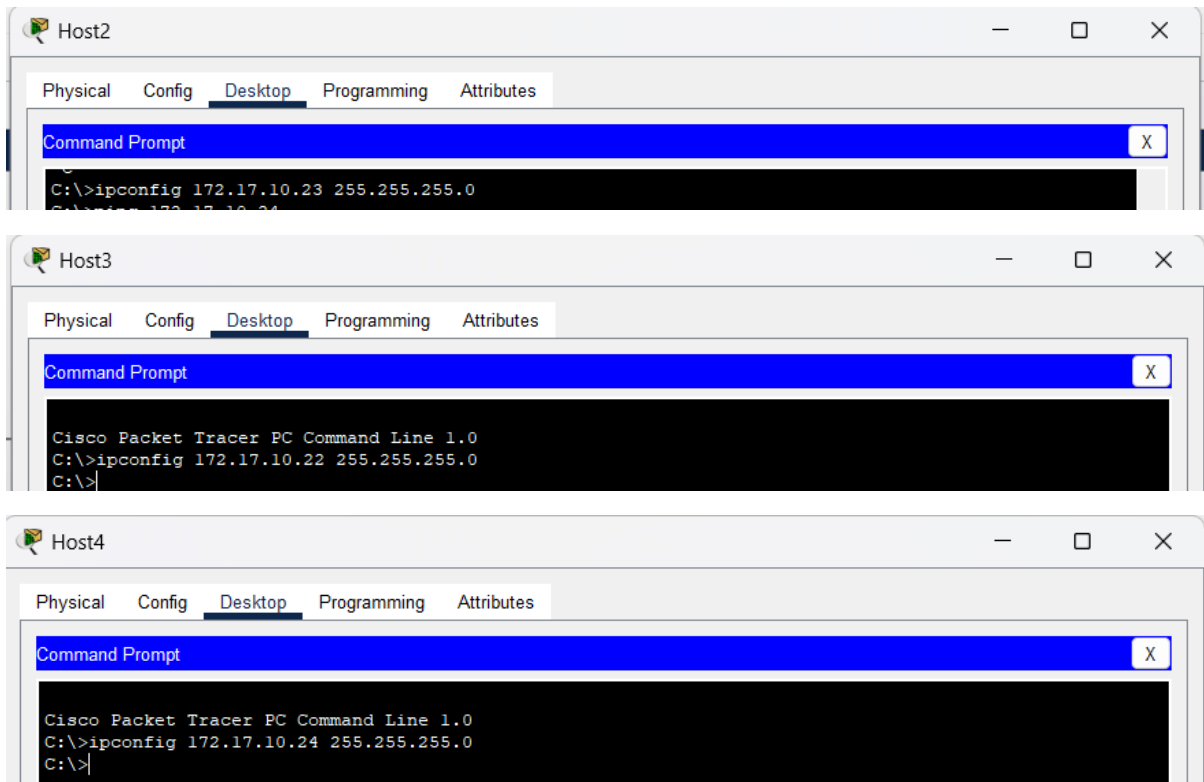
a) Designing the topology



b) Assign the Layer 3 address (IP address) to all hosts.

Manually configured IPs on each host according to the Addressing Plan.





c) Configure the switch to create two VLANs

- VLAN10 as CSIT
- VLAN 20 as BCA

```
Switch>enable
Switch#config t

Switch(config)#vlan 10
Switch(config-vlan)#name CSIT
Switch(config-vlan)#vlan 20
Switch(config-vlan)#name BCA
Switch(config-vlan)#exit
```

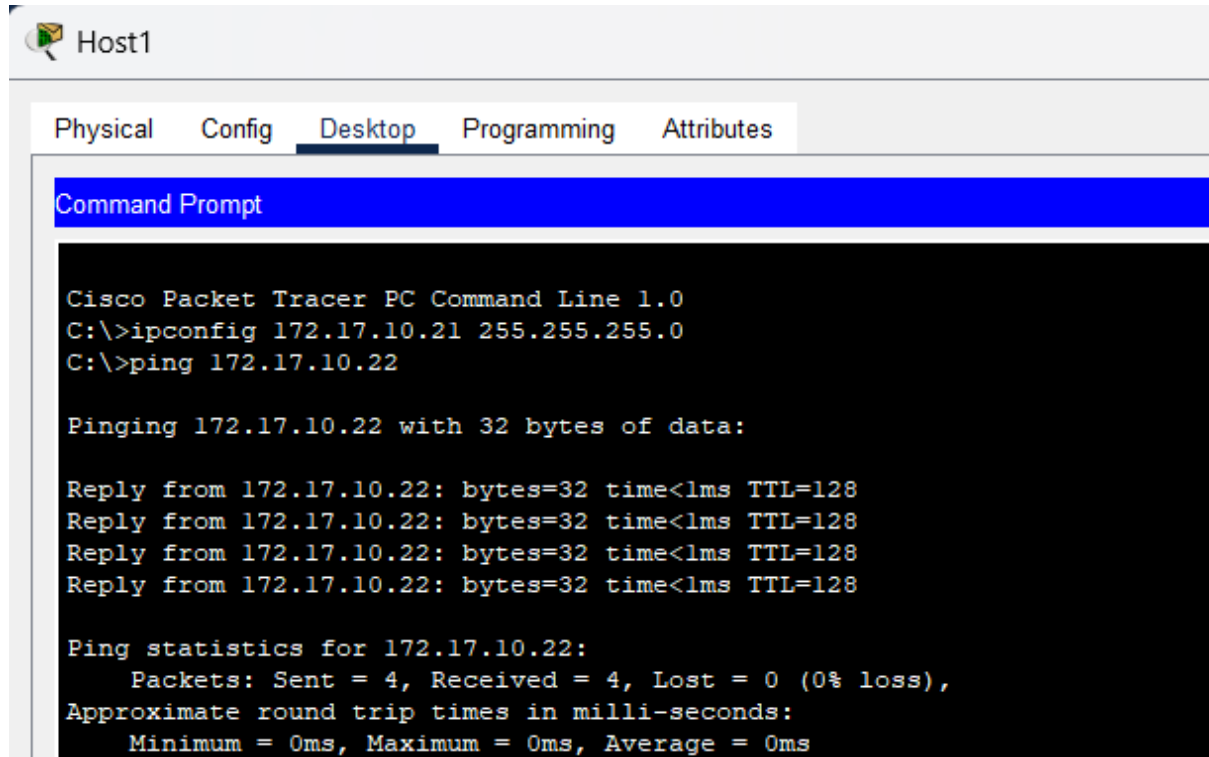
d) Assign VLANs to all the PC according to Addressing Table.

```
Switch(config)#interface range fa0/1-2
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 10
Switch(config-if-range)#interface range fa0/11-12
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 20
Switch(config-if-range)#
```

- e) From the command prompt on each Host, do ping test between Hosts on the same and different VLAN and write the output.

- Can Host1 ping Host3?

Yes, Host1 can ping Host3 because both are in the same VLAN (VLAN 10 - CSIT).



The screenshot shows the Host1 interface with the 'Desktop' tab selected. The Command Prompt displays the following text:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig 172.17.10.21 255.255.255.0
C:\>ping 172.17.10.22

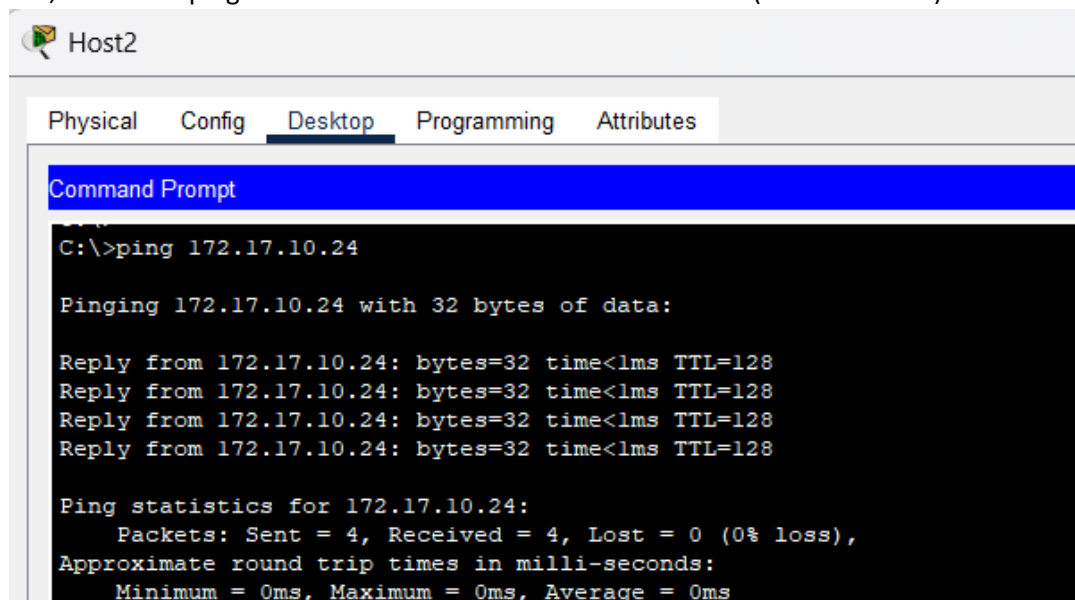
Pinging 172.17.10.22 with 32 bytes of data:

Reply from 172.17.10.22: bytes=32 time<1ms TTL=128
Reply from 172.17.10.22: bytes=32 time<1ms TTL=128
Reply from 172.17.10.22: bytes=32 time<1ms TTL=128
Reply from 172.17.10.22: bytes=32 time<1ms TTL=128

Ping statistics for 172.17.10.22:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

- Can Host2 ping Host4?

Yes, Host2 can ping Host4 because both are in the same VLAN (VLAN 20 - BCA).



The screenshot shows the Host2 interface with the 'Desktop' tab selected. The Command Prompt displays the following text:

```
C:\>ping 172.17.10.24

Pinging 172.17.10.24 with 32 bytes of data:

Reply from 172.17.10.24: bytes=32 time<1ms TTL=128
Reply from 172.17.10.24: bytes=32 time<1ms TTL=128
Reply from 172.17.10.24: bytes=32 time<1ms TTL=128
Reply from 172.17.10.24: bytes=32 time<1ms TTL=128

Ping statistics for 172.17.10.24:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

- Can Host1 ping Host2 and Host4?

No, Host1 cannot ping Host2 or Host4 because they are in different VLANs.

```
C:\>ping 172.17.10.23

Pinging 172.17.10.23 with 32 bytes of data:

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

Ping statistics for 172.17.10.23:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 172.17.10.24

Pinging 172.17.10.24 with 32 bytes of data:

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

Ping statistics for 172.17.10.24:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>|
```

- Can Host2 ping Host1 and Host3?

No, Host1 cannot ping Host2 or Host4 because they are in different VLANs.

```
C:\>ping 172.17.10.21

Pinging 172.17.10.21 with 32 bytes of data:

Request timed out.
Request timed out.

Ping statistics for 172.17.10.21:
    Packets: Sent = 3, Received = 0, Lost = 3 (100% loss),

Control-C
^C
C:\>ping 172.17.10.22

Pinging 172.17.10.22 with 32 bytes of data:

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

Ping statistics for 172.17.10.22:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

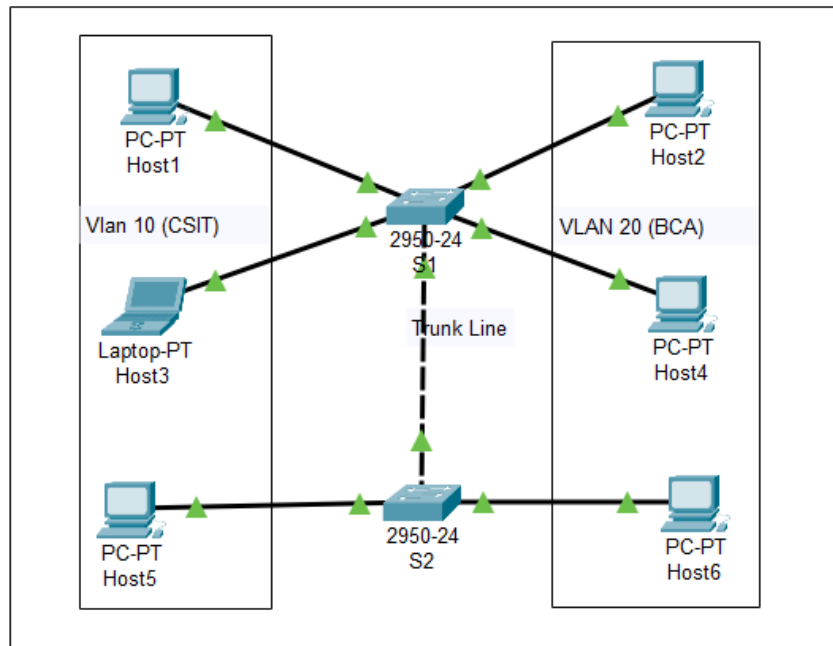
TASK 2

Creation of VLAN Trunking

Addressing Plan Table

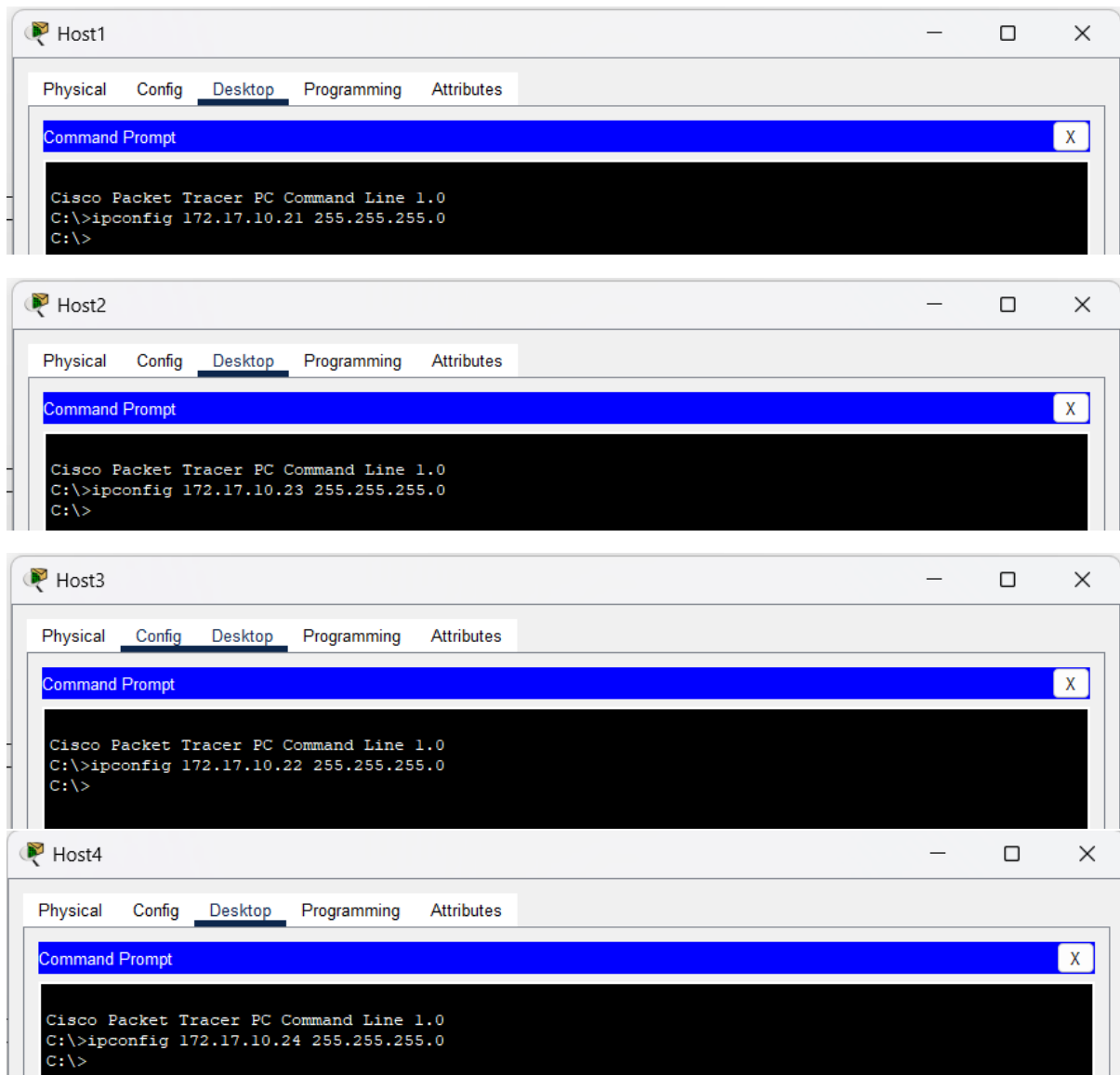
Device	Interface	IPv4 Address	Subnet Mask	Switch Port	VLAN No	VLAN Name	Link
Host1	NIC	172.17.10.21	255.255.255.0	S1; Fa0/1	10	CSIT	Access
Host3	NIC	172.17.10.22	255.255.255.0	S1; Fa0/2	10	CSIT	Access
Host2	NIC	172.17.10.23	255.255.255.0	S1; Fa0/11	20	BCA	Access
Host4	NIC	172.17.10.24	255.255.255.0	S1; Fa0/12	20	BCA	Access
Host5	NIC	172.17.10.25	255.255.255.0	S2; Fa0/3	10	CSIT	Access
Host6	NIC	172.17.10.26	255.255.255.0	S2; Fa0/13	20	BCA	Access
S1	Fa0/24	-	-	S2; Fa0/24	-	-	Trunk

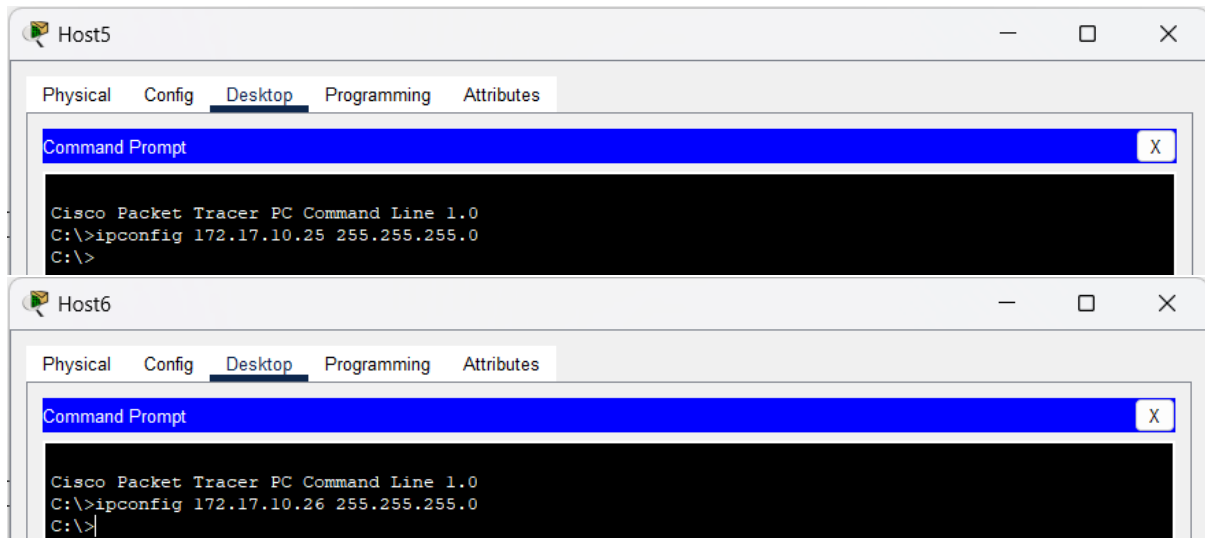
a) Designing the topology



b) Assign the Layer 3 address (IP address) to all hosts.

Manually configured IPs on each host according to the Addressing Plan.





c) Configure the switch S1 and S2 to create two VLANs in each.

- VLAN10 as CSIT
- VLAN 20 as BCA

```
Switch>enable
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hosynname S1
      ^
% Invalid input detected at '^' marker.

Switch(config)#hostname S1
S1(config)#vlan 10
S1(config-vlan)#name CSIT
S1(config-vlan)#vlan 20
S1(config-vlan)#name BCA
S1(config-vlan)#exit
S1(config)#
```

```
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S2
S2(config)#vlan 10
S2(config-vlan)#name CSIT
S2(config-vlan)#vlan 20
S2(config-vlan)#name BCA
S2(config-vlan)#
```

d) Assign VLANs to all the PC according to Addressing Table.


```

S1(config)#interface range fa0/1-2
S1(config-if-range)#swi
S1(config-if-range)#switchport mode access
S1(config-if-range)#switchport access vlan 10
      ^
% Invalid input detected at '^' marker.

S1(config-if-range)#switchport access vlan 10
S1(config-if-range)#exit
S1(config)#interface range fa0/11-12
S1(config-if-range)#switchport mode access
S1(config-if-range)#switchport access vlan 20
S1(config-if-range)#

```

```

S2(config)#interface fa0/3
S2(config-if)#switchport mode access
S2(config-if)#switchport access vlan 10
S2(config-if)#interface fa0/13
S2(config-if)#switchport mode access
S2(config-if)#switchport access vlan 20
S2(config-if)#

```

```

S2(config-if)#interface fa0/24
S2(config-if)#swi
S2(config-if)#switchport mo
S2(config-if)#switchport mode tr
S2(config-if)#switchport mode trunk
S2(config-if)#switchport trunk allowed vlan 10,20

S1(config)#interface fa0/24
S1(config-if)#switchport mode trunk
S1(config-if)#switchport trunk allowed vlan 10,20
S1(config-if)#

```

e) From the command prompt on each Host, do ping test between Hosts on the same and different VLAN and write the output.

- Can Host1 ping Host3 and Host5?

Yes. Host1, Host3 and Host5 are all in VLAN 10 (CSIT). Since trunk ports are configured between switches, communication within the same VLAN across switches is possible.

```
Host1
Physical Config Desktop Programming Attributes
Command Prompt

Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig 172.17.10.21 255.255.255.0
C:\>ping 172.17.10.22

Pinging 172.17.10.22 with 32 bytes of data:

Reply from 172.17.10.22: bytes=32 time<1ms TTL=128
Reply from 172.17.10.22: bytes=32 time<1ms TTL=128
Reply from 172.17.10.22: bytes=32 time<1ms TTL=128
Reply from 172.17.10.22: bytes=32 time<1ms TTL=128

Ping statistics for 172.17.10.22:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 172.17.10.25

Pinging 172.17.10.25 with 32 bytes of data:

Reply from 172.17.10.25: bytes=32 time<1ms TTL=128
Reply from 172.17.10.25: bytes=32 time<1ms TTL=128
Reply from 172.17.10.25: bytes=32 time<1ms TTL=128
Reply from 172.17.10.25: bytes=32 time<1ms TTL=128

Ping statistics for 172.17.10.25:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>|
```

- Can Host2 ping Host4 and Host6?

Yes. Host2, Host4, and Host6 are all part of VLAN 20 (BCA). They can successfully communicate with each other even across switches due to trunk port configuration.

Host2

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig 172.17.10.23 255.255.255.0
C:\>ping 172.17.10.24

Pinging 172.17.10.24 with 32 bytes of data:

Reply from 172.17.10.24: bytes=32 time<1ms TTL=128
Reply from 172.17.10.24: bytes=32 time<1ms TTL=128
Reply from 172.17.10.24: bytes=32 time<1ms TTL=128
Reply from 172.17.10.24: bytes=32 time<1ms TTL=128

Ping statistics for 172.17.10.24:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 172.17.10.26

Pinging 172.17.10.26 with 32 bytes of data:

Reply from 172.17.10.26: bytes=32 time=11ms TTL=128
Reply from 172.17.10.26: bytes=32 time<1ms TTL=128
Reply from 172.17.10.26: bytes=32 time=1ms TTL=128
Reply from 172.17.10.26: bytes=32 time<1ms TTL=128

Ping statistics for 172.17.10.26:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 3ms
```

- Can Host6 ping Host1?

No. Host6 is in VLAN 20 while Host1 is in VLAN 10.

Host6

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig 172.17.10.26 255.255.255.0
C:\>ping 172.17.10.21

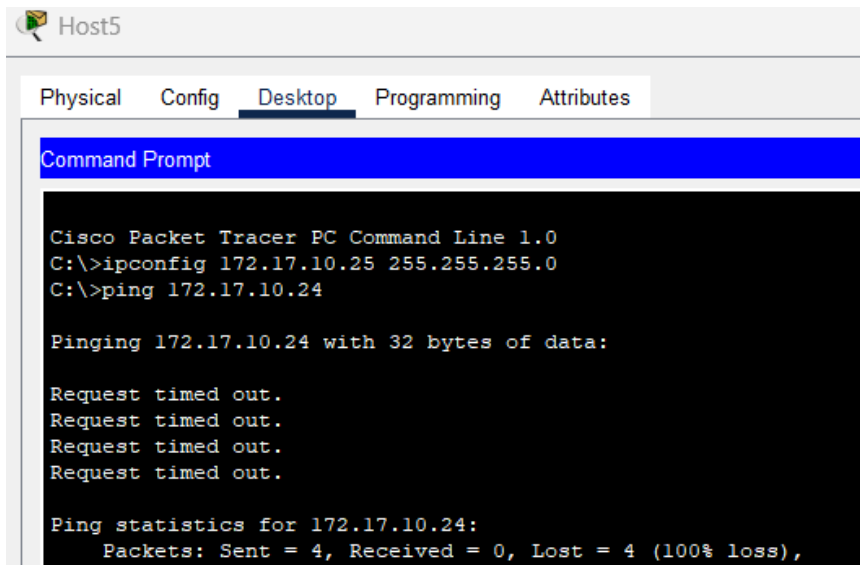
Pinging 172.17.10.21 with 32 bytes of data:

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

Ping statistics for 172.17.10.21:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

- Can Host5 ping Host4?

No. Host5 is in VLAN 10, and Host4 is in VLAN 20.



The screenshot shows the 'Host5' window in Cisco Packet Tracer. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The command prompt shows the following text:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig 172.17.10.25 255.255.255.0
C:\>ping 172.17.10.24

Pinging 172.17.10.24 with 32 bytes of data:

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

Ping statistics for 172.17.10.24:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

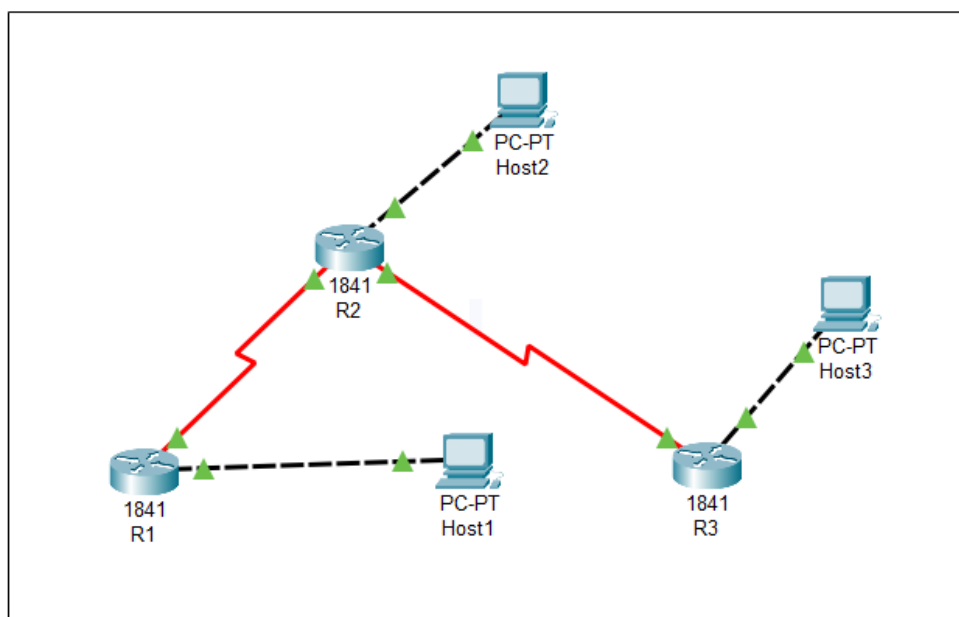
TASK 3

Static Routing Implementation:

Addressing Table Plan

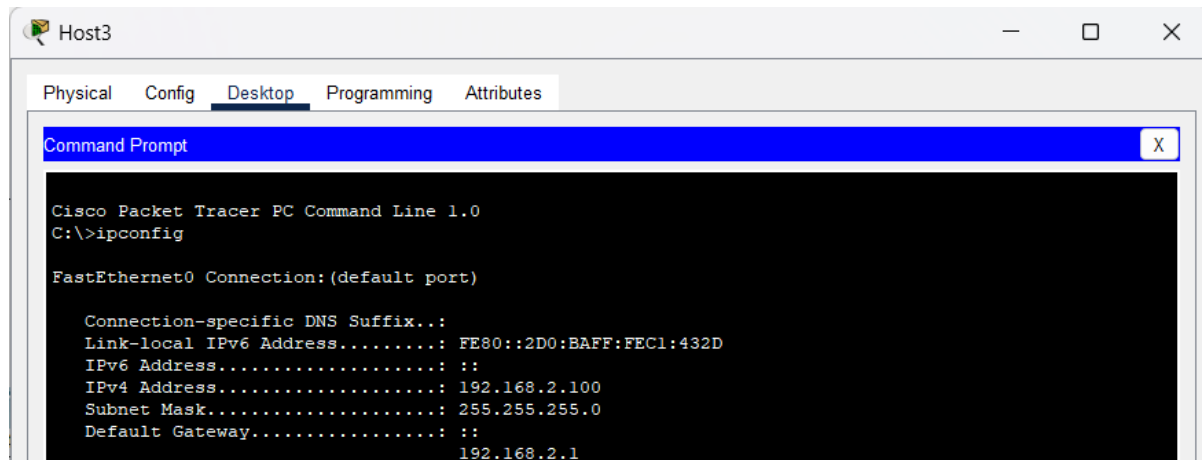
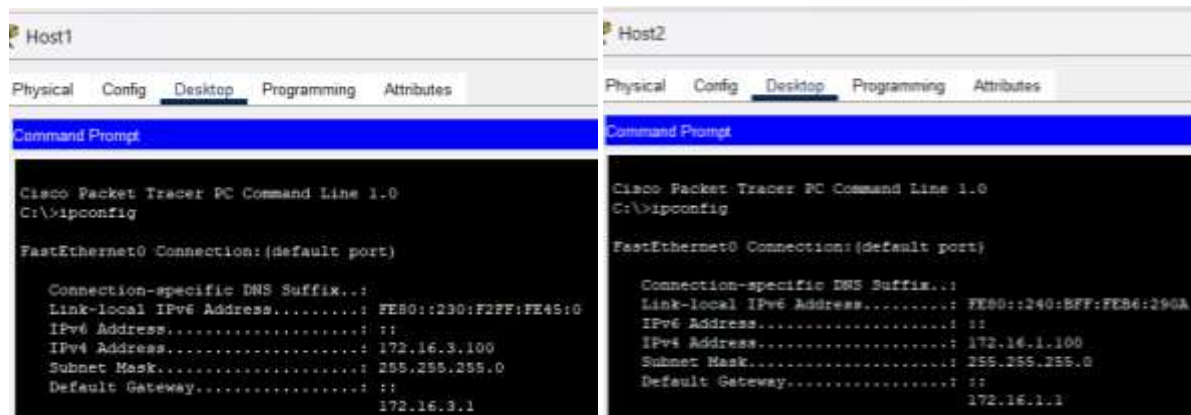
Device	Interface	IPv4 Address	Subnet Mask	Gateway	Link Ports
Host1	NIC	172.16.3.100	255.255.255.0	172.16.3.1	R1; fa0/0
Host2	NIC	172.16.1.100	255.255.255.0	172.16.1.1	R2; fa0/0
Host3	NIC	192.168.2.100	255.255.255.0	192.168.2.1	R3; fa0/0
R1	fa0/0	172.16.3.1	255.255.255.0	-	-
R1	se 0/1/0	172.16.2.1	255.255.255.0	-	R2; se 0/1/0
R2	fa0/0	172.16.1.1	255.255.255.0	-	-
R2	se 0/1/0	172.16.2.2	255.255.255.0	-	R1; se 0/1/0
R2	se 0/1/1	192.168.1.1	255.255.255.0	-	R3; se 0/1/0
R3	fa0/0	192.168.2.1	255.255.255.0	-	-
R3	se 0/1/0	192.168.1.2	255.255.255.0	-	R2; se 0/1/1

a) Designing the topology



- b) Assign the IP address to all hosts and Routers according to Addressing Table.

Manually configured IPs on each host and routers according to the Addressing Plan.



```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fa0/0
Router(config-if)#ip address 172.16.3.1 255.255.255.0
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)#interface s0/1/0
Router(config-if)#ip address 172.16.2.1 255.255.255.0
Router(config-if)#no shutdown
```

```
Router>enab
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R2
R2(config)#interf
R2(config)#interface fa0/0
R2(config-if)#ip address 172.16.1.1 255.255.255.0
R2(config-if)#no shut
```

```

R2(config-if)#interface s0/1/1
R2(config-if)#ip address 192.168.1.1 255.255.255.0
R2(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
R2(config-if)#

```

c) Configure the routers with static route.

```

R1>en
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip route 172.16.1.0 255.255.255.0 172.16.2.2
R1(config)#ip route 192.168.2.0 255.255.255.0 172.16.2.2
R1(config)#ip route 192.168.1.0 255.255.255.0 172.16.2.2
R1(config)#

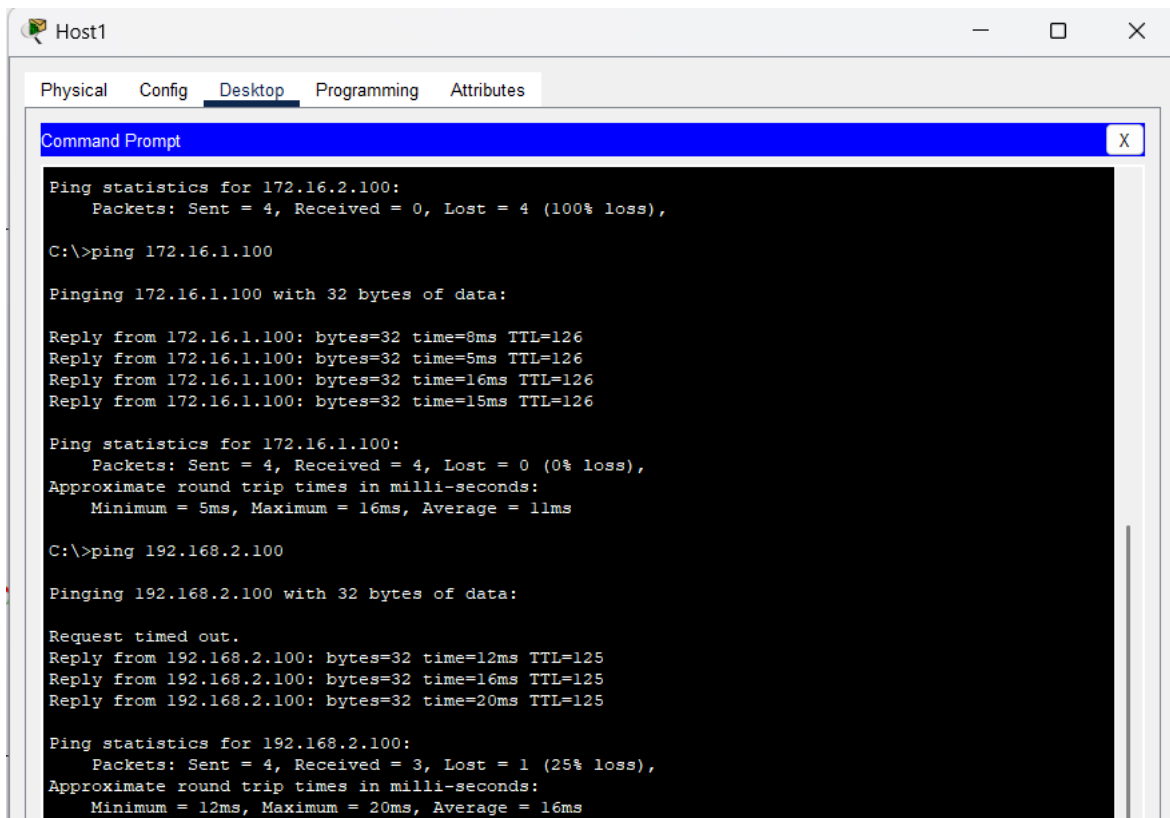
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface s0/1/1
R2(config-if)#no shu
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#ip route 172.16.3.0 255.255.255.0 172.16.2.1
R2(config)#ip route 192.168.2.0 255.255.255.0 192.168.1.2
R2(config)#

R3>en
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ip route 172.16.1.0 255.255.255.0 192.168.1.1
R3(config)#ip route 172.16.3.0 255.255.255.0 192.168.1.1
R3(config)#ip route 172.16.2.0 255.255.255.0 192.168.1.1
R3(config)#

```

d) From the command prompt on each host, ping between hosts. Write the output.

- Can Host1 ping Host2 and Host3?



The screenshot shows a desktop window titled 'Host1' with tabs for 'Physical', 'Config', 'Desktop' (selected), 'Programming', and 'Attributes'. A 'Command Prompt' window is open, displaying the following text:

```
Ping statistics for 172.16.2.100:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 172.16.1.100

Pinging 172.16.1.100 with 32 bytes of data:

Reply from 172.16.1.100: bytes=32 time=8ms TTL=126
Reply from 172.16.1.100: bytes=32 time=5ms TTL=126
Reply from 172.16.1.100: bytes=32 time=16ms TTL=126
Reply from 172.16.1.100: bytes=32 time=15ms TTL=126

Ping statistics for 172.16.1.100:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 5ms, Maximum = 16ms, Average = 11ms

C:\>ping 192.168.2.100

Pinging 192.168.2.100 with 32 bytes of data:

Request timed out.
Reply from 192.168.2.100: bytes=32 time=12ms TTL=125
Reply from 192.168.2.100: bytes=32 time=16ms TTL=125
Reply from 192.168.2.100: bytes=32 time=20ms TTL=125

Ping statistics for 192.168.2.100:
  Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 12ms, Maximum = 20ms, Average = 16ms
```

- Can router R1 ping router Host3?

```
R1>en
R1#ping 192.168.2.100

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.100, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/15/20 ms
```

- Can Host2 ping router R1 and Host3?

Command Prompt

```
C:\>ipconfig 172.16.1.100 255.255.255.0 172.16.1.1
C:\>ping 172.16.3.1

Pinging 172.16.3.1 with 32 bytes of data:

Reply from 172.16.3.1: bytes=32 time=14ms TTL=254
Reply from 172.16.3.1: bytes=32 time=8ms TTL=254
Reply from 172.16.3.1: bytes=32 time=9ms TTL=254
Reply from 172.16.3.1: bytes=32 time=7ms TTL=254

Ping statistics for 172.16.3.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 7ms, Maximum = 14ms, Average = 9ms

C:\>ping 172.16.2.1

Pinging 172.16.2.1 with 32 bytes of data:

Reply from 172.16.2.1: bytes=32 time=11ms TTL=254
Reply from 172.16.2.1: bytes=32 time=9ms TTL=254
Reply from 172.16.2.1: bytes=32 time=10ms TTL=254
Reply from 172.16.2.1: bytes=32 time=8ms TTL=254

Ping statistics for 172.16.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 11ms, Average = 9ms

C:\>ping 192.168.2.100

Pinging 192.168.2.100 with 32 bytes of data:

Reply from 192.168.2.100: bytes=32 time=12ms TTL=126
Reply from 192.168.2.100: bytes=32 time=8ms TTL=126
Reply from 192.168.2.100: bytes=32 time=8ms TTL=126
Reply from 192.168.2.100: bytes=32 time=9ms TTL=126

Ping statistics for 192.168.2.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 12ms, Average = 9ms

C:\>
```

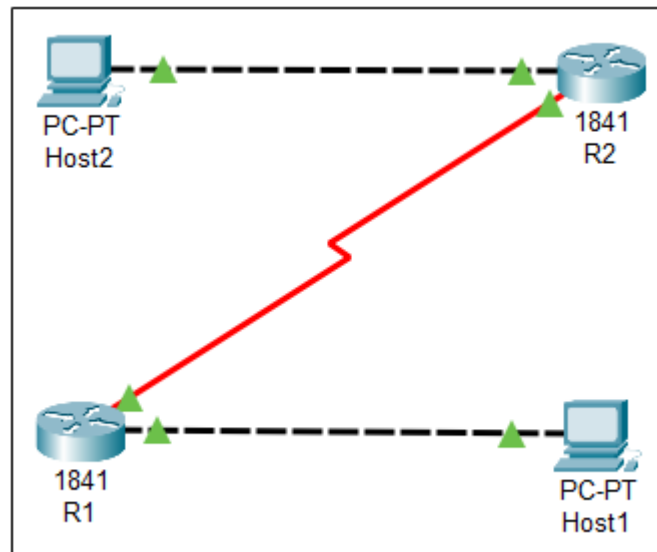
TASK 4

Routing Information protocol (RIP) Implementation:

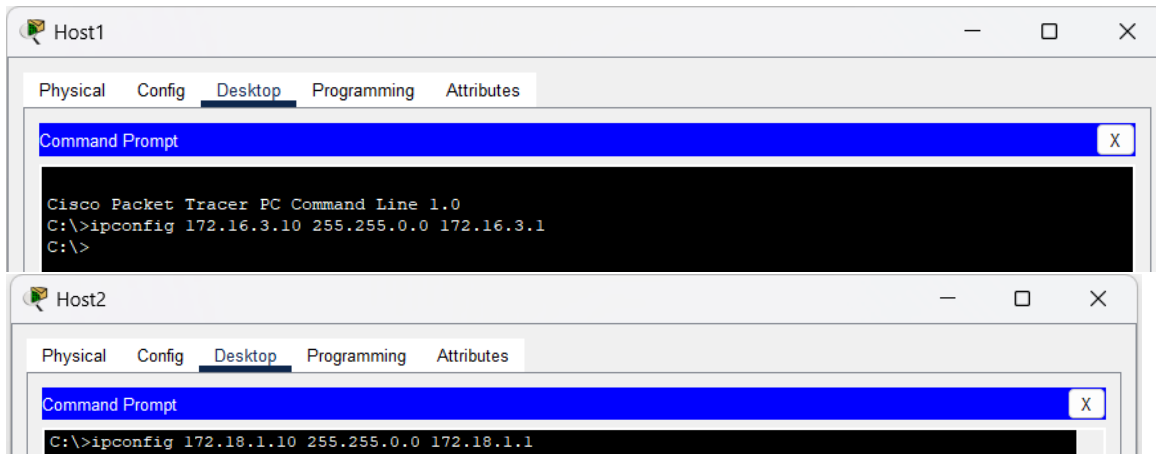
Addressing Table Plan

Device	Interface	IPv4 Address	Subnet Mask	Gateway	Link Ports
Host1	NIC	172.16.3.10	255.255.0.0	172.16.3.1	R1; fa0/0
Host2	NIC	172.18.1.10	255.255.255.0	172.18.1.1	R2; fa0/0
R1	fa0/0	172.16.3.1	255.255.0.0	—	—
	se 0/0/0	172.17.2.1	255.255.255.252	—	R2; se 0/0/0
R2	fa0/0	172.18.1.1	255.255.255.0	—	—
	se 0/0/0	172.17.2.2	255.255.255.252	—	R1; se 0/0/0

a) Designing the topology



b) Assign the IP address to all PCs and Routers according to Addressing Table



```

Router(config)#hostname R1
R1(config)#interface fa0/0
R1(config-if)# ip address 172.16.3.1 255.255.0.0
R1(config-if)# no shutdown
R1(config)#interface s0/1/0
R1(config-if)# ip address 172.17.2.1 255.255.255.252
R1(config-if)# no shutdown
R1(config-if)#

Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R2
R2(config)#interface fa0/0
R2(config-if)# ip address 172.18.1.1 255.255.255.0
R2(config-if)# no shutdown

R2(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

R2(config-if)#interface s0/1/0
R2(config-if)#ip address 172.17.2.2 255.255.255.252
R2(config-if)#no shut
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

```

- c) Configure the routers with RIPv2.

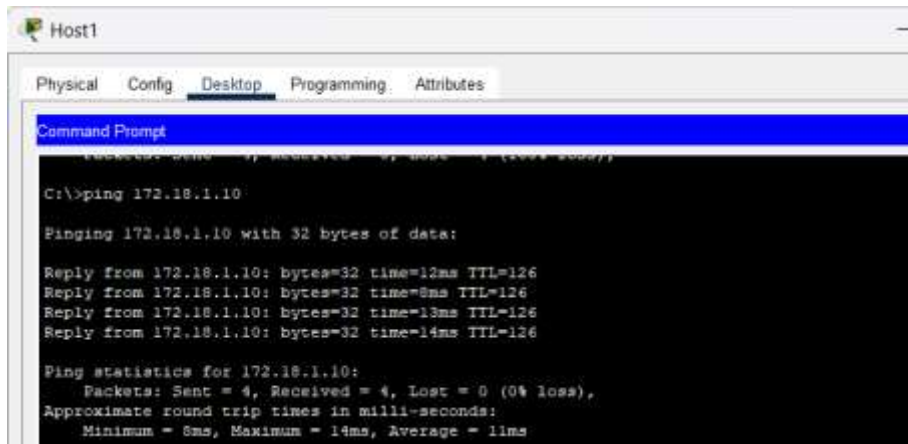
```

R1(config-if)#exit
R1(config)#router rip
R1(config-router)#version 2
R1(config-router)#no auto-summary
R1(config-router)#network 172.16.0.0
R1(config-router)#network 172.17.2.0
R1(config-router)#

R2(config-if)#exit
R2(config)#router rip
R2(config-router)#version 2
R2(config-router)#no auto-summary
R2(config-router)#network 172.18.1.0
R2(config-router)#network 172.17.2.0
R2(config-router)#

```

- d) From the command prompt on each host, ping between hosts and routers. Write the output.
- Can host1 ping host2?



```
Host1
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ping 172.18.1.10

Pinging 172.18.1.10 with 32 bytes of data:

Reply from 172.18.1.10: bytes=32 time=12ms TTL=126
Reply from 172.18.1.10: bytes=32 time=8ms TTL=126
Reply from 172.18.1.10: bytes=32 time=13ms TTL=126
Reply from 172.18.1.10: bytes=32 time=14ms TTL=126

Ping statistics for 172.18.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 14ms, Average = 11ms
```

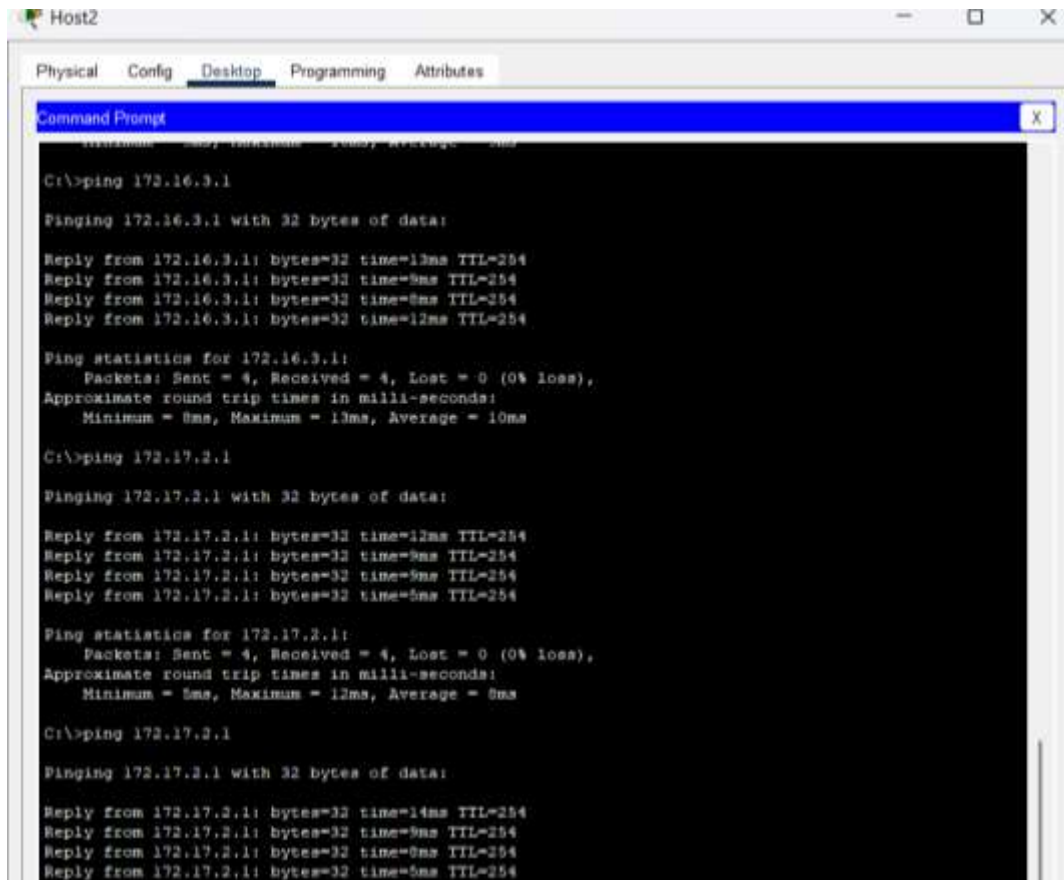
- Can router R1 ping router R2?

```
R1#
%SYS-5-CONFIG_I: Configured from console by console
ping 172.17.2.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.17.2.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 9/10/12 ms

R1#
```

- Can host2 ping router R1?



```
Host2
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ping 172.16.3.1

Pinging 172.16.3.1 with 32 bytes of data:

Reply from 172.16.3.1: bytes=32 time=13ms TTL=254
Reply from 172.16.3.1: bytes=32 time=8ms TTL=254
Reply from 172.16.3.1: bytes=32 time=8ms TTL=254
Reply from 172.16.3.1: bytes=32 time=12ms TTL=254

Ping statistics for 172.16.3.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 13ms, Average = 10ms

C:\>ping 172.17.2.1

Pinging 172.17.2.1 with 32 bytes of data:

Reply from 172.17.2.1: bytes=32 time=12ms TTL=254
Reply from 172.17.2.1: bytes=32 time=9ms TTL=254
Reply from 172.17.2.1: bytes=32 time=9ms TTL=254
Reply from 172.17.2.1: bytes=32 time=8ms TTL=254

Ping statistics for 172.17.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 12ms, Average = 9ms

C:\>ping 172.17.2.1

Pinging 172.17.2.1 with 32 bytes of data:

Reply from 172.17.2.1: bytes=32 time=14ms TTL=254
Reply from 172.17.2.1: bytes=32 time=9ms TTL=254
Reply from 172.17.2.1: bytes=32 time=8ms TTL=254
Reply from 172.17.2.1: bytes=32 time=8ms TTL=254
```

Task 5

Linux Installation over VMware

a) Installing VMware Workstation



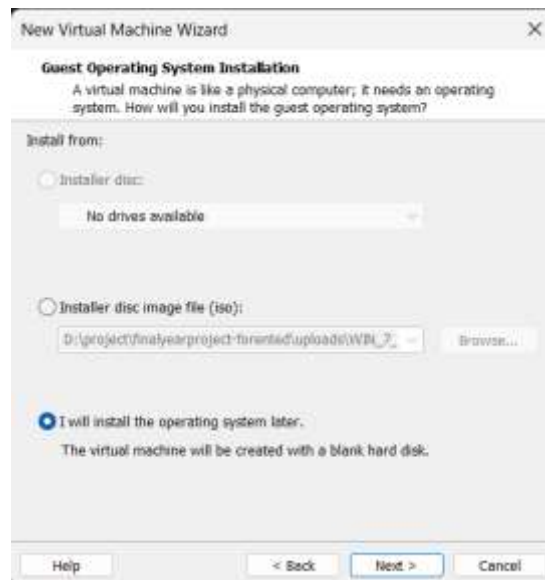
b) Creating Virtual Machine of Linux (Alma Linux 9).

For the creation of a Virtual Machine of Alma Linux 9, the following steps were taken:

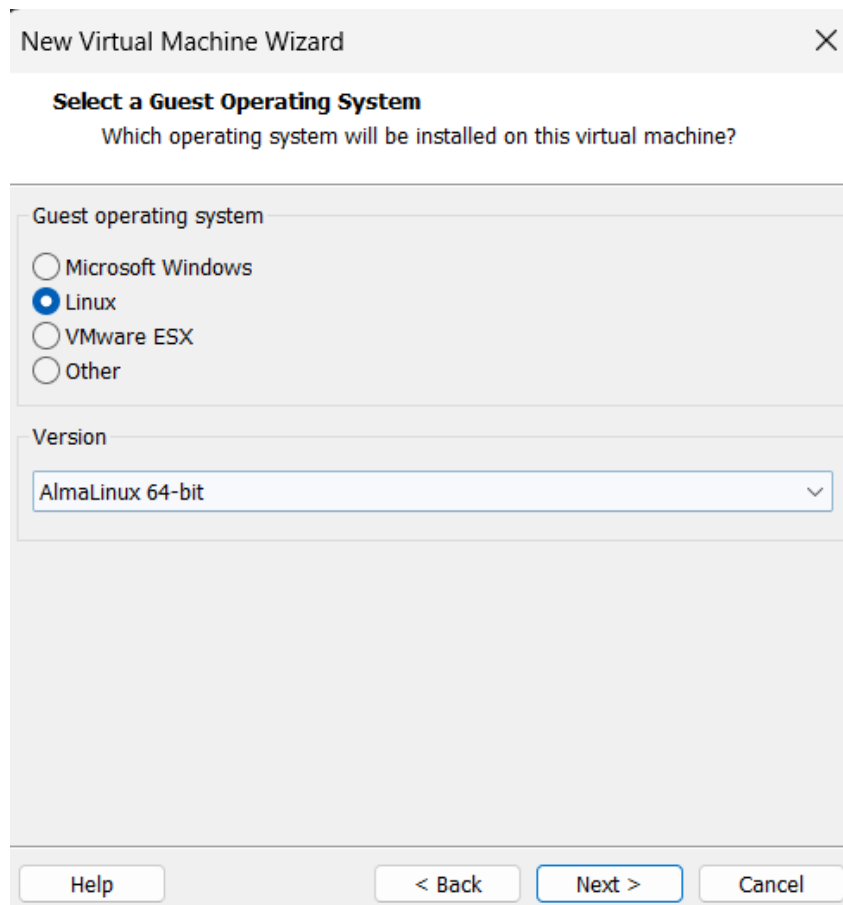
1. Firstly, the option for creation of a new virtual machine was selected, and a new Virtual Machine Wizard opened.



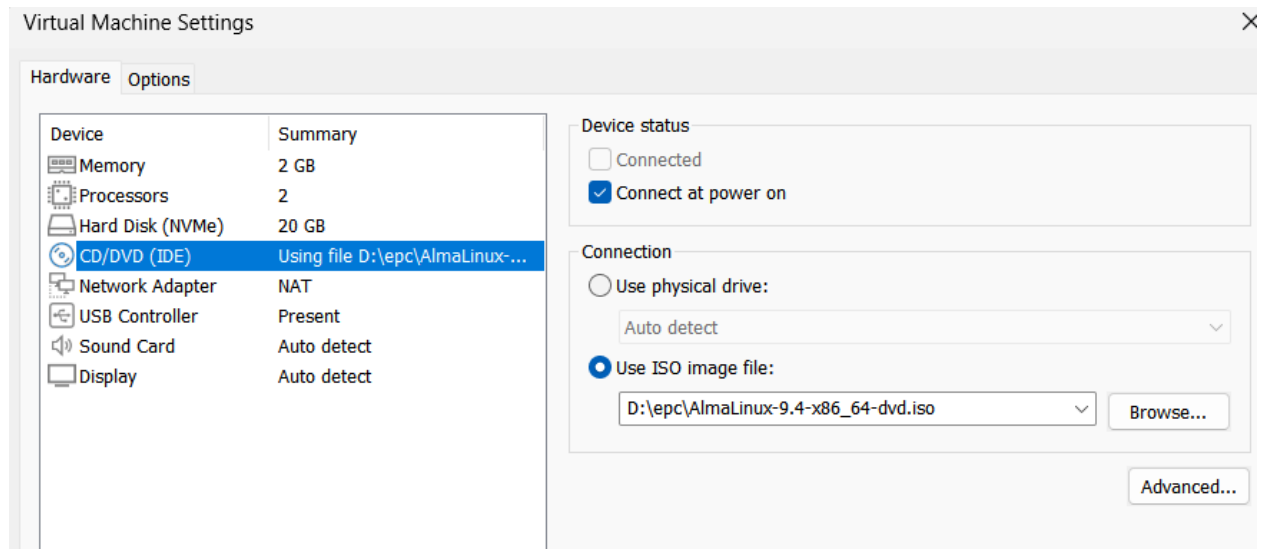
2. Then, the typical installation was selected, and the option stating I will install the operating system later was also selected.



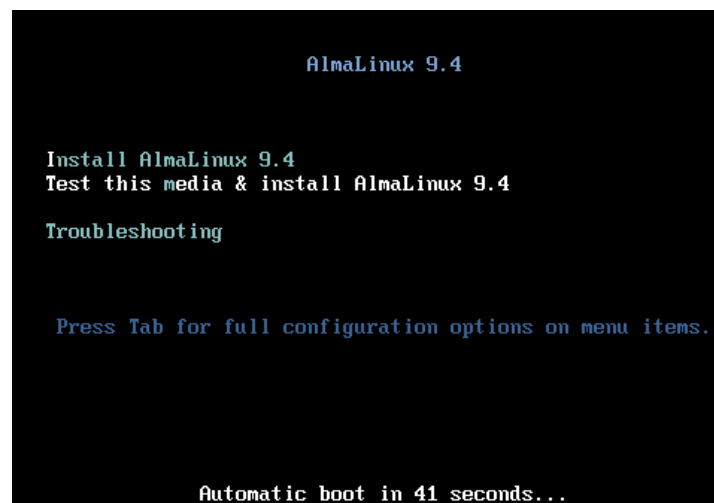
3. Alma Linux 64-bit was chosen as the guest operating system and then the location for virtual machine was selected.



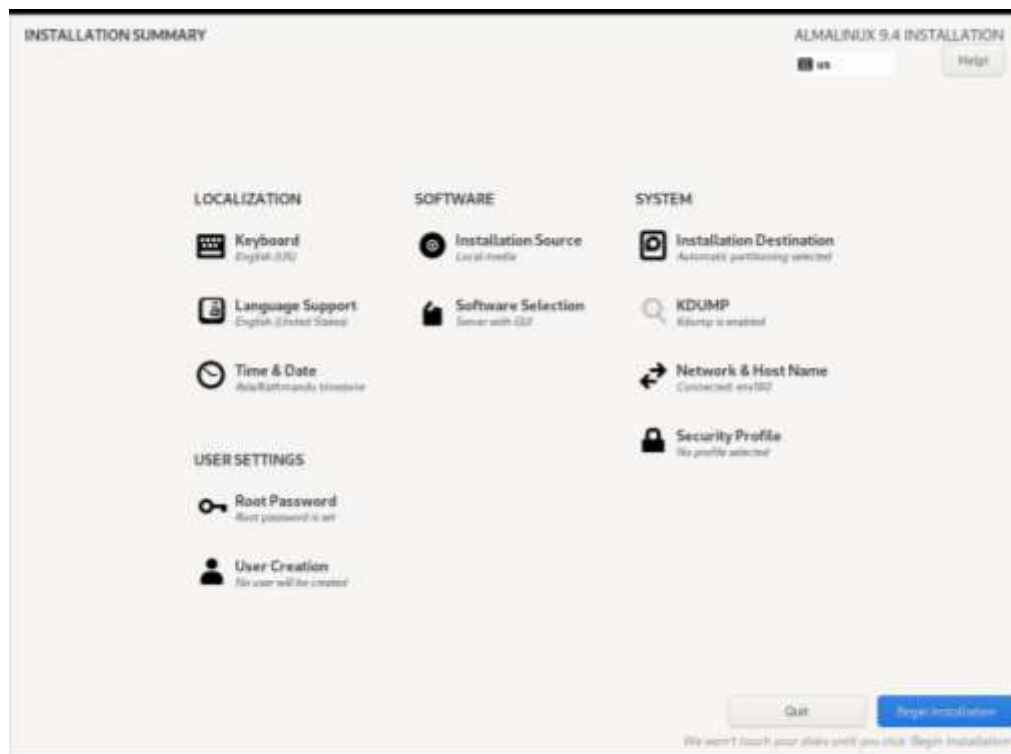
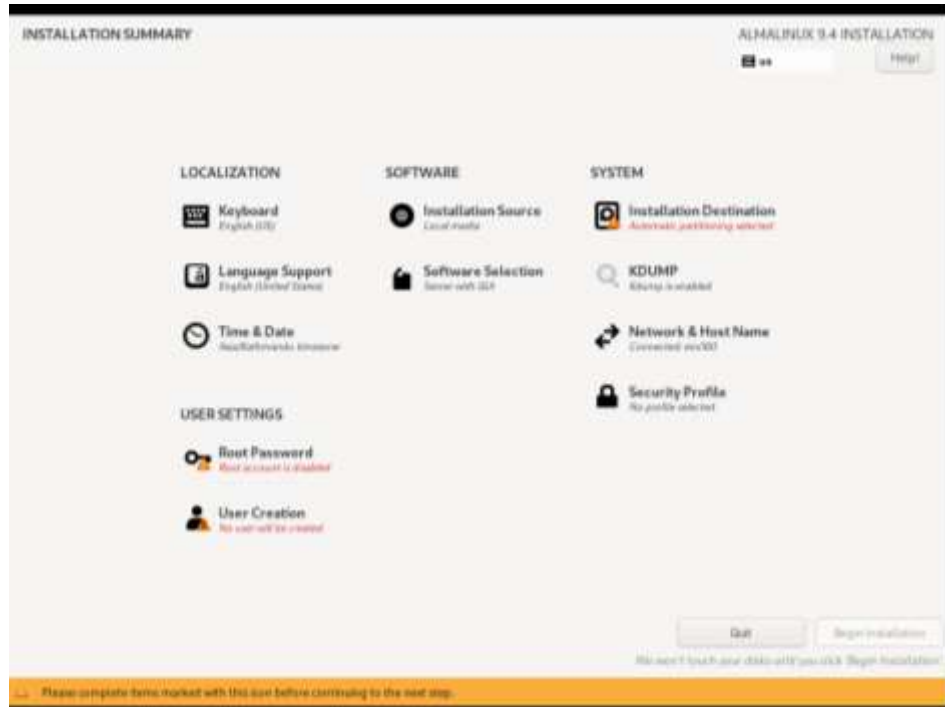
4. After that, the virtual machine storage type was chosen as multiple files and after verifying the installation details, the wizard was closed.
5. After that, the virtual machine was edited to use the ISO of Alma Linux for the boot.



6. Then the machine was powered on and the option to install AlmaLinux 9.4 was selected

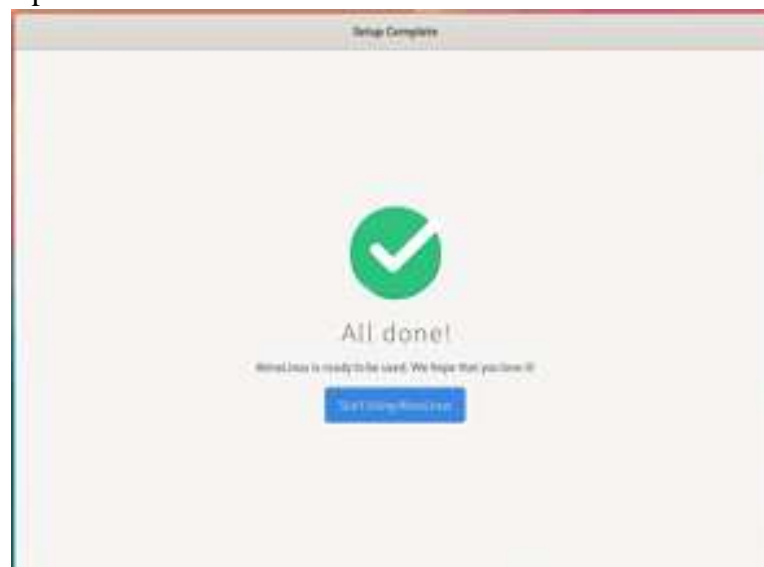


7. After that, the installation summary appears, after checking and verifying all the details, the installation was started.





8. Then, on reboot, we are prompted to create a user for the machine, after which the installation is completed



c) Assign hostname of the virtual machine to `jesus.ns.local`.

To assign the hostname in Linux to a user defined one a simple command is used:

`hostnamectl set-hostname`

```
[root@jesus ~]# hostname  
jesus.ns.local
```

Task 6

Users, Groups, Permission and other privileges

a) Create groups friends and staff.

```
[root@jesus ~]# groupadd friends
[root@jesus ~]# groupadd staff
[root@jesus ~]# tail -n 2 /etc/group
friends:x:1005:
staff:x:1006:
```

b) Create a user 'david' with friends as the primary group and staff as the secondary group.

```
[root@jesus ~]# useradd -g friends -G staff david
[root@jesus ~]# passwd david
Changing password for user david.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
[root@jesus ~]# tail -n 1 /etc/passwd
david:x:1005:1005::/home/david:/bin/bash
```

c) Create another user 'john' such that his account will expire on 16th Jan 2026, will have to renew password within every 90 days and will not get login shell.

```
[root@jesus ~]# useradd -e 2026-01-16 -s /sbin/nologin john
[root@jesus ~]# chage -M 90 john
[root@jesus ~]# passwd john
Changing password for user john.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
[root@jesus ~]# tail -n 1 /etc/shadow
john:$6$rounds=100000$vFZcA5z3/Lqg556f$pJUoVEi8ls.8XXHb2JI07NeVIQeAP7fS4W5KHq984
haCqqVHJbpRKL8jLmLVuSsgdpbbRVhNvC0M2X9eEy7nH/:20232:0:90:7::20469:
```

d) Assign read and execute permission on the home directory of david to john.

```
[root@jesus ~]# setfacl -m john:rx /home/david
[root@jesus ~]#
```

e) Create group for each department (training, support).

```
[root@jesus ~]# groupadd training
[root@jesus ~]# groupadd support
[root@jesus ~]# tail -n 2 /etc/group
training:x:1008:
support:x:1009:
```

f) Create user account (ram, sita, ramesh, dinesh, supervisor, ceo) for each employee assigning them respective group.

```
[root@jesus ~]# useradd -g training ram
[root@jesus ~]# useradd -g training sita
useradd: user 'sita' already exists
[root@jesus ~]# useradd -g support ramesh
[root@jesus ~]# useradd -g support dinesh
[root@jesus ~]# useradd -g training -g support supervisor
[root@jesus ~]# useradd -g training -g support ceo
```

- g) **Create common directory (/root/training and /root/support) for each department.**

```
[root@jesus ~]# mkdir -p /root/training /root/support
[root@jesus ~]# ls /rrot/
ls: cannot access '/rrot/': No such file or directory
[root@jesus ~]# ls /root/
anaconda-ks.cfg  Desktop  Downloads  Music      Pictures  support  training
esktop          Passwords Public      Templates Videos
```

- h) **Change ownership of group directories such that ceo will become the owner and the respective groups will be group owner.**

```
[root@jesus ~]# chown ceo:training /root/training
[root@jesus ~]# chown ceo:support /root/support
[root@jesus ~]# ls /root/ -l
total 8
-rw-----. 1 root root      1089 Aug 20  2024 anaconda-ks.cfg
drwxr-xr-x. 2 root root         6 Aug 22  2024 Desktop
drwxr-xr-x. 2 root root         6 Aug 22  2024 Documents
drwxr-xr-x. 2 root root         6 Aug 22  2024 Downloads
drwxr-xr-x. 2 root root         6 Aug 22  2024 Music
drwxr-xr-x. 3 root root        52 Aug 22  2024 Passwords
drwxr-xr-x. 2 root root     4096 May 24 14:16 Pictures
drwxr-xr-x. 2 root root         6 Aug 22  2024 Public
drwxr-xr-x. 2 ceo support         6 May 24 14:40 support
drwxr-xr-x. 2 root root         6 Aug 22  2024 Templates
drwxr-xr-x. 2 ceo training         6 May 24 14:40 training
drwxr-xr-x. 2 root root         6 Aug 22  2024 Videos
```

Task 7

Bash Shell Scripting

- a) Write a script named helloworld.sh to display “Hello World”.

```
[root@jesus ~]# vi helloworld.sh
[root@jesus ~]# cat helloworld.sh
#!/bin/bash
echo "Hello WOrld"

[root@jesus ~]# chmod +x helloworld.sh
[root@jesus ~]# ./helloworld.sh
Hello World
```

- b) Write a script named age.sh to prompt for age and display it.

```
[root@jesus ~]# vim age.sh
[root@jesus ~]# cat age.sh
#!/bin/bash
read -p "Enter your age:" age
echo "your age is $age"

[root@jesus ~]# ./age.sh
bash: ./age.sh: Permission denied
[root@jesus ~]# chmod +x age.sh
[root@jesus ~]# ./age.sh
Enter your age:23
your age is 23
[root@jesus ~]#
```

- c) Write a script to calculate simple interest.

```
[root@jesus ~]# vim simple_intrest.sh
[root@jesus ~]# cat simple_intrest.sh
#!/bin/bash

read -p "P: " p
read -p "R: " r
read -p "T: " t

si=$((p*t*r/100))
echo "simple Intrest : $si"

[root@jesus ~]# chmod +x simple_intrest.sh
[root@jesus ~]# ./simple_intrest.sh
P: 150
R: 2
T: 3
simple Intrest :_9
```

- d) Write a script to determine if a user-inputted number is positive, negative, or zero.

```
root@jesus ~]# cat check_number.sh
at: check_number.sh: No such file or directory
root@jesus ~]# vim check_number.sh
root@jesus ~]# cat check_number.sh
#!/bin/bash
read -p "Enter a number: " num
if (( num > 0 ));
then echo "Positive";
elif(( num > 0 ))
then echo "Negative";
lse
echo "Zero";
i

root@jesus ~]# chmod +x check_number.sh
root@jesus ~]# ./check_number.sh
```

Task 8

Disk (File System and Quota) Management

- a) Create a partition of 500MB and format it with ext4 filesystem then mount it on /data1 directory permanently.

```
[root@alma ~]# fdisk /dev/sdb

Welcome to fdisk (util-linux 2.37.4).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.

Device does not contain a recognized partition table.
Created a new DOS disklabel with disk identifier 0x908398ed.

Command (m for help): n
Partition type
   p   primary (0 primary, 0 extended, 4 free)
   e   extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1):
First sector (2048-1023999, default 2048):
Last sector, +/-sectors or +/-size[K,M,G,T,P] (2048-1023999, default 10239
Created a new partition 1 of type 'Linux' and of size 499 MiB.

Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.

[root@alma ~]# lsblk
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINTS
sda   8:0    0 19.5G 0 disk
├─sda1 8:1    0   1M 0 part
├─sda2 8:2    0 200M 0 part /boot/efi
├─sda3 8:3    0   1G 0 part /boot
├─sda4 8:4    0 18.3G 0 part /
sdb   8:16   0 500M 0 disk
└─sdb1 8:17   0 499M 0 part

[root@alma ~]# mkfs.ext4 /dev/sdb1
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 510976 1k blocks and 127512 inodes
Filesystem UUID: a094f8d5-c699-4648-a180-4a6fb1c36911
Superblock backups stored on blocks:
    8193, 24577, 40961, 57345, 73729, 204801, 221185, 401409

Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done

[root@alma ~]# mkdir /data1
[root@alma ~]# mount /dev/sdb1 /data1/
mount: (hint) your fstab has been modified, but systemd still uses
the old version; use 'systemctl daemon-reload' to reload.
[root@alma ~]# echo '/dev/sdb1 /data1 ext4 defaults 0 0' >> /etc/fstab
```

- b) Increase swap space in your system by 1GB. Also make sure that it gets activated at boot time automatically.

```
[root@alma ~]# fallocate -l 1G /swapfile
[root@alma ~]# chmod 600 /swapfile
[root@alma ~]# mkswap /swapfile
Setting up swapon space version 1, size = 1024 MiB (1073737728 bytes)
no label, UUID=9642a5bc-f615-4aaf-bcab-d438d99c10b4
[root@alma ~]# swapon /swapfile
[root@alma ~]# free -h
              total        used        free      shared  buff/cache   available
Mem:           3.8Gi       369Mi       3.5Gi         16Mi       148Mi       3.4Gi
Swap:          1.0Gi           0B         1.0Gi
[root@alma ~]# echo '/swapfile none swap sw 0 0' >> /etc/fstab
[root@alma ~]#
```

Task 9

Boot Process and Service Management

- a) Recover the root password with “nsa13” as new password.

```
[root@jesus ~]# passwd root
Changing password for user root.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
[root@jesus ~]#
```

- b) Suppose default boot mode of your system is in “multi-user.target”. Configure your system to boot in GUI mode by default i.e., “graphical.target”

```
[root@jesus ~]# systemctl set-default graphical.target
[root@jesus ~]#
```

- c) Suppose ssh service is disabled in your system, check the status of the ssh service, then start the ssh service. Also, configure the ssh service to start automatically in boot time.

```
[root@jesus ~]# systemctl status sshd
● sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; preset: ena>
   Active: active (running) since Sat 2025-05-24 14:13:11 +0545; 2h 24min ago
     Docs: man:sshd(8)
           man:sshd_config(5)
  Main PID: 970 (sshd)
    Tasks: 1 (limit: 10753)
   Memory: 1.7M
      CPU: 20ms
   CGroup: /system.slice/sshd.service
           └─970 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

May 24 14:13:11 jesus.ns.local systemd[1]: Starting OpenSSH server daemon...
May 24 14:13:11 jesus.ns.local sshd[970]: Server listening on 0.0.0.0 port 22.
May 24 14:13:11 jesus.ns.local sshd[970]: Server listening on :: port 22.
May 24 14:13:11 jesus.ns.local systemd[1]: Started OpenSSH server daemon.
lines 1-16/16 (END)
```

Task 10

Red Hat Package Management (YUM Repository)

- a) Search a yum repo for google chrome, configure your system with respective remote repository then install google chrome in your system. Before installing google chrome update all the existing yum repositories.

```
[root@jesus ~]# sudo yum update -y
google-chrome                               5.8 kB/s | 1.3 kB      00:00
Dependencies resolved.
Nothing to do.
Complete!
[root@jesus ~]# sudo tee /etc/yum.repos.d/google-chrome.repo <<EOF
[google-chrome]
name=google-chrome
baseurl=https://dl.google.com/linux/chrome/rpm/stable/\$basearch
enabled=1
gpgcheck=1
gpgkey=https://dl.google.com/linux/linux_signing_key.pub
EOF
[google-chrome]
name=google-chrome
baseurl=https://dl.google.com/linux/chrome/rpm/stable/\$basearch
enabled=1
gpgcheck=1
gpgkey=https://dl.google.com/linux/linux_signing_key.pub
[root@jesus ~]# sudo yum install google-chrome-stable -y
google-chrome                               5.1 kB/s | 1.3 kB      00:00
Package google-chrome-stable-136.0.7103.113-1.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[root@jesus ~]#
```

- b) Enable EPEL repository (epel-release package) and verify the repo configuration in /etc/yum.repos.d then install vsftpd, httpd package using YUM command

```
[root@jesus ~]# sudo yum install epel-release -y
Last metadata expiration check: 0:02:04 ago on Sat 24 May 2025 05:20:50 PM +0545
.
Package epel-release-9-10.el9.noarch is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[root@jesus ~]#
```

c) Uninstall the package httpd.

```
[root@jesus ~]# sudo yum remove httpd -y
Dependencies resolved.
```

```
=====
Package                Arch      Version      Repository    Size
=====
Removing:
  httpd                  x86_64    2.4.62-4.el9 @appstream    59 k
Removing unused dependencies:
  almalinux-logos-httpd noarch    90.6-1.el9   @appstream    15 k
  apr                    x86_64    1.7.0-12.el9_3 @appstream    288 k
  apr-util               x86_64    1.6.1-23.el9 @appstream    211 k
  apr-util-bdb           x86_64    1.6.1-23.el9 @appstream    15 k
  apr-util-openssl       x86_64    1.6.1-23.el9 @appstream    23 k
  httpd-core              x86_64    2.4.62-4.el9 @appstream    4.7 M
  httpd-filesystem       noarch    2.4.62-4.el9 @appstream    464
  httpd-tools             x86_64    2.4.62-4.el9 @appstream    199 k
  mod_http2              x86_64    2.0.26-4.el9 @appstream    442 k
  mod_lua                x86_64    2.4.62-4.el9 @appstream    142 k
=====
```

Transaction Summary

```
=====
Remove 11 Packages
=====
```


Task 11

- a) **Install, start and enable the required packages and services required for the cron job automations.**

```
[root@jesus ~]# yum install -y cronie
Last metadata expiration check: 0:08:32 ago on Sat 24 May 2025 05:20:50 PM +0545
.
Package cronie-1.5.7-13.el9.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
```

- b) **Schedule a cron job as user cab so that the information of used and free disk space will be saved in file /home/cab/cronout at 2:30 AM on the first day of every May.**

```
[cab@jesus root]$ crontab -e
no crontab for cab - using an empty one
crontab: installing new crontab
[cab@jesus root]$ crontab -l
30 2 1 5 * df -h > /home/cab/cronout
```

- c) **Set up a cron job as the root user to search for core files in the /var directory and list them in /var/log/corefiles. The job should run every Monday at 11:20 am system time.**

```
[cab@jesus root]$ crontab -e
crontab: installing new crontab
[cab@jesus root]$ crontab -l
20 11 * * 1 find /var -type f -name "core" > /var/log/corefiles 2>/dev/null
```

- d) **Enable cron access for user sita and deny for user ramesh.**

```
[root@jesus ~]# echo "sita" | sudo tee -a /etc/cron.allow
sita
[root@jesus ~]# echo "ramesh" | sudo tee -a /etc/cron.deny
ramesh
[root@jesus ~]#
```

Task 12

Network Configuration

- a) Configure the network interface with ipv4 address 192.168.0.10/24. Also start and enable the respective services.

```
[root@jesus ~]# nmcli con mod eth0 ipv4.address 192.168.0.10/24
Warning: nmcli (1.52.0) and NetworkManager (1.48.10) versions don't match. Restarting NetworkManager is advised.
Error: unknown connection 'eth0'.
[root@jesus ~]# nmcli con modify eth0 ipv4.method manual
Warning: nmcli (1.52.0) and NetworkManager (1.48.10) versions don't match. Restarting NetworkManager is advised.
Error: unknown connection 'eth0'.
[root@jesus ~]# nmcli con up eth0
Warning: nmcli (1.52.0) and NetworkManager (1.48.10) versions don't match. Restarting NetworkManager is advised.
Error: unknown connection 'eth0'.
```

- b) Configure Zabbix or Nagios or Cacti or Prometheus or Observium server in your system. Also start and enable the respective services.



```
root@jesus:~
[root@jesus ~]# yum install -y zabbix-server-mysql zabbix-web-mysql
Last metadata expiration check: 0:26:36 ago on Sat 24 May 2025 05:20:50 PM +0545.
Package zabbix-server-mysql-1:6.0.39-1.el9.x86_64 is already installed.
Package zabbix-web-mysql-1:6.0.39-1.el9.noarch is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[root@jesus ~]# systemctl enable zabbix-server
Created symlink /etc/systemd/system/multi-user.target.wants/zabbix-server-mysql.service → /usr/lib/systemd/system/zabbix-server-mysql.service.
[root@jesus ~]#
```

Task 13

Firewall Configuration

- a) Install firewalld package as well as start and enable firewall services.

```
root@jesus:~  
[root@jesus ~]# yum install -y firewalld  
Last metadata expiration check: 0:28:18 ago on Sat 24 May 2025 05:20:50 PM +0545.  
Package firewalld-1.3.4-9.el9_5.noarch is already installed.  
Dependencies resolved.  
Nothing to do.  
Complete!  
[root@jesus ~]# systemctl start firewalld  
[root@jesus ~]# systemctl enable firewalld  
[root@jesus ~]#
```

- b) Add the following services and ports to allow packets through the firewall.
[Service = http, smtp port = 25 /tcp, 25/udp, 110/tcp]

```
[root@jesus ~]# firewall-cmd --permanent --add-service=http  
Warning: ALREADY_ENABLED: http  
success  
[root@jesus ~]# firewall-cmd --permanent --add-port=25/tcp  
success  
[root@jesus ~]# firewall-cmd --permanent --add-port=25/udp  
success  
[root@jesus ~]# firewall-cmd --permanent --add-port=110/tcp  
success  
[root@jesus ~]# firewall-cmd --reload  
success  
[root@jesus ~]#
```

Task 14

NFS Server Configuration

- a) **Create & Share /nsashared directory in read/write mode with NFS to users on the local network.**

```
[root@jesus ~]# yum install -y nfs-utils
Last metadata expiration check: 0:32:02 ago on Sat 24 May 2025 05:20:50 PM +0545.
Package nfs-utils-1:2.5.4-34.el9.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!

[root@jesus ~]# mkdir -p /home/share
[root@jesus ~]# nano /etc/exports
[root@jesus ~]# exportfs -a
[root@jesus ~]# systemctl enable nfs-server --now
Created symlink /etc/systemd/system/multi-user.target.wants/nfs-server.service → /usr/lib/sy
stemd/system/nfs-server.service.
[root@jesus ~]# █
```

Task 15

Apache Web Server Configuration

- a) Set up a simple virtual host called `cab.nsa.local` with `index.html` placed in `DocumentRoot /var/cab`. Update the hosts table for name resolution.

```
[root@jesus ~]# yum install -y httpd
Last metadata expiration check: 0:46:06 ago on Sat 24 May 2025 05:20:50 PM +0545.
Package httpd-2.4.62-4.el9.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[root@jesus ~]# mkdir -p /var/cab
[root@jesus ~]# echo "<h1>Welcome CAB Virtual Host </h1>" /var/cab/index.html
<h1>Welcome CAB Virtual Host </h1> /var/cab/index.html
[root@jesus ~]# cd /etc/httpd/conf.d/cab.conf
bash: cd: /etc/httpd/conf.d/cab.conf: No such file or directory
[root@jesus ~]# vi /etc/httpd/conf.d/cab.conf
[root@jesus ~]# cat /etc/httpd/conf.d/cab.conf
<VirtualHost *:80>
    ServerName cab.nsa.local
    DocumentRoot /var/cab

    <Directory /var/cab>
        AllowOverride None
        Require all granted
    </Directory>

    ErrorLog /var/log/httpd/cab_error.log
    CustomLog /var/log/httpd/cab_access.log combined
</VirtualHost>

[root@jesus ~]# echo "127.0.0.1 cab.nsa.local" >> /etc/hosts
[root@jesus ~]# systemctl restart httpd
```