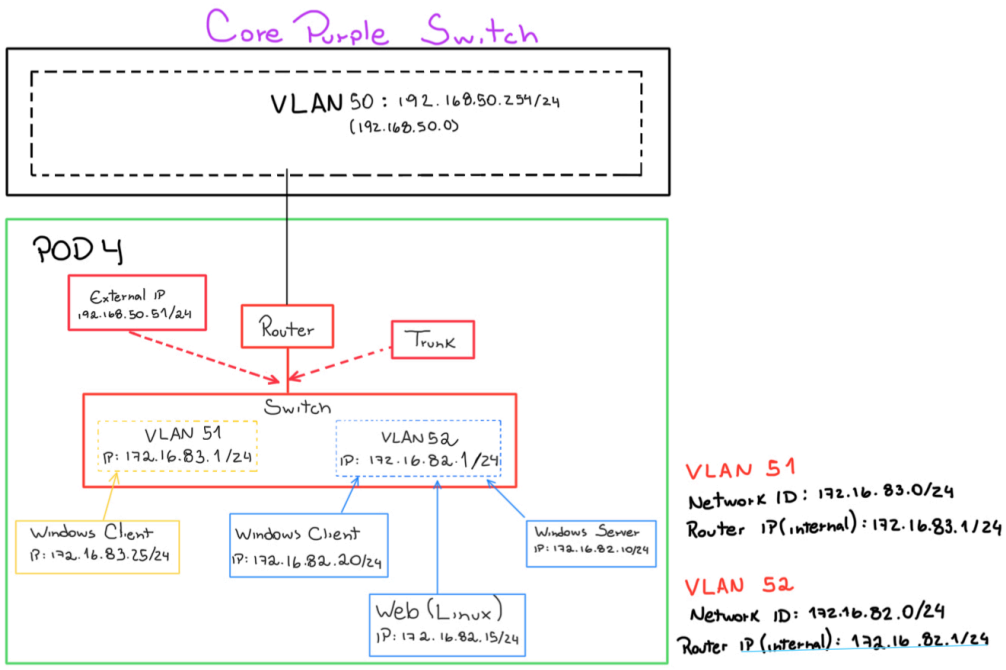
A3 Report

Group: SNA11514UG441
System and Network Administration -11514
Arnon Ramos - u3258082
Matheus Nevus - u3241280

Table of Contents

Section 1

Network Diagram



VLAN Configuration

We set up two VLANs in our network environment:

- **VLAN 52**: Hosts **Windows Server 2019**, **Linux Ubuntu**, and **Windows 10 Client**.
- **VLAN 51**: Hosts **Windows 10 Client 2**.

Each VLAN has its unique subnet:

- **VLAN 51**: IP Range: 172.16.83.0/24
- **VLAN 52**: IP Range: 172.16.82.0/24

IP Address Configuration Table

Device	IP Address	Subnet Mask	Gateway	DNS Server	Hostname	FQDN	VLAN
Windows 2019 Server	172.16.82.10	255.255.255.0	172.16.82.1	172.16.82.10	Win2019-Server	Win2019-Server.SNA11514UG441.org.u	52
Ubuntu Server	172.16.82.15	255.255.255.0	172.16.82.1	172.16.82.10	Linux-Server	Linux-Server.SNA11514UG441.org.u	52
Windows 10 Client	172.16.82.20	255.255.255.0	172.16.82.1	172.16.82.10	Win10-Client	Win10-Client2.SNA11514UG441.org.u	52
Windows 10 Client 2	172.16.83.25	255.255.255.0	172.16.81.1	172.16.81.10	Win10-Client2	Win10-Client2.SNA11514UG441.org.u	51

Network Address Translation (NAT) Impact on Inter-Network Communication

After further review, it has been confirmed that the implementation of the Network Address Translation (NAT) did not impact inter-network communication when conducting the ping test with the external organization. The issue initially observed was unrelated to NAT and was instead caused by other network configurations, such as Access Control Lists (ACLs), which restricted the communication.

Purpose of NAT in Inter-Network Communication

NAT is primarily responsible for translating internal private IP addresses into public or routable IP addresses when devices inside the network communicate with external systems, such as another organization's network. Its role is generally limited to ensuring that traffic originating from an internal network can be properly addressed when reaching external networks.

Inter-Network Ping Test Results

In the case of the inter-network ping test, NAT functioned as expected by translating the internal IP addresses. However, there was no direct impact from NAT on the ping results because:

- The translation of internal IP addresses to external addresses was successful.
- The communication issue was traced to the Access Control List (ACL), which restricted ICMP traffic, not NAT.
- Once the ACL was adjusted, the ping test was completed successfully, confirming that NAT was not the source of the problem.

Activity Appendix Reference

- *Refer to Appendix 2 for Activity 1 on Switch Configuration where we implemented the VLANs for both PCs.*
- *Refer to Appendix 1 for Activity 2 to see Router Configurations, the plan, tests, and web tests.*
- *For intra-tests in Activity 2, refer to Appendix 1 and 2.*
- *For the static routing and communication to the organization, refer to Appendix 1 in Installation Logs.*
- *For ping tests and web tests for intra-net testing to external organizations, refer to Appendix 1.*
- *For Activity 3, refer to Appendix 1 for Firewall tests and installation.*
- *For NAT implementation, refer to Appendix 1; for NAT tests, refer to Appendix 2 and 1*

Section 2

We encountered several challenges and required revisions during the planning and setup process, particularly with VLAN connectivity and routing.

Key Reflections on Testing Phases

1. **VLAN Communication Issues**:
   We initially faced communication issues between VLANs due to misconfigured router sub-interface IPs. Correcting these IPs and reconfiguring static routes solved the problem, allowing inter-VLAN communication.
2. **Firewall Configuration Challenges**:
   Setting up the firewall ACLs was straightforward, but we had to ensure they didn't inadvertently block necessary traffic. A detailed review and testing of the ACLs were critical to maintainin- security without hindering legitimate communication.

Troubleshooting Methods

A systematic approach to **ping tests** and **packet capture** during troubleshooting proved effective in diagnosing network issues. By narrowing down potential problem areas, we significantly improved network performance and resolved issues more efficiently.

Section 3

Firewall Setup

We configured a firewall on the Cisco ISR4221 router to secure traffic between VLANs and the external network. ACLs were created to filter traffic based on IP, protocol, and port.

Steps for Firewall Configuration:

1. **Created ACL for VLAN Traffic**:
   Separate ACLs were implemented to permit or deny traffic between VLANs and the external network.
   - **ACL 101**: Allowed HTTP, HTTPS, and ICMP traffic between VLAN 51 and VLAN 52.
2. **Applied ACL to Router Interfaces**:
   ACLs were applied to the sub-interfaces on the router to control traffic flow between VLANs.
3. **Testing Firewall Effectiveness**:
   We verified the firewall's effectiveness by attempting unauthorized traffic between all ip's, which was successfully blocked.

   Refer to Appendix 1 for more information

Firewall Effectiveness in Real-World Scenarios

Firewalls are essential in real-world networks to secure sensitive systems. In our setup, ACLs efficiently blocked unauthorised traffic between VLANs without affecting network performance. However, future implementations might involve dynamic firewall rules for even greater adaptability.

Appendix 1 - Matheus: u3241280

Software to be Installed

- Windows 2019 Server
- Linux Ubuntu
- Windows 10 Client

Roles and Features for Windows 2019

- AD DS
- DNS
- DHCP

Roles and Features for Linux Ubuntu

- Apache Web Server

Environment

- Oracle VM Virtual Box

- Host Machine: Windows 10 Edu
- VLAN 52

Planned Installation Steps

- Install Router Configurations
- Install Router Security Measures

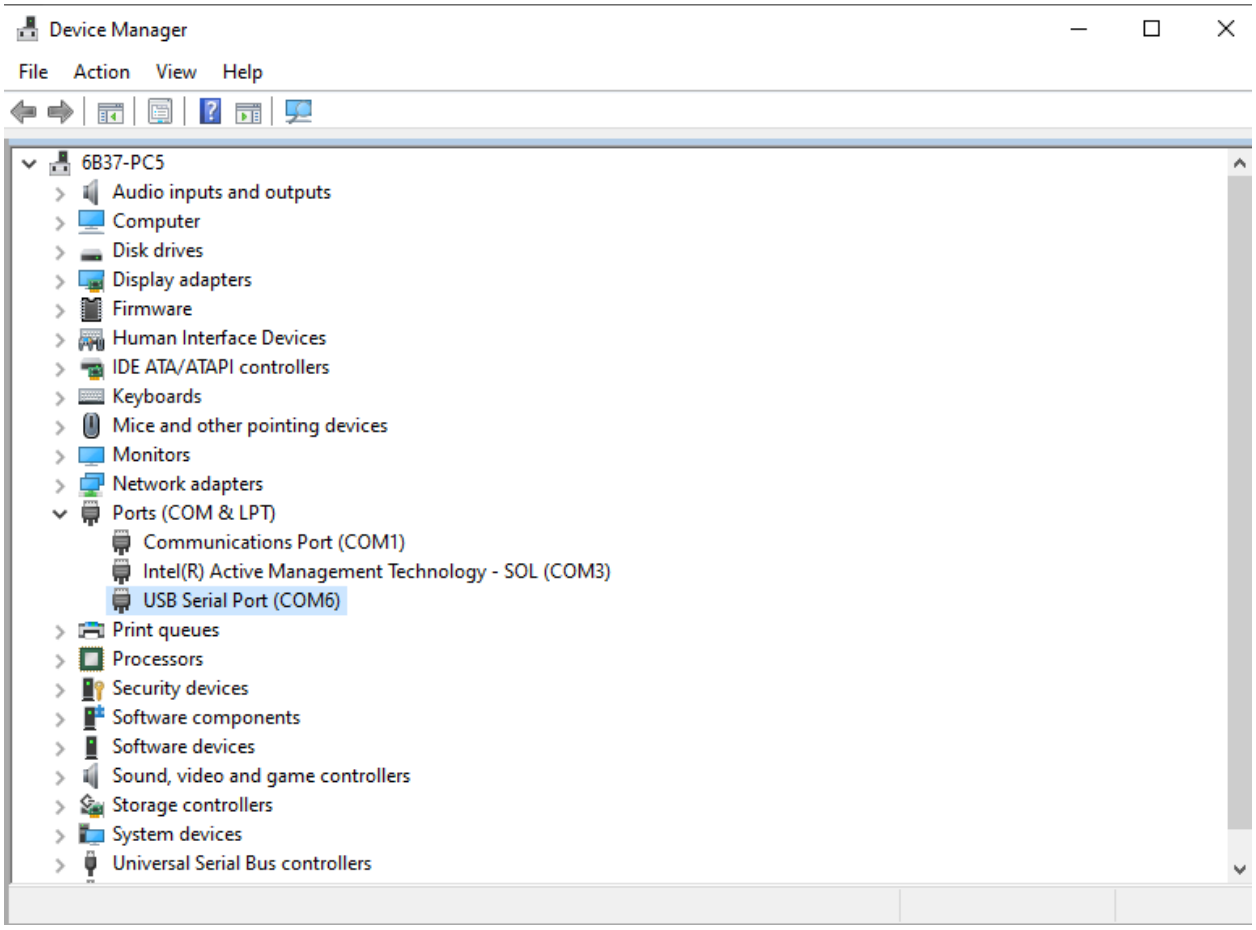
Test Plan

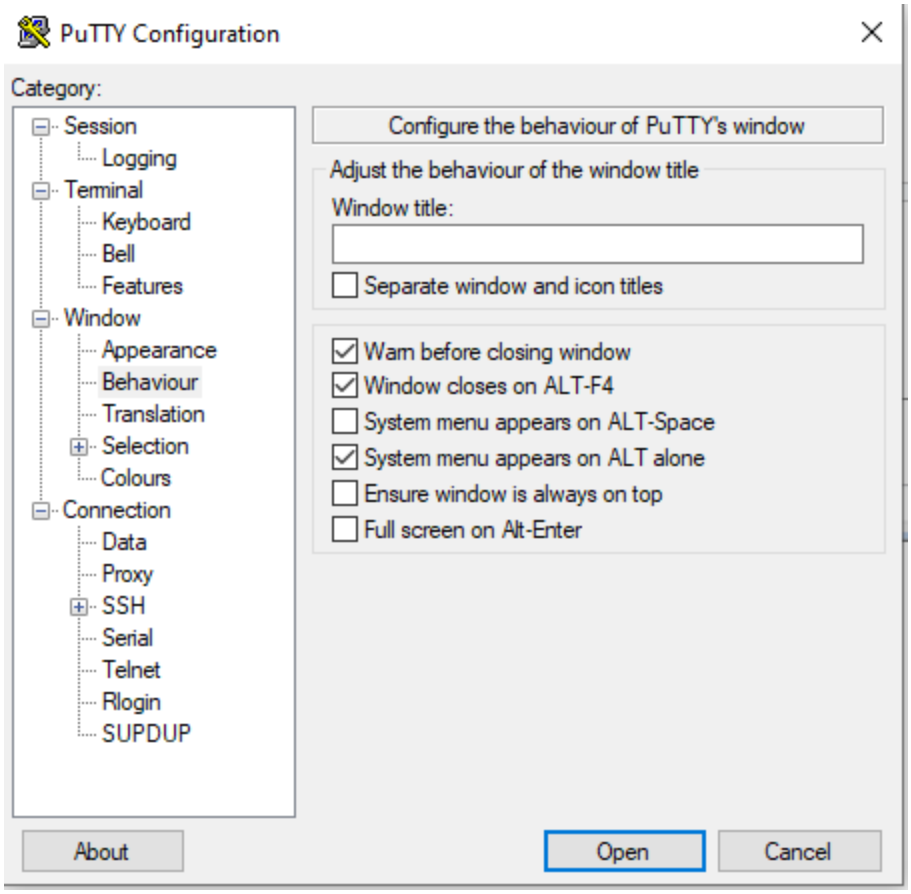
Network Connectivity:

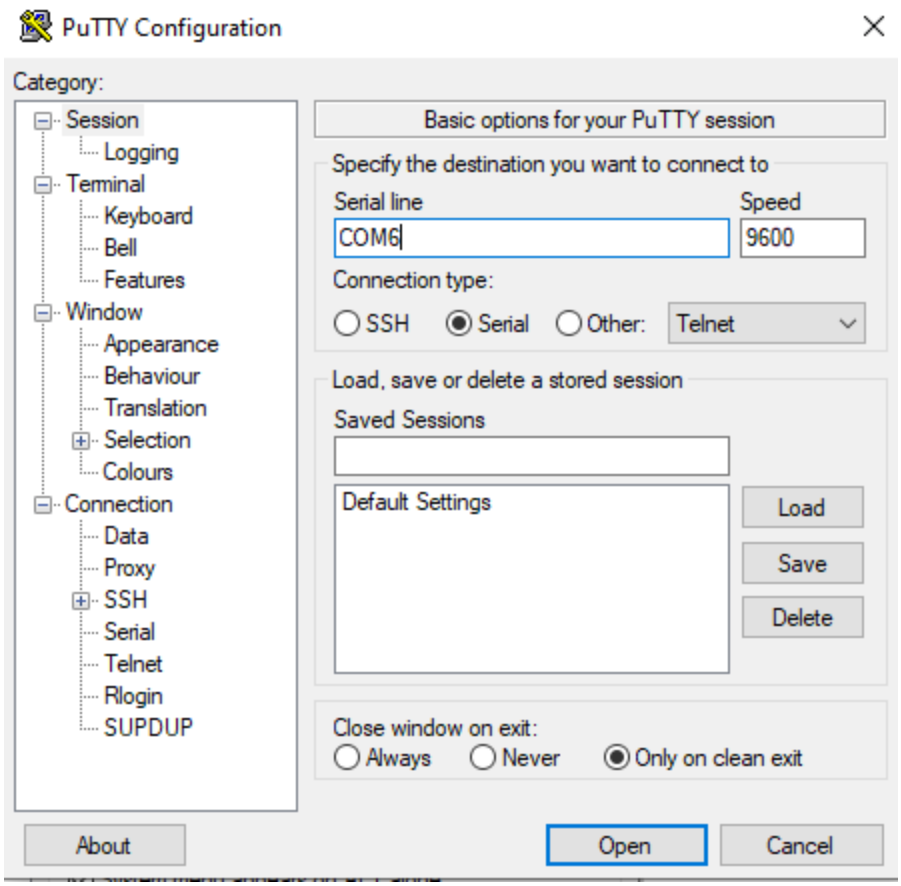
- Conduct tests by pinging From VLAN 51 - VLAN 52
- Conduct our Web tests to Win10-Client2 on the same VLAN and different VLAN
- Conduct Organisation Tests

Installation Logs

- Putty Router Configuration




PuTTY Configuration
Category:
Session
Logging
Terminal
Keyboard
Bell
Features
Window
Appearance
Behaviour
Translation
Selection
Colours
Connection
Data
Proxy
SSH
Serial
Telnet
Rlogin
SUPDUP
Configure the behaviour of PuTTY's window
Adjust the behaviour of the window title
Window title:
Separate window and icon titles
Warn before closing window
Window closes on ALT-F4
System menu appears on ALT-Space
System menu appears on ALT alone
Ensure window is always on top
Full screen on Alt-Enter
About
Open
Cancel



- Router Configuration

```
Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname ROUTER
ROUTER(config)#interface Gi0/1/0
ROUTER(config-if)#ip address 190.168
*Oct 24 01:19:36.393: %SMART_LIC-3-COMM_FAILED: Communications failure with the Cisco Smart License Utility (CSLU) :
Unable to resolve server hos
ROUTER(config-if)#ip address 190.168.50.51 255.255.255.0
ROUTER(config-if)#no shutdown
ROUTER(config-if)#exit
ROUTER(config)#interface Gi0/0/0.51
*Oct 24 01:21:29.544: %LINK-3-UPDOWN: Interface GigabitEthernet0/0/0, changed state to up
*Oct 24 01:21:30.544: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
```

```
ROUTER(config)#interface GigabitEthernet0/0/0.51
ROUTER(config-subif)#encapsulation dot1Q 51
ROUTER(config-subif)#ip address 172.16.83.1 255.255.255.0
ROUTER(config-subif)#no shutdown
ROUTER(config-subif)#exit
ROUTER(config)#interface GigabitEthernet0/0/0.52
ROUTER(config-subif)#encapsulation dot1Q 52
ROUTER(config-subif)#ip address 172.16.82.1 255.255.255.0
ROUTER(config-subif)#no shutdown
ROUTER(config-subif)#exit
ROUTER(config)#ip routing
ROUTER(config)#exit
ROUTER#
*Oct 24 01:41:22.832: %SYS-5-CONFIG_I: Configured from console by console
```

```
ROUTER#show ip route
Codes: L - local, C - connected, S - static, 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, m - OMP
       n - NAT, Ni - NAT inside, No - NAT outside, Nd - NAT DIA
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       H - NHRP, G - NHRP registered, g - NHRP registration summary
       o - ODR, P - periodic downloaded static route, l - LISP
       a - application route
       + - replicated route, % - next hop override, p - overrides from PfR
       & - replicated local route overrides by connected

Gateway of last resort is not set

      172.16.0.0/16 is variably subnetted, 8 subnets, 2 masks
C        172.16.18.0/24 is directly connected, GigabitEthernet0/0/0.2600
L        172.16.18.1/32 is directly connected, GigabitEthernet0/0/0.2600
C        172.16.19.0/24 is directly connected, GigabitEthernet0/0/0.2604
L        172.16.19.2/32 is directly connected, GigabitEthernet0/0/0.2604
C        172.16.82.0/24 is directly connected, GigabitEthernet0/0/0.52
L        172.16.82.1/32 is directly connected, GigabitEthernet0/0/0.52
C        172.16.83.0/24 is directly connected, GigabitEthernet0/0/0.51
L        172.16.83.1/32 is directly connected, GigabitEthernet0/0/0.51
      190.168.0.0/16 is variably subnetted, 2 subnets, 2 masks
C        190.168.50.0/24 is directly connected, GigabitEthernet0/1/0
L        190.168.50.51/32 is directly connected, GigabitEthernet0/1/0
ROUTER#
ROUTER#
```

- NAT Configuration

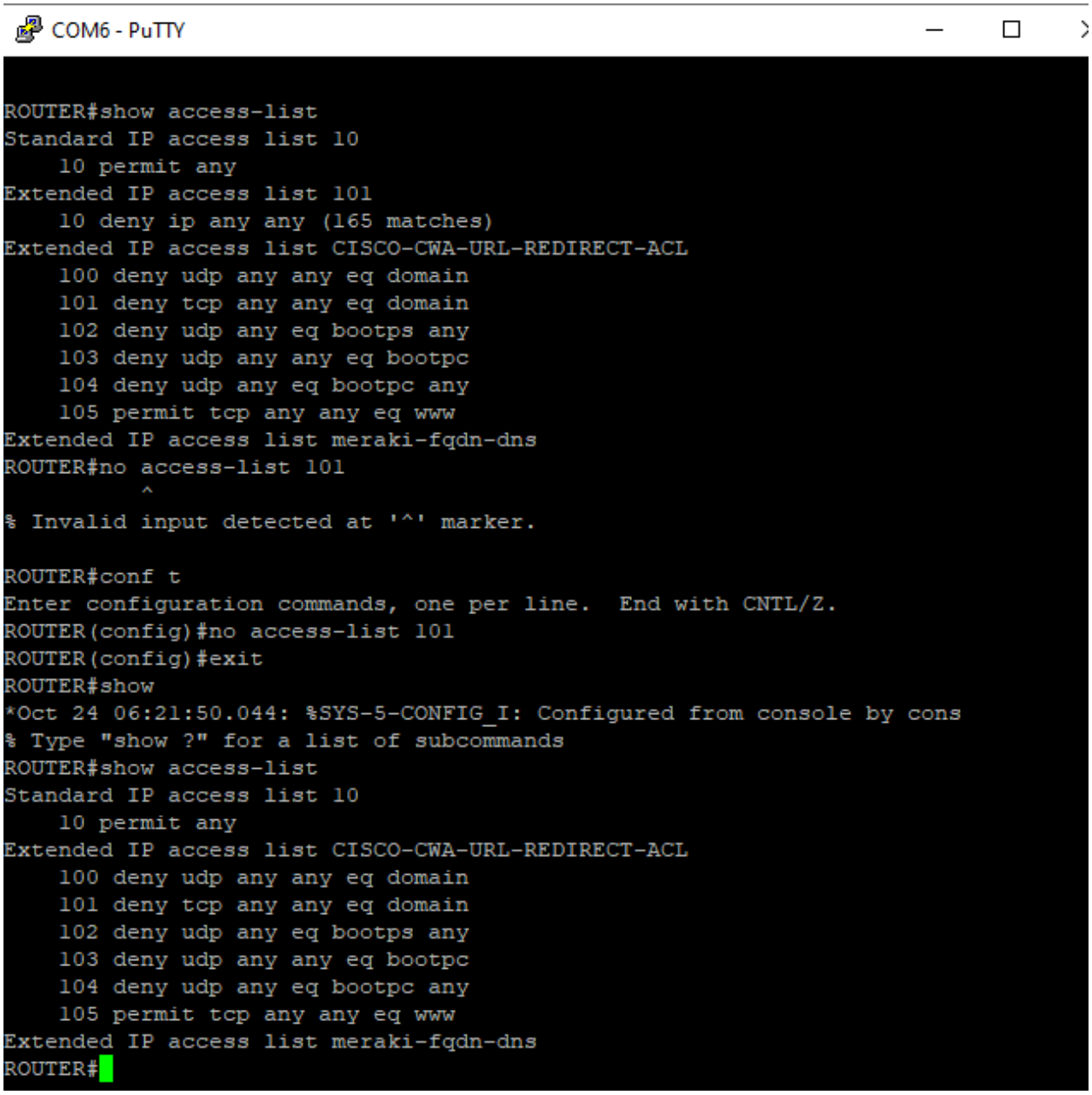
```
ROUTER>enable
ROUTER#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
ROUTER(config)#interface Gi0/0/0
ROUTER(config-if)#no ip address
ROUTER(config-if)#ip nat inside
ROUTER(config-if)#no shutdown
ROUTER(config-if)#exit
ROUTER(config)#
ROUTER(config)#interface Gi0/1/0
ROUTER(config-if)#ip address 192.167.50.51 255.255.255.0
ROUTER(config-if)#ip nat outside
ROUTER(config-if)#no shutdown
ROUTER(config-if)#exit
ROUTER(config)#
ROUTER(config)#interface Gi0/0/0.51
ROUTER(config-subif)#encapsulation dot1Q 51
ROUTER(config-subif)#ip address 172.16.83.1 255.255.255.0
ROUTER(config-subif)#ip nat inside
ROUTER(config-subif)#no shutdown
ROUTER(config-subif)#exit
ROUTER(config)#
ROUTER(config)#interface Gi0/0/0.52
ROUTER(config-subif)#encapsulation dot1Q 52
ROUTER(config-subif)#ip address 172.16.82.1 255.255.255.0
ROUTER(config-subif)#ip nat inside
ROUTER(config-subif)#no shutdown
ROUTER(config-subif)#exit
ROUTER(config)#
ROUTER(config)#access-list 10 permit any
ROUTER(config)#ip nat inside source list 10 interface Gi0/1/0 oveload
                                                              ^
% Invalid input detected at '^' marker.

ROUTER(config)#ip nat inside source list 10 interface Gi0/1/0 overload
```

```
ROUTER#show ip nat translations
Total number of translations: 0

ROUTER#show ip nat statistics
Total active translations: 0 (0 static, 0 dynamic; 0 extended)
Outside interfaces:
  GigabitEthernet0/1/0
Inside interfaces:
  GigabitEthernet0/0/0, GigabitEthernet0/0/0.51, GigabitEthernet0/0/0.52
Hits: 0  Misses: 0
Expired translations: 0
Dynamic mappings:
-- Inside Source
[Id: 1] access-list 10 interface GigabitEthernet0/1/0 refcount 0
nat-limit statistics:
 max entry: max allowed 0, used 0, missed 0
In-to-out drops: 0  Out-to-in drops: 0
Pool stats drop: 0  Mapping stats drop: 0
Port block alloc fail: 0
IP alias add fail: 0
Limit entry add fail: 0
ROUTER#
```

- ACL Security Installation

```
ROUTER(config)#access-list 101 deny ip any any
ROUTER(config)#interface Gi0/0/0
ROUTER(config-if)#ip access-group 101 in
ROUTER(config-if)#exit
ROUTER(config)#exit
ROUTER#show acces
*Oct 24 06:12:23.616: %SYS-5-CONFIG_I: Configured from console by consoles
% Ambiguous command:  "show access"
ROUTER#show access-list
Standard IP access list 10
    10 permit any
Extended IP access list 101
    10 deny ip any any
Extended IP access list CISCO-CWA-URL-REDIRECT-ACL
    100 deny udp any any eq domain
    101 deny tcp any any eq domain
    102 deny udp any eq bootps any
    103 deny udp any any eq bootpc
    104 deny udp any eq bootpc any
    105 permit tcp any any eq www
Extended IP access list meraki-fqdn-dns
ROUTER#
```

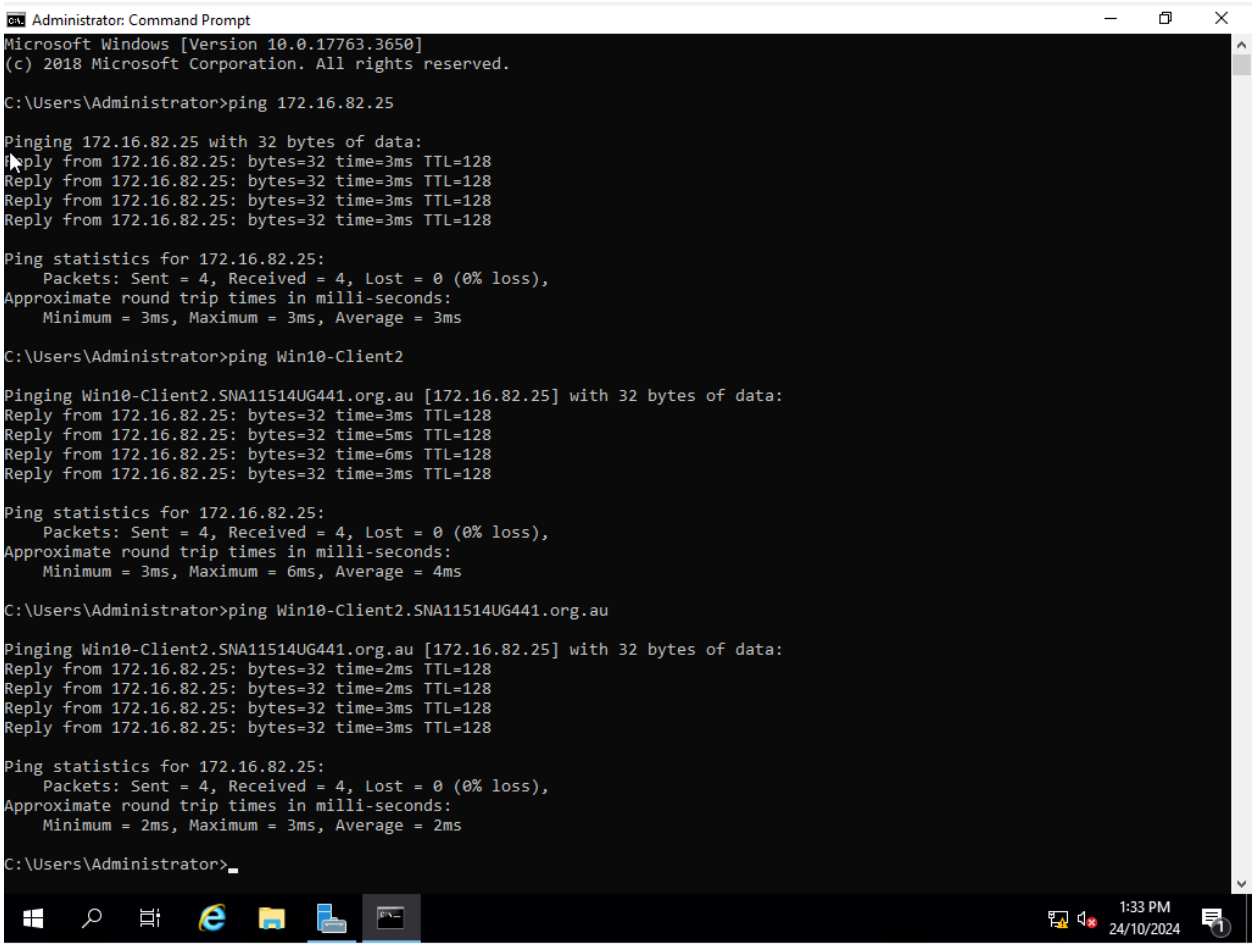
- Turning Off ACL



Testing Logs

Intra Tests

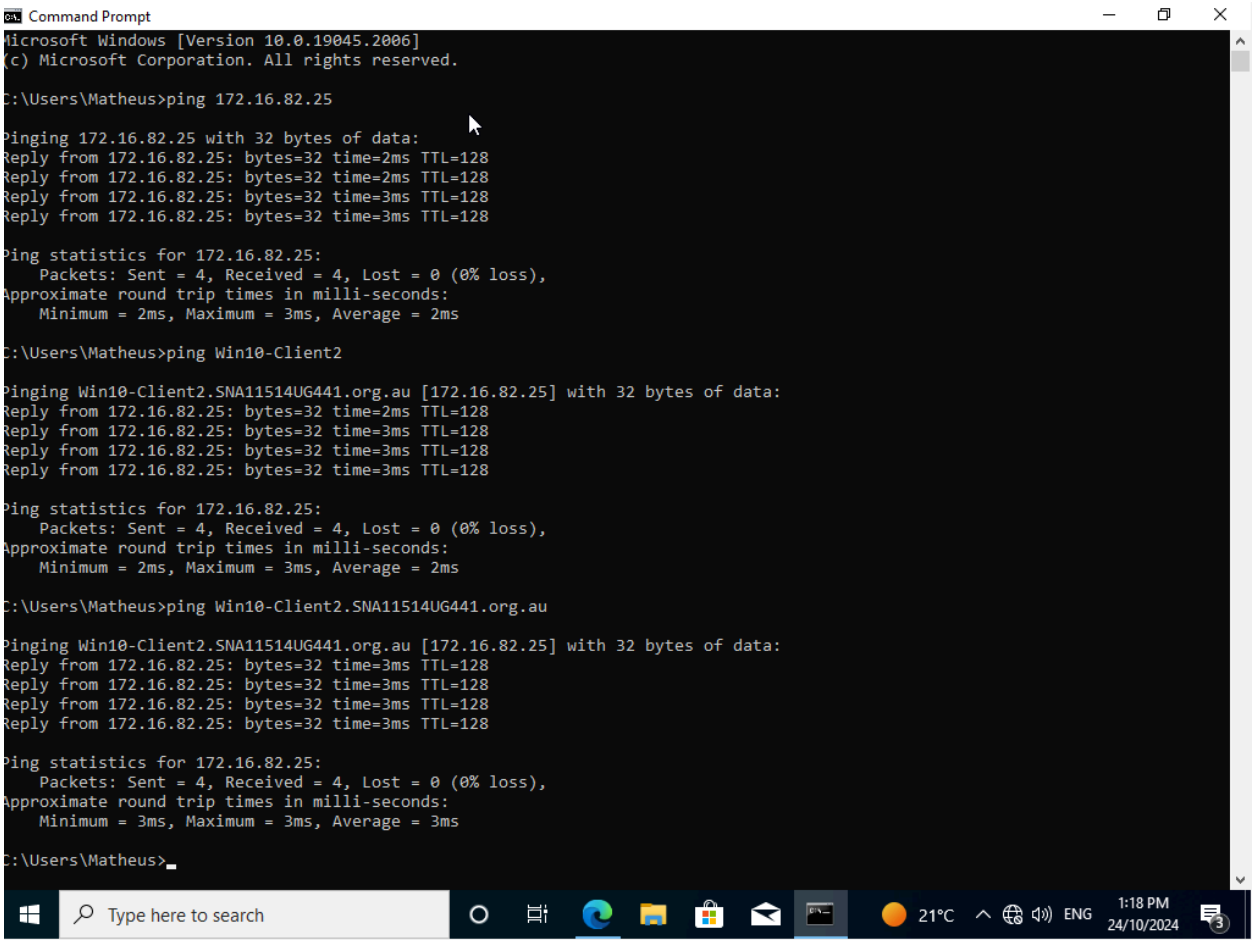
- Ping Win10-Client2 From Win2019-Server



- Ping Win10-Client2 From Linux-Server

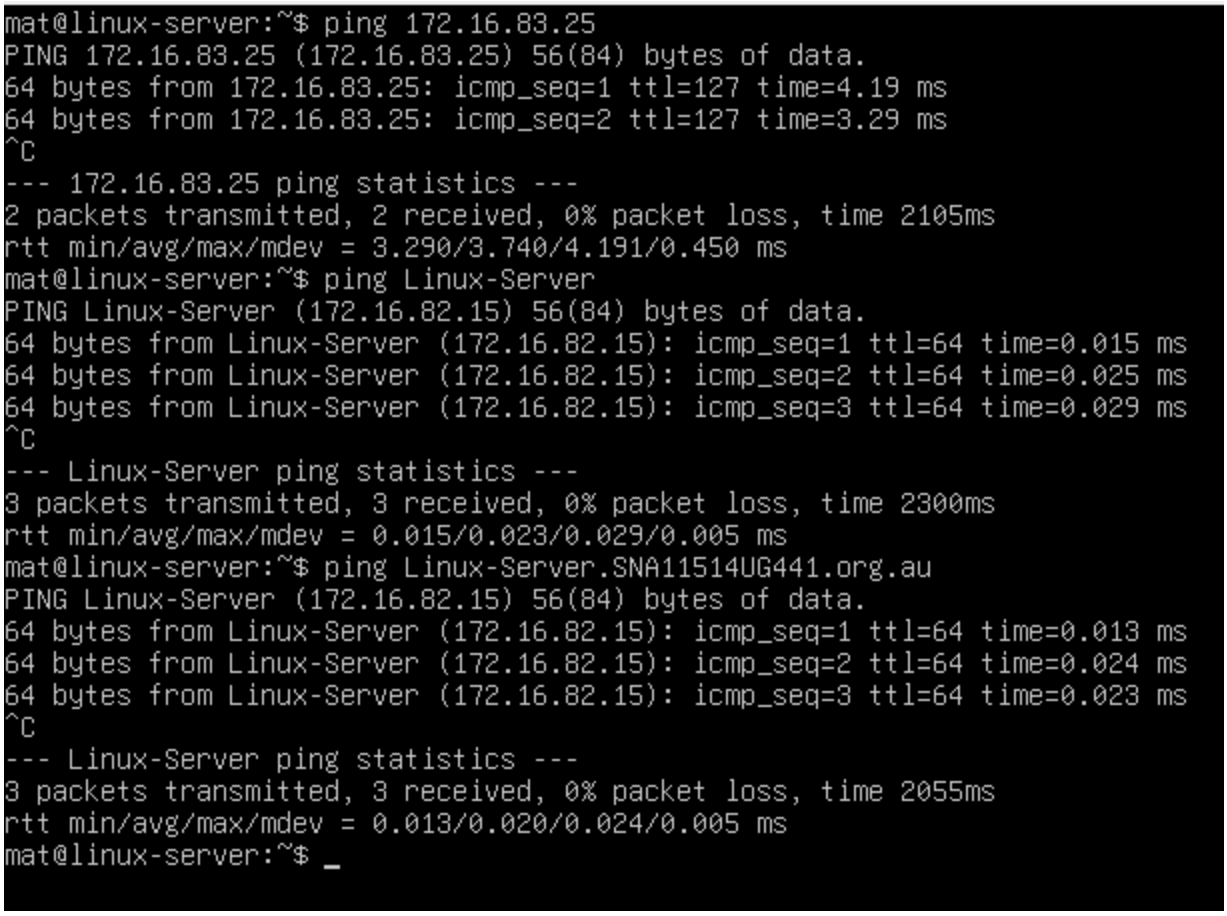
```
mat@linux-server:~$ ping 172.16.82.25
PING 172.16.82.25 (172.16.82.25) 56(84) bytes of data.
64 bytes from 172.16.82.25: icmp_seq=1 ttl=128 time=3.02 ms
64 bytes from 172.16.82.25: icmp_seq=2 ttl=128 time=3.26 ms
64 bytes from 172.16.82.25: icmp_seq=3 ttl=128 time=2.98 ms
^C
--- 172.16.82.25 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2012ms
rtt min/avg/max/mdev = 2.979/3.086/3.256/0.121 ms
mat@linux-server:~$ ping Win10-Client2
PING Win10-Client2 (172.16.82.25) 56(84) bytes of data.
64 bytes from Win10-Client2 (172.16.82.25): icmp_seq=1 ttl=128 time=3.56 ms
64 bytes from Win10-Client2 (172.16.82.25): icmp_seq=2 ttl=128 time=3.11 ms
64 bytes from Win10-Client2 (172.16.82.25): icmp_seq=3 ttl=128 time=3.31 ms
^C
--- Win10-Client2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2009ms
rtt min/avg/max/mdev = 3.106/3.322/3.557/0.184 ms
mat@linux-server:~$ ping Win10-Client2.SNA11514UG441.org.au
PING Win10-Client2 (172.16.82.25) 56(84) bytes of data.
64 bytes from Win10-Client2 (172.16.82.25): icmp_seq=1 ttl=128 time=3.15 ms
64 bytes from Win10-Client2 (172.16.82.25): icmp_seq=2 ttl=128 time=2.99 ms
64 bytes from Win10-Client2 (172.16.82.25): icmp_seq=3 ttl=128 time=3.14 ms
^C
--- Win10-Client2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2265ms
rtt min/avg/max/mdev = 2.994/3.093/3.146/0.070 ms
mat@linux-server:~$ _
```

- Ping Win10-Client2 From Win10-Client

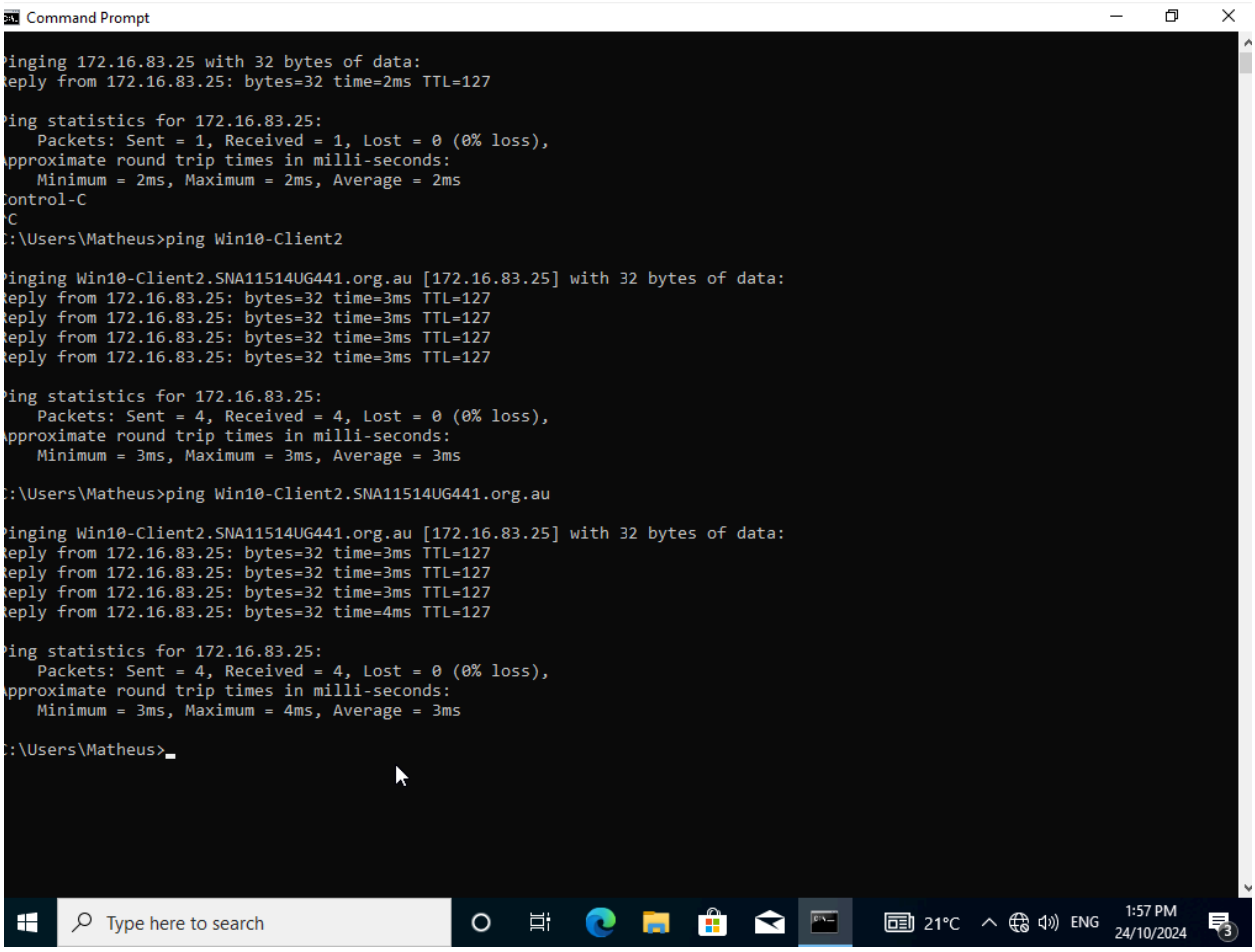


Inter Tests

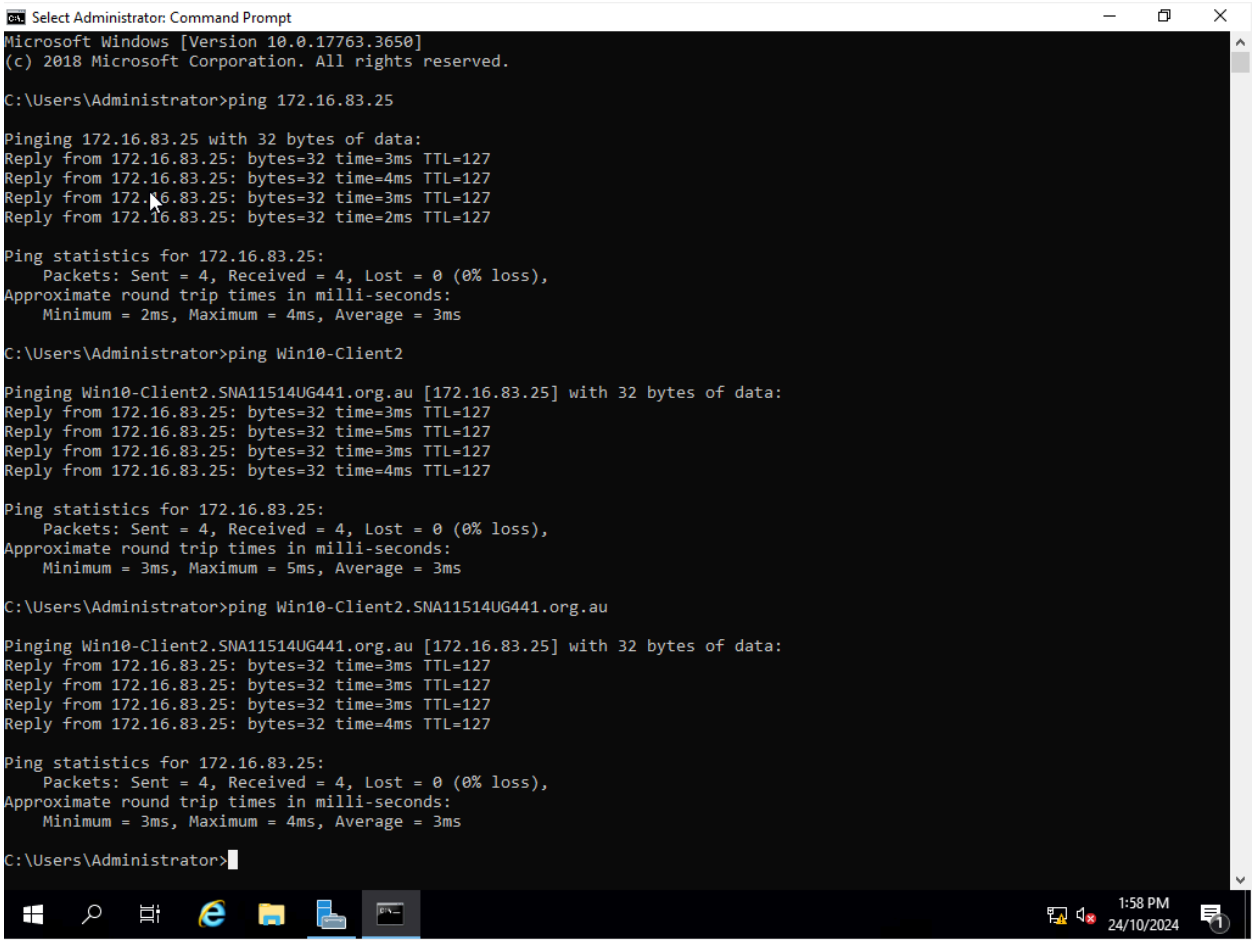
Linux-Server Pinging Win10-Client2



Win10-Client pinging Win10-Client2



Win2019-Server pinging Win10- Client2

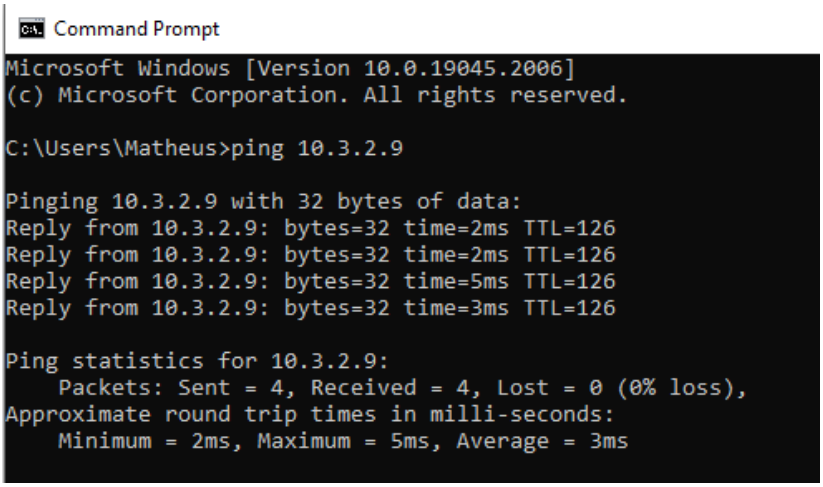


- Nat Test From Win10-Client

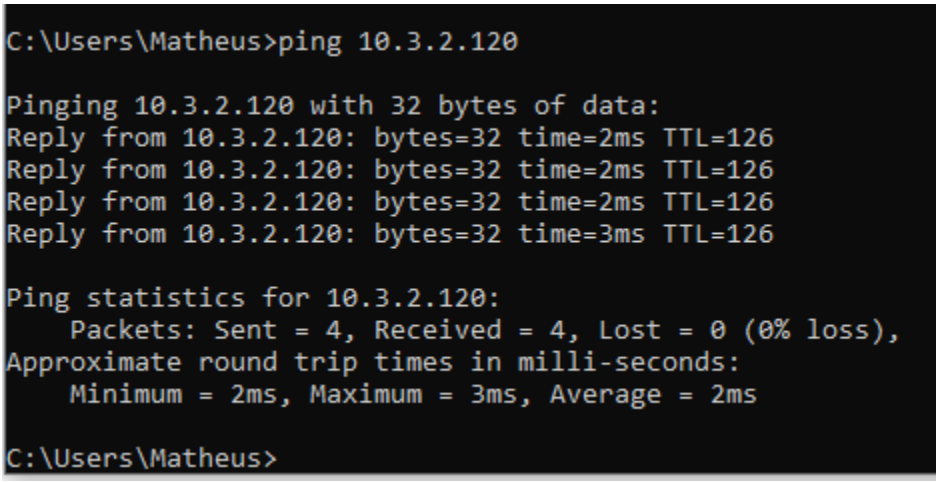
```
C:\Users\Matheus>ping 172.16.83.25

Pinging 172.16.83.25 with 32 bytes of data:
Reply from 172.16.83.25: bytes=32 time=3ms TTL=127
Reply from 172.16.83.25: bytes=32 time=3ms TTL=127
Reply from 172.16.83.25: bytes=32 time=3ms TTL=127
Reply from 172.16.83.25: bytes=32 time=3ms TTL=127

Ping statistics for 172.16.83.25:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 3ms, Average = 3ms

C:\Users\Matheus>
```

Org Tests

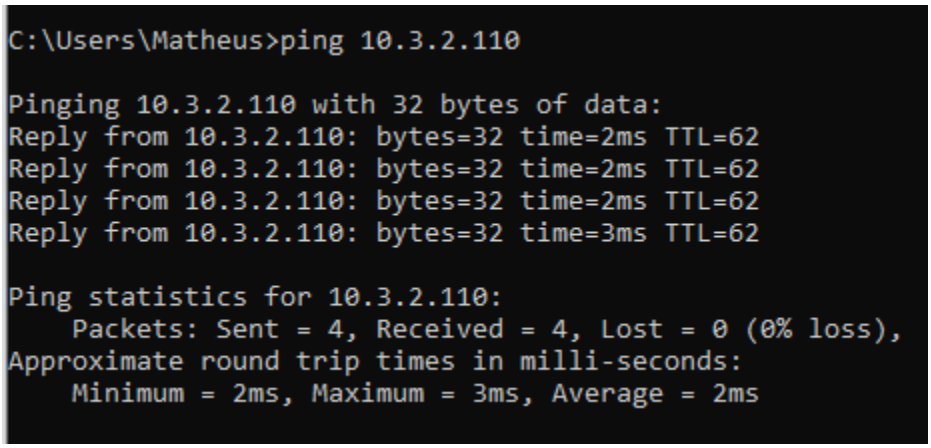
Ping Win Server from Win10-Client



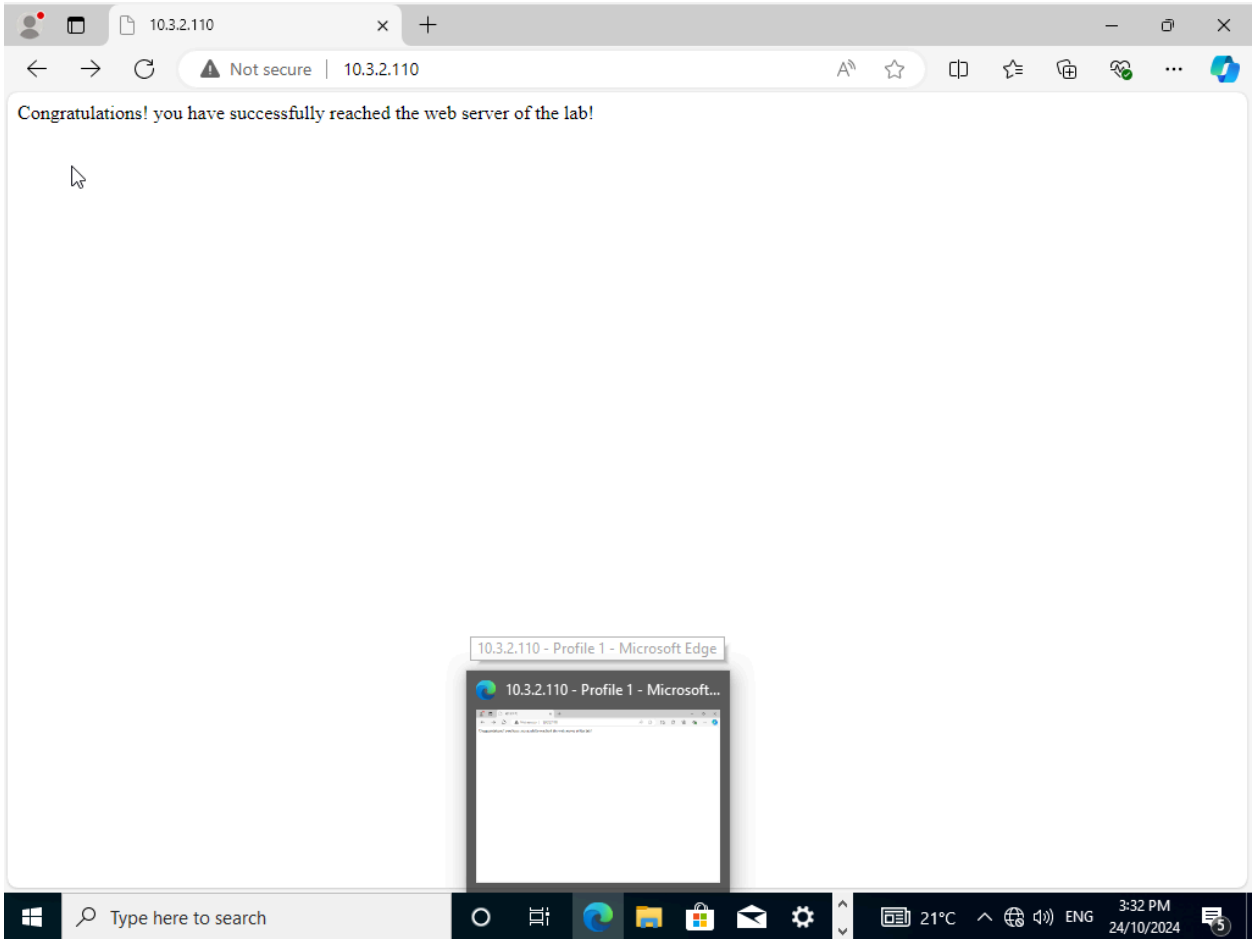
Ping Win Client from Win10-Client



Ping Linux Server from Win10-Client



Web test from Win10-Client



Firewall Tests

- Deny all traffic test

```
Pinging 172.16.83.25 with 32 bytes of data:
Request timed out.
Reply from 172.16.82.1: Destination net unreachable.
Request timed out.
Reply from 172.16.82.1: Destination net unreachable.

Ping statistics for 172.16.83.25:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),

C:\Users\Matheus>_
```

Summary of Dependencies

In my network setup, I may encounter several potential issues that could impact functionality:

1. **Router Configuration Issues**: Incorrect IP addresses or sub-interface configurations could prevent VLANs from communicating, hindering connectivity between devices in VLAN 51 and VLAN 52.
2. **ACL Security Configuration Errors**: Misconfigured Access Control Lists (ACLs) might block valid traffic or create security vulnerabilities, affecting inter-VLAN communication and overall security.
3. **Ping Test Failures**: Inconsistent results during ping tests may indicate connectivity problems stemming from routing or VLAN configuration issues, which would require immediate attention to resolve.
4. **Web Access Test Issues**: If the Ubuntu web server isn't configured correctly or if the firewall restricts access, users in VLAN 52 may not reach the web server in VLAN 51, obstructing web access tests.
5. **Organisation Connectivity Problems**: Difficulties connecting to an external organisation's network may arise due to routing errors or external network issues, affecting our ability to verify inter-organisation connectivity.
6. **Firewall Configuration Mistakes**: Overly restrictive firewall settings could block essential traffic between VLANs or hinder communication with external networks, disrupting service.
7. **Router or Network Hardware Malfunctions**: Physical issues with the router or switch, such as bad ports or cables, could lead to intermittent connectivity problems, complicating troubleshooting efforts.

Appendix 2 - Arnon: u3258082

Software to be Installed

Software: Windows 10 Edu
Hostname: Win10-Client2
Assigned: VLAN 51

Planned Installation Steps

VLAN Creation:

- Create VLAN 51 for Windows Client 1, Ubuntu Web Server, and Windows Server.
- Create VLAN 52 for Windows Client 2.

Trunk Port Configuration:

- Configure a trunk port on the switch to allow VLAN traffic between the switch and the router

Test Plan

VLAN Connectivity Tests:

- **Objective**: Verify that devices within the same VLAN can communicate with each other.
- **Steps**:
    - Ping the Windows Client, Ubuntu Web Server, and Windows Server within VLAN 51.

Inter-VLAN Connectivity Tests:

- **Objective**: Verify that devices from different VLANs can communicate via routing.
- **Steps**:

    Ping VLAN 52 (Windows Server, Linux Server and Windows Client 1) From Windows Client 2

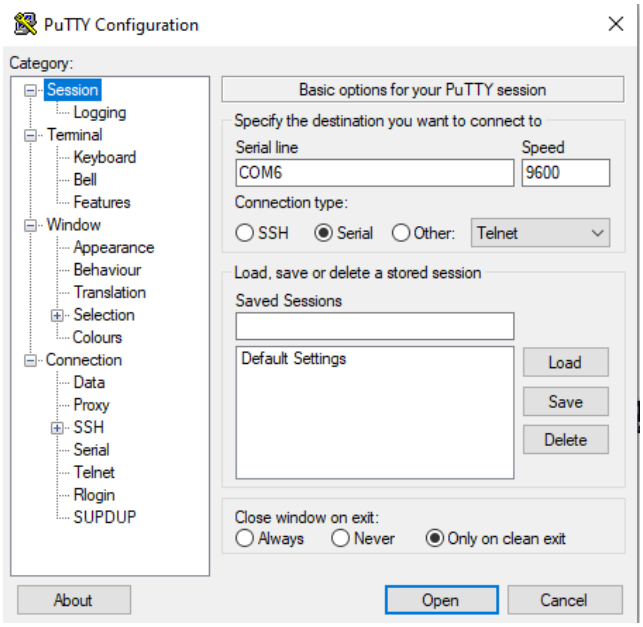
Web Access Test:

- **Objective**: Test access to the web server hosted in VLAN 51 from the client in VLAN 52.
- **Steps**:
    - Open a web browser on the Windows Client in VLAN 52 and enter the IP address of the Ubuntu Web Server in VLAN 51.

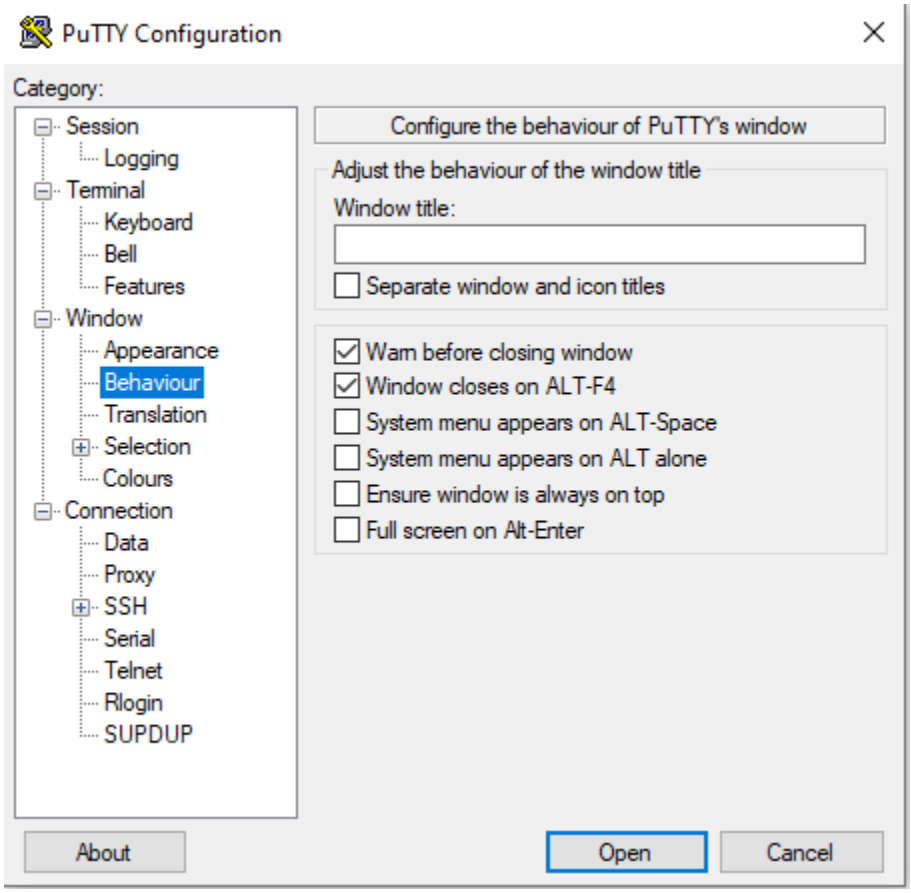
Intranet Connectivity Test:

- **Objective**: Test communication between VLANs and other organisation routers.
- **Steps**:
    - Ping the Windows Server of another organisation via its IP address through static routing.
    - Ping and access the web server of the other organisation to verify inter-network connectivity.
    - Open a browser on the client machine and access a web server hosted by another organisation over the network.

Installation Logs



Putty Switch Configuration



- Created VLAN 51 and 52

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 51
Switch(config-vlan)#no shutdown
%VLAN 51 is not shutdown.
Switch(config-vlan)#exit
Switch(config)#vlan 52
Switch(config-vlan)#no shutdown
%VLAN 52 is not shutdown.
Switch(config-vlan)#exit
Switch(config)#interface range Gil/0/5-6
Switch(config-if-range)#description VLAN 51 interface to PC
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchort access vlan 51
                               ^
% Invalid input detected at '^' marker.

Switch(config-if-range)#switchport access vlan 51
Switch(config-if-range)#no shutdown
Switch(config-if-range)#exit
Switch(config)#interface Gil/0/9
Switch(config-if)#description VLAN 52 interface to Servers
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 52
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#show vlan brief
                  ^
% Invalid input detected at '^' marker.

Switch(config)#exit
Switch#show
*Oct 24 01:23:18.796: %SYS-5-CONFIG_I: Configured from console by consolevlan br
ief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Gil/0/1, Gil/0/2, Gil/0/3
                                                 Gil/0/4, Gil/0/7, Gil/0/8
                                                 Gil/0/10, Gil/0/11, Gil/0/12
                                                 Gil/0/13, Gil/0/14, Gil/0/15
                                                 Gil/0/16, Gil/0/17, Gil/0/18
                                                 Gil/0/19, Gil/0/20, Gil/0/21
                                                 Gil/0/22, Gil/0/23, Gil/0/24
                                                 Gil/1/1, Gil/1/2, Gil/1/3
                                                 Gil/1/4
51   VLAN0051                          active    Gil/0/5, Gil/0/6
52   VLAN0052                          active    Gil/0/9
1002 fddi-default                      act/unsup
1003 token-ring-default                act/unsup
1004 fddinet-default                   act/unsup
1005 trnet-default                     act/unsup
```

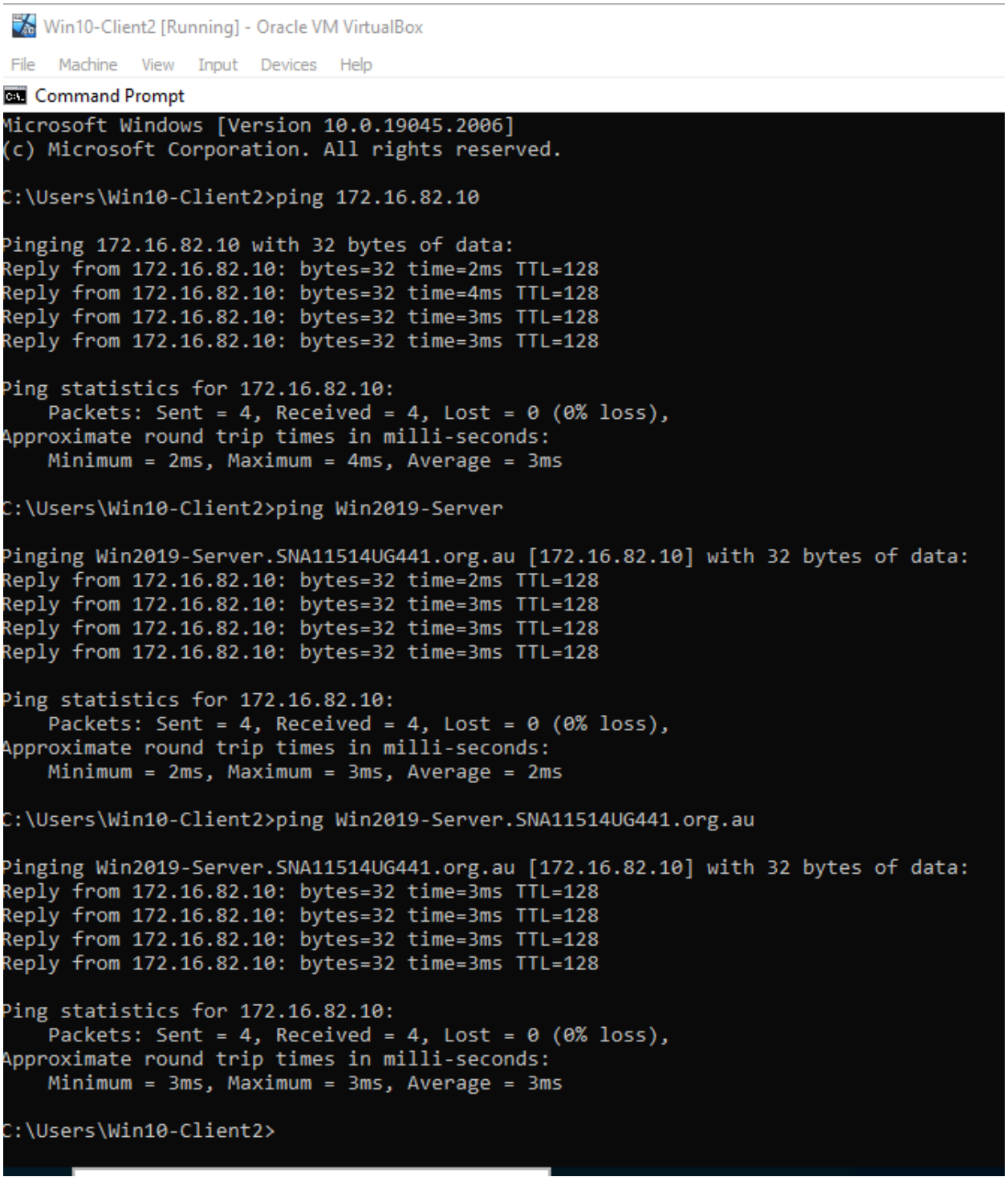
- Created Trunk Port

```
Port          Mode             Encapsulation  Status        Native vlan
Gi1/0/1       on               802.1q         trunking      1

Port          Vlans allowed on trunk
Gi1/0/1       51-52

Port          Vlans allowed and active in management domain
Gi1/0/1       51-52

Port          Vlans in spanning tree forwarding state and not pruned
Gi1/0/1       51-52
Switch#
*Oct 17 01:43:34.816: %LINK-3-UPDOWN: Interface GigabitEthernet1/0/6, changed st
ate to up
*Oct 17 01:43:35.816: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEth
ernet1/0/6, changed state to up
```

Testing Logs

Intra Tests

- Pinged Win2019-Server



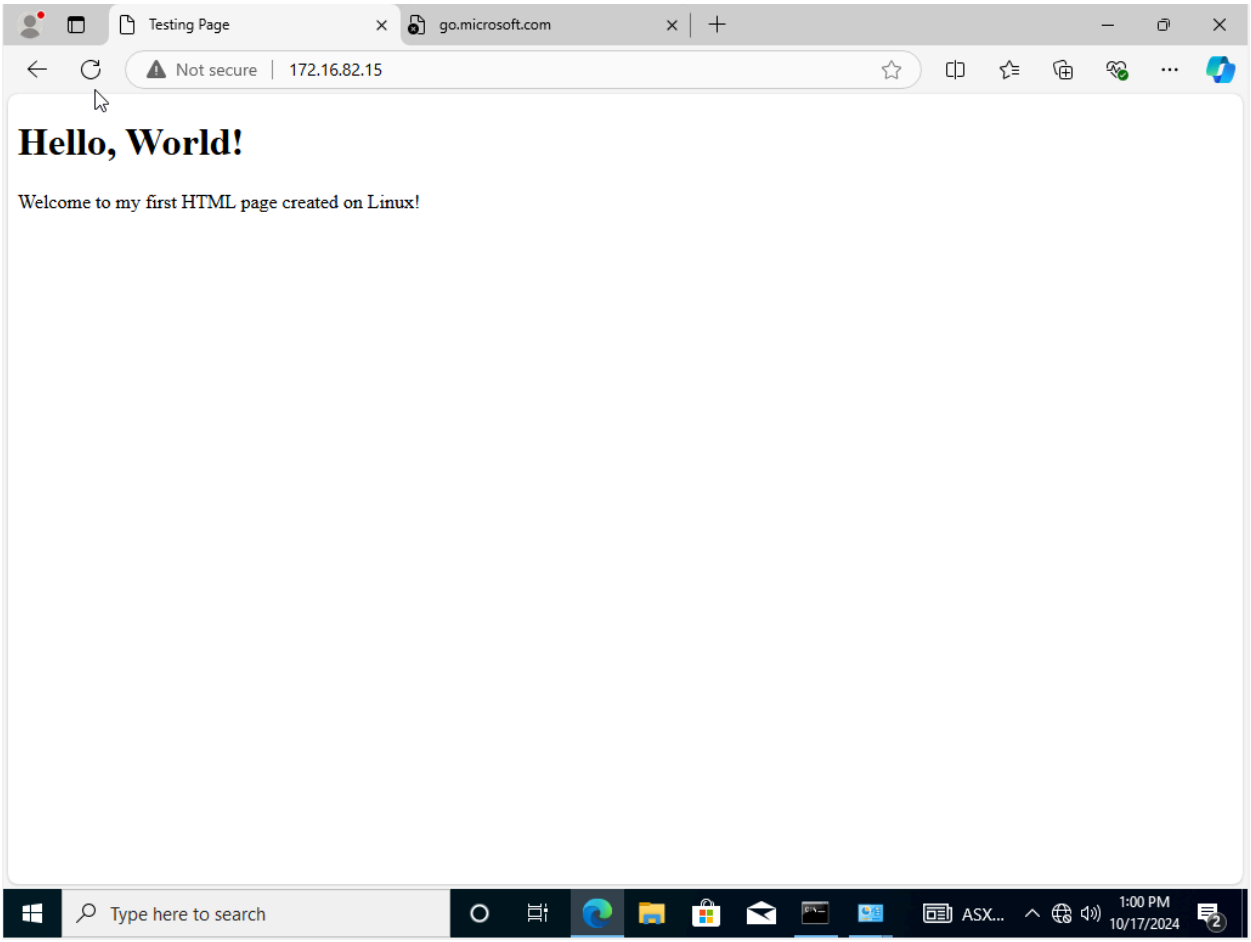
- Pinged Win10-Client from Win10-Client2

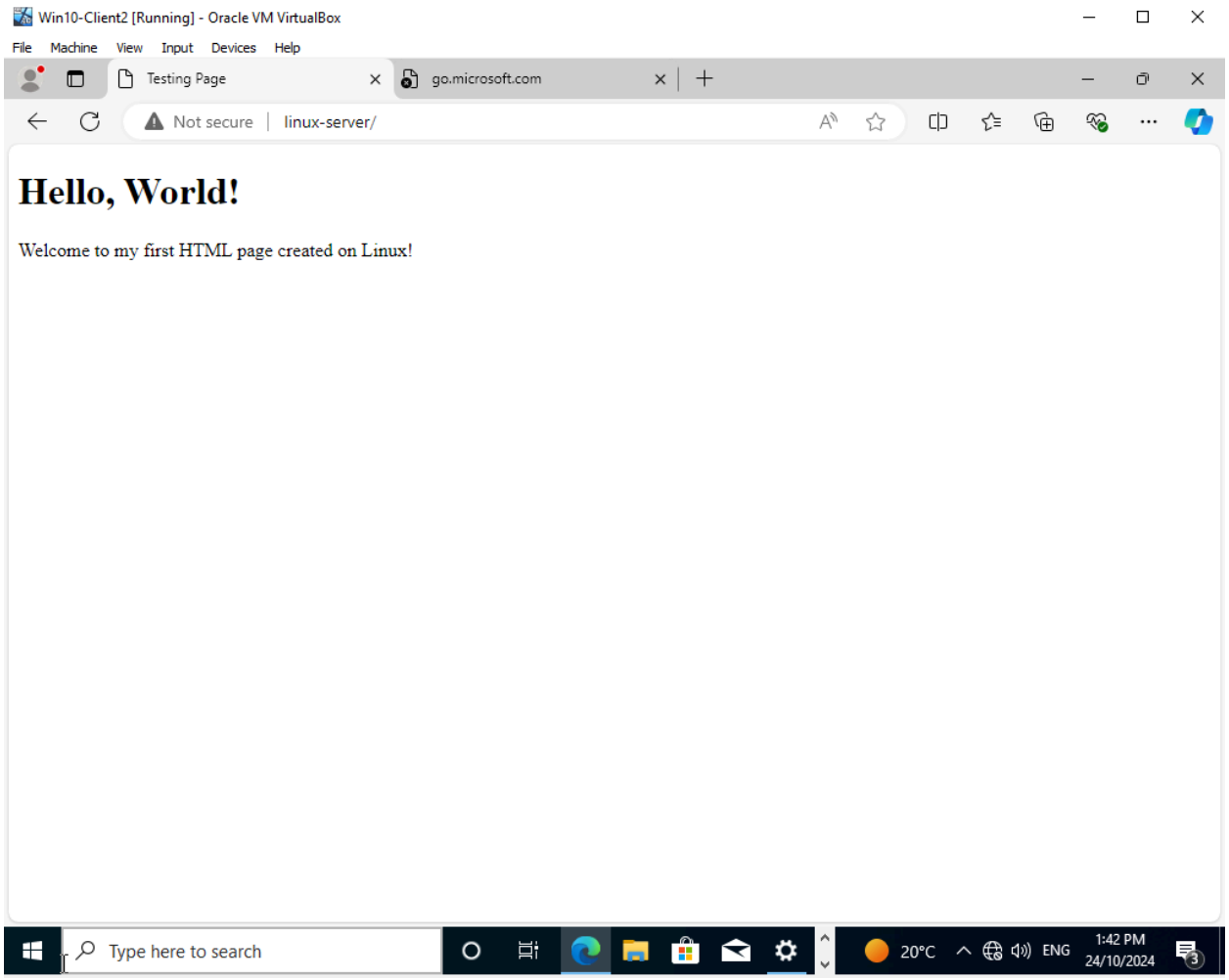
```
C:\Users\Win10-Client2>ping 172.16.82.20

Pinging 172.16.82.20 with 32 bytes of data:
Reply from 172.16.82.20: bytes=32 time=5ms TTL=128
Reply from 172.16.82.20: bytes=32 time=3ms TTL=128
Reply from 172.16.82.20: bytes=32 time=2ms TTL=128
Reply from 172.16.82.20: bytes=32 time=2ms TTL=128

Ping statistics for 172.16.82.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 5ms, Average = 3ms

C:\Users\Win10-Client2>ping Win10-Client

Pinging Win10-Client.SNA11514UG441.org.au [172.16.82.20] with 32 bytes of data:
Reply from 172.16.82.20: bytes=32 time=2ms TTL=128
Reply from 172.16.82.20: bytes=32 time=3ms TTL=128
Reply from 172.16.82.20: bytes=32 time=2ms TTL=128
Reply from 172.16.82.20: bytes=32 time=2ms TTL=128

Ping statistics for 172.16.82.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\Users\Win10-Client2>ping Win10-Client.SNA11514UG441.org.au

Pinging Win10-Client.SNA11514UG441.org.au [172.16.82.20] with 32 bytes of data:
Reply from 172.16.82.20: bytes=32 time=2ms TTL=128
Reply from 172.16.82.20: bytes=32 time=2ms TTL=128
Reply from 172.16.82.20: bytes=32 time=3ms TTL=128
Reply from 172.16.82.20: bytes=32 time=3ms TTL=128

Ping statistics for 172.16.82.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms
```

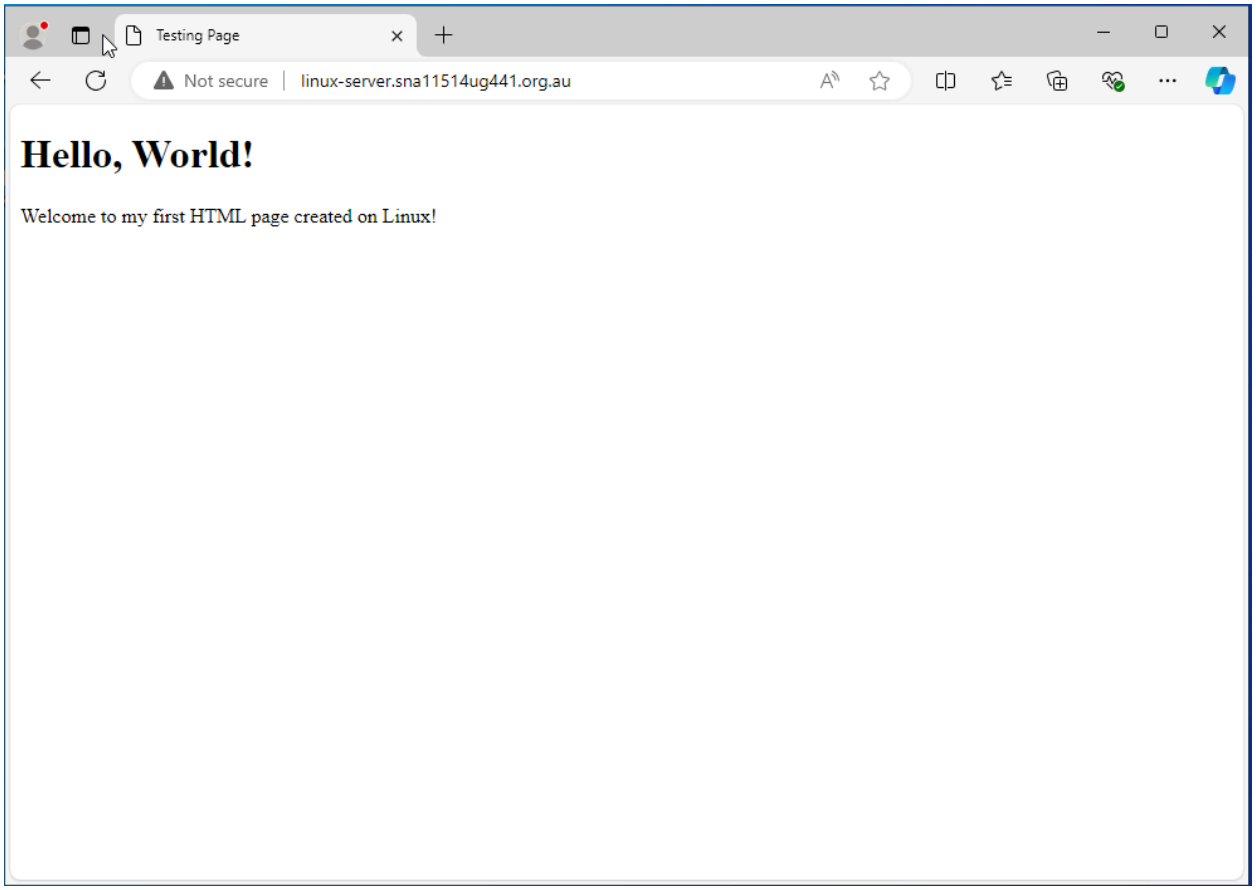
- Web test ping 172.16.82.15 same VLAN and Linux

```
C:\Users\Win10-Client2>ping 172.16.82.15

Pinging 172.16.82.15 with 32 bytes of data:
Reply from 172.16.82.15: bytes=32 time=2ms TTL=64
Reply from 172.16.82.15: bytes=32 time=3ms TTL=64
Reply from 172.16.82.15: bytes=32 time=3ms TTL=64
Reply from 172.16.82.15: bytes=32 time=2ms TTL=64

Ping statistics for 172.16.82.15:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\Users\Win10-Client2>ping Linux-Server

Pinging Linux-Server.SNA11514UG441.org.au [172.16.82.15] with 32 bytes of data:
Reply from 172.16.82.15: bytes=32 time=3ms TTL=64
Reply from 172.16.82.15: bytes=32 time=3ms TTL=64
Reply from 172.16.82.15: bytes=32 time=3ms TTL=64
Reply from 172.16.82.15: bytes=32 time=3ms TTL=64

Ping statistics for 172.16.82.15:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 3ms, Average = 3ms

C:\Users\Win10-Client2>ping Linux-Server.SNA11514UG441.org.au

Pinging Linux-Server.SNA11514UG441.org.au [172.16.82.15] with 32 bytes of data:
Reply from 172.16.82.15: bytes=32 time=3ms TTL=64
Reply from 172.16.82.15: bytes=32 time=3ms TTL=64
Reply from 172.16.82.15: bytes=32 time=3ms TTL=64
Reply from 172.16.82.15: bytes=32 time=3ms TTL=64

Ping statistics for 172.16.82.15:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 3ms, Average = 3ms
```

- Web tests

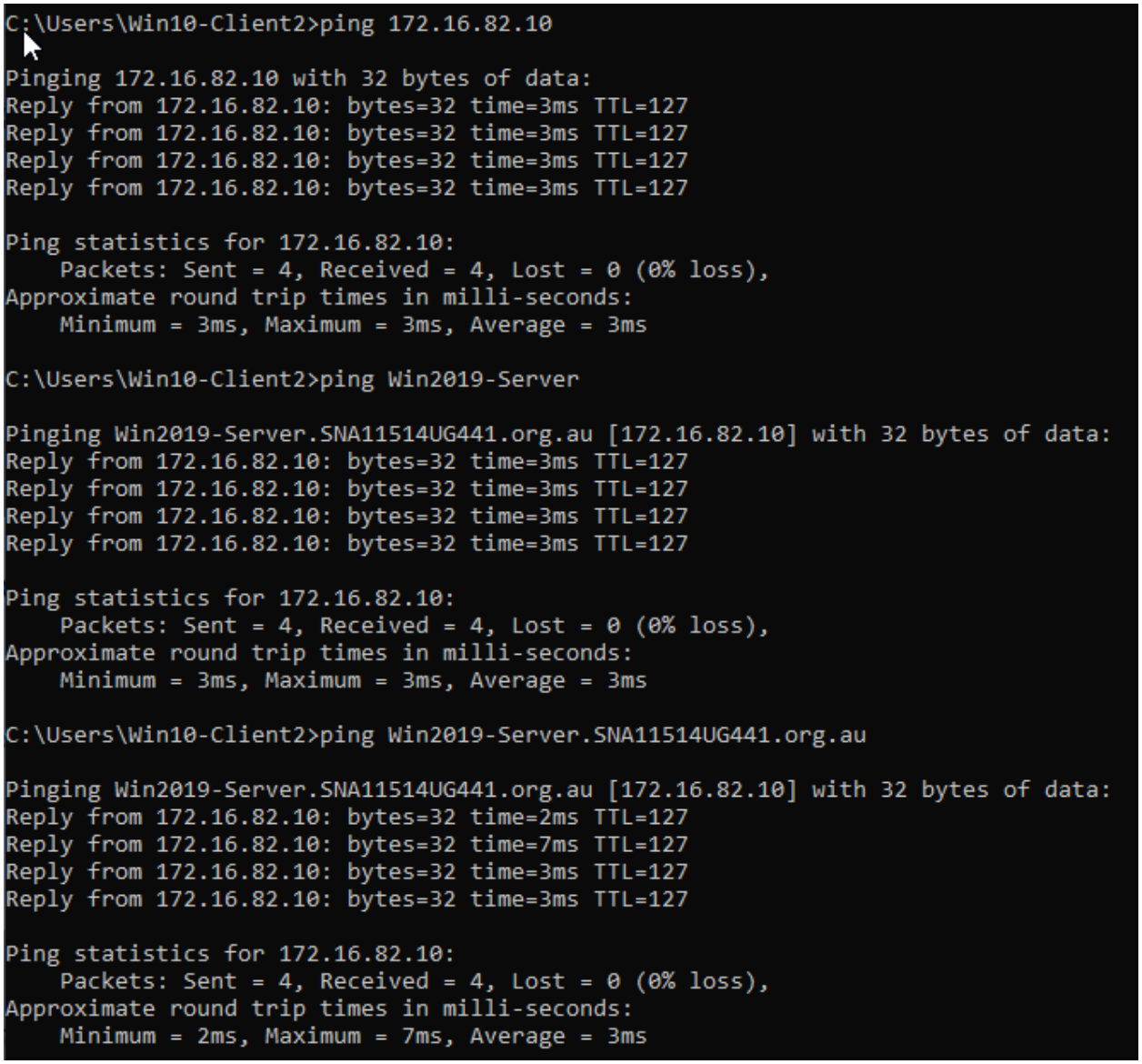

Testing Page
go.microsoft.com
Not secure
172.16.82.15
Hello, World!
Welcome to my first HTML page created on Linux!
Type here to search
ASX...
1:00 PM
10/17/2024


Win10-Client2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Testing Page
go.microsoft.com
Not secure
linux-server/
Hello, World!
Welcome to my first HTML page created on Linux!
Type here to search
20°C
ENG
1:42 PM
24/10/2024



Inter Tests

- Ping Win2019-Server From Win10-Client2



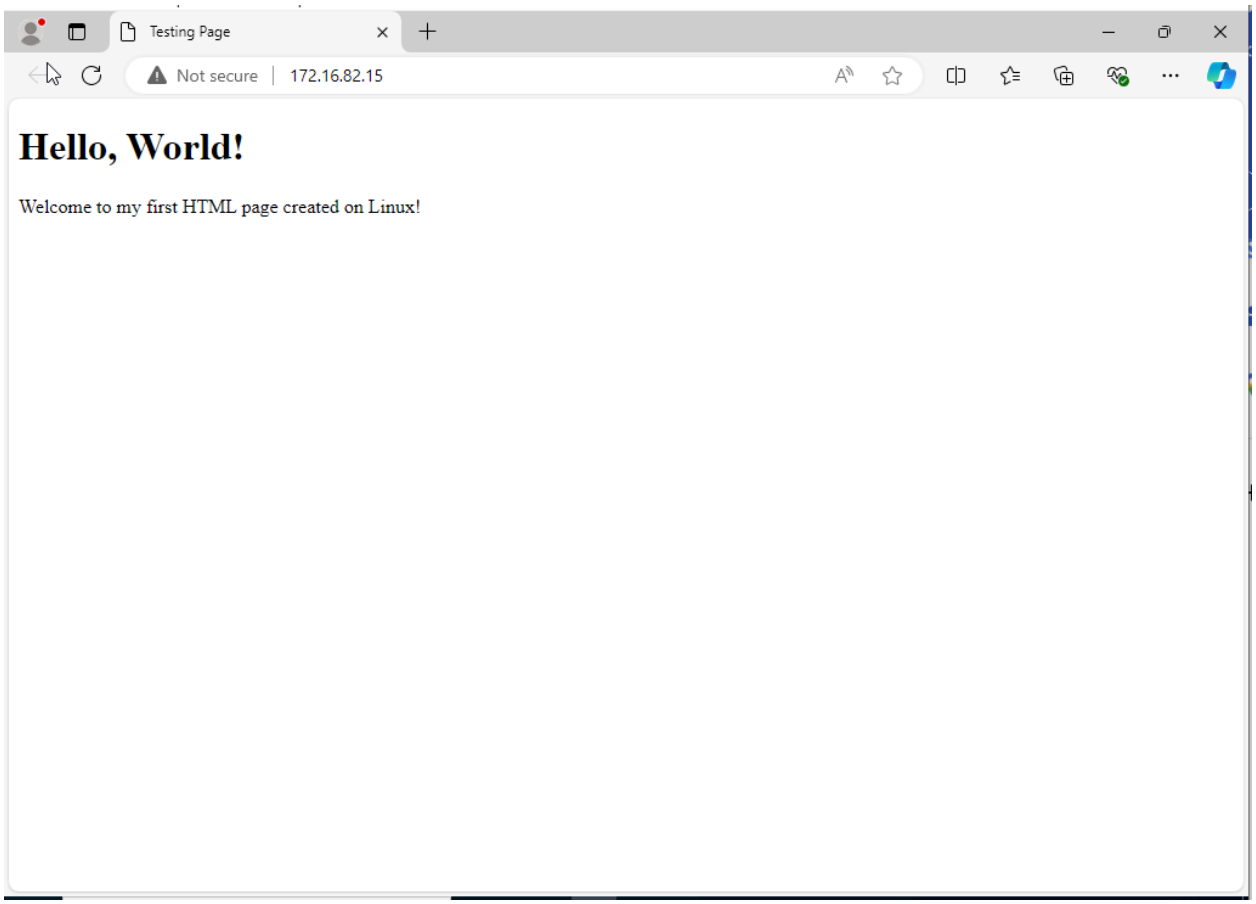
* Ping Win10-Client from Win10-Client2

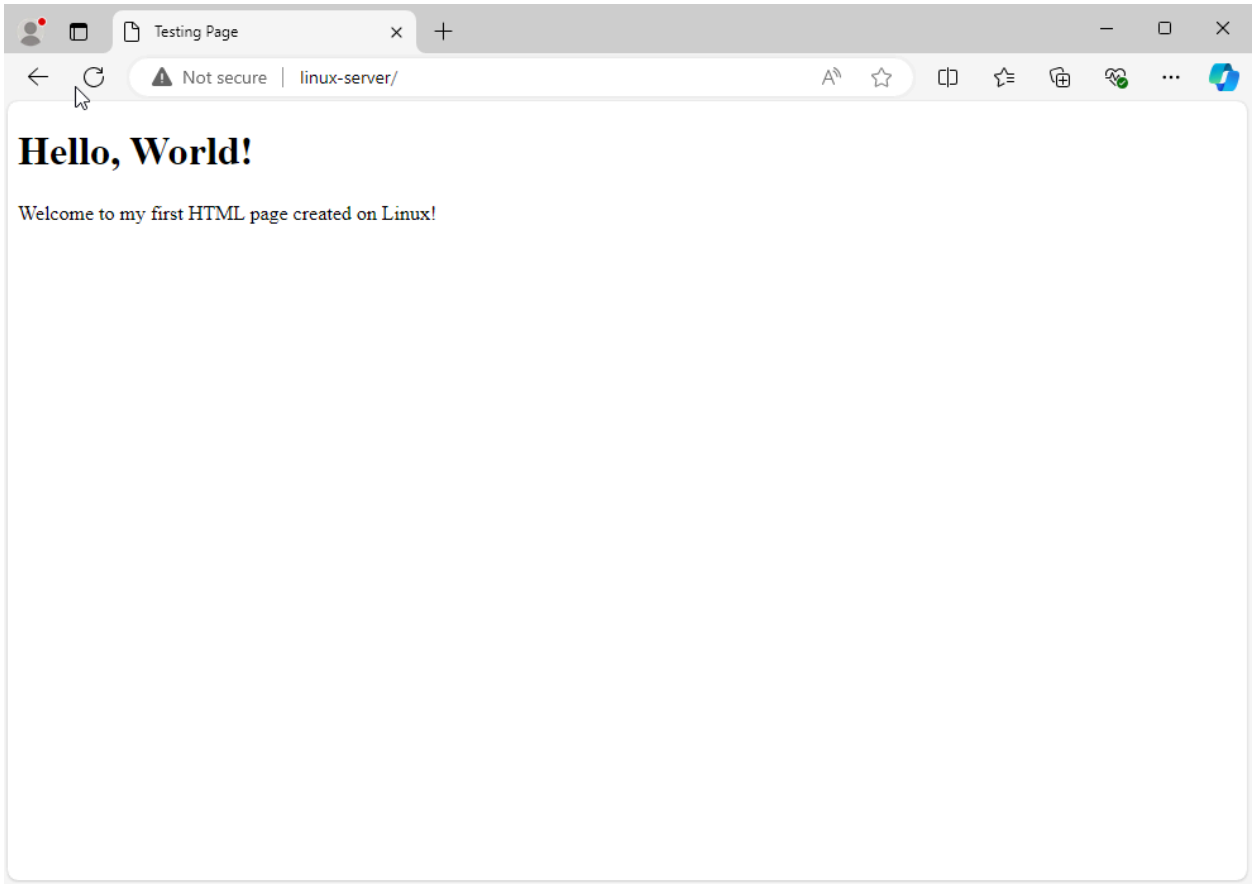
```
C:\Users\Win10-Client2>ping 172.16.82.20

Pinging 172.16.82.20 with 32 bytes of data:
Reply from 172.16.82.20: bytes=32 time=4ms TTL=127
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127

Ping statistics for 172.16.82.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 4ms, Average = 3ms

C:\Users\Win10-Client2>ping Win10-Client

Pinging Win10-Client.SNA11514UG441.org.au [172.16.82.20] with 32 bytes of data:
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127

Ping statistics for 172.16.82.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 3ms, Average = 3ms

C:\Users\Win10-Client2>ping Win10-Client.SNA11514UG441.org.au

Pinging Win10-Client.SNA11514UG441.org.au [172.16.82.20] with 32 bytes of data:
Reply from 172.16.82.20: bytes=32 time=2ms TTL=127
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127
Reply from 172.16.82.20: bytes=32 time=4ms TTL=127

Ping statistics for 172.16.82.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 4ms, Average = 3ms
```

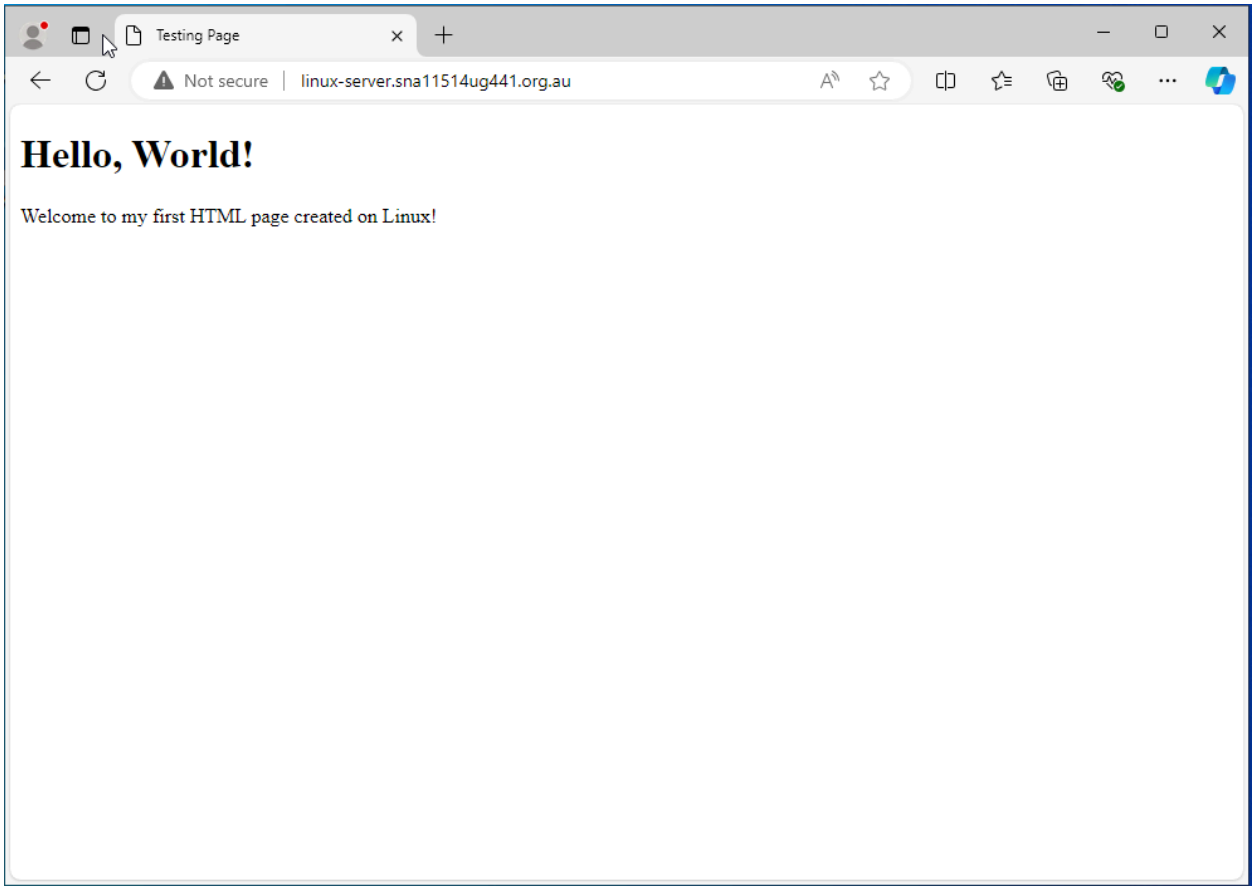
- Ping Linux Server From Win10-Client2

```
C:\Users\Win10-Client2>ping 172.16.82.15

Pinging 172.16.82.15 with 32 bytes of data:
Reply from 172.16.82.15: bytes=32 time=3ms TTL=63
Reply from 172.16.82.15: bytes=32 time=3ms TTL=63
Reply from 172.16.82.15: bytes=32 time=3ms TTL=63
Reply from 172.16.82.15: bytes=32 time=3ms TTL=63

Ping statistics for 172.16.82.15:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 3ms, Average = 3ms

C:\Users\Win10-Client2>ping Linux-Server

Pinging Linux-Server.SNA11514UG441.org.au [172.16.82.15] with 32 bytes of data:
Reply from 172.16.82.15: bytes=32 time=2ms TTL=63
Reply from 172.16.82.15: bytes=32 time=3ms TTL=63
Reply from 172.16.82.15: bytes=32 time=3ms TTL=63
Reply from 172.16.82.15: bytes=32 time=3ms TTL=63

Ping statistics for 172.16.82.15:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\Users\Win10-Client2>ping Linux-Server.SNA11514UG441.org.au

Pinging Linux-Server.SNA11514UG441.org.au [172.16.82.15] with 32 bytes of data:
Reply from 172.16.82.15: bytes=32 time=2ms TTL=63
Reply from 172.16.82.15: bytes=32 time=3ms TTL=63
Reply from 172.16.82.15: bytes=32 time=3ms TTL=63
Reply from 172.16.82.15: bytes=32 time=3ms TTL=63

Ping statistics for 172.16.82.15:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms
```

- Web Test from Linux


Testing Page
Not secure
172.16.82.15
Hello, World!
Welcome to my first HTML page created on Linux!


Testing Page
Not secure
linux-server/
Hello, World!
Welcome to my first HTML page created on Linux!



Nat test from Client 2

Command Prompt

```
Microsoft Windows [Version 10.0.19045.2006]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Win10-Client2>ping 172.16.82.20

Pinging 172.16.82.20 with 32 bytes of data:
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127
Reply from 172.16.82.20: bytes=32 time=3ms TTL=127

Ping statistics for 172.16.82.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 3ms, Average = 3ms
```

Org Tests

- Ping Win Server

```
C:\Users\Win10-Client2>ping 10.3.2.9

Pinging 10.3.2.9 with 32 bytes of data:
Reply from 10.3.2.9: bytes=32 time=2ms TTL=126
Reply from 10.3.2.9: bytes=32 time=2ms TTL=126
Reply from 10.3.2.9: bytes=32 time=2ms TTL=126
Reply from 10.3.2.9: bytes=32 time=3ms TTL=126

Ping statistics for 10.3.2.9:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms
```

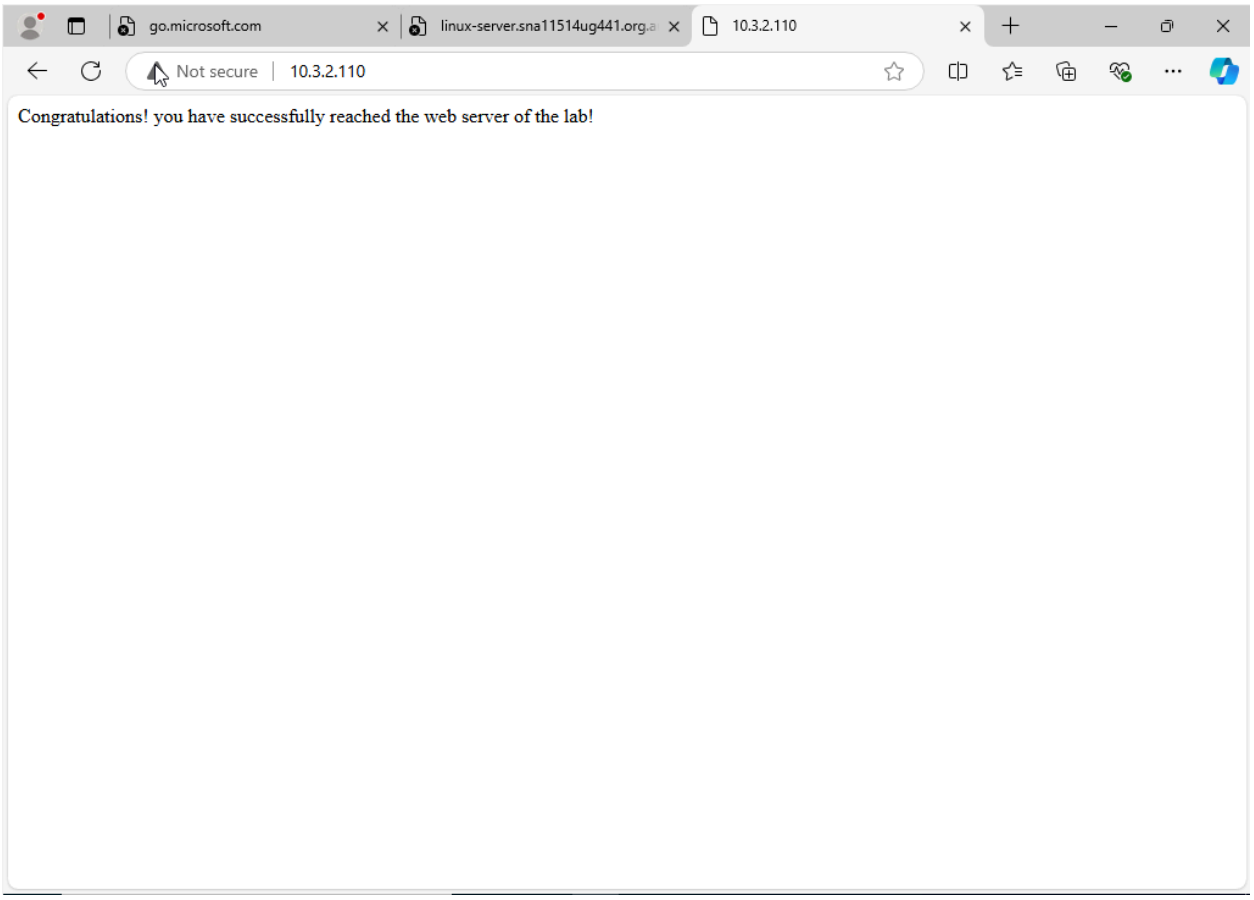
- Ping Win Client

```
Pinging 10.3.2.120 with 32 bytes of data:
Reply from 10.3.2.120: bytes=32 time=3ms TTL=126
Reply from 10.3.2.120: bytes=32 time=2ms TTL=126
Reply from 10.3.2.120: bytes=32 time=2ms TTL=126
Reply from 10.3.2.120: bytes=32 time=3ms TTL=126

Ping statistics for 10.3.2.120:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms
```

- Ping Linux Server

```
C:\Users\Win10-Client2>ping 10.3.2.110

Pinging 10.3.2.110 with 32 bytes of data:
Reply from 10.3.2.110: bytes=32 time=3ms TTL=62
Reply from 10.3.2.110: bytes=32 time=4ms TTL=62
Reply from 10.3.2.110: bytes=32 time=3ms TTL=62
Reply from 10.3.2.110: bytes=32 time=4ms TTL=62

Ping statistics for 10.3.2.110:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 4ms, Average = 3ms
```

- Ping Web



Summary of Dependencies

During my work on the VLAN configuration and connectivity tests, I've identified several potential issues that could affect the project's success:

1. **VLAN Configuration Errors**: Incorrectly assigned VLAN IDs or misconfigured trunk ports could prevent devices from communicating effectively, resulting in network segmentation issues.
2. **Ping Test Failures**: If ping tests between clients in the same VLAN or across different VLANs fail, it may indicate underlying issues with VLAN routing or switch configuration that require immediate investigation.
3. **Inter-VLAN Communication Problems**: Errors in router configuration or ACL settings could obstruct inter-VLAN communication, leading to connectivity issues between devices in VLAN 51 and VLAN 52.

4. **Web Access Test Challenges**: If the Ubuntu web server is not properly set up or if firewall rules block access, clients in VLAN 52 may struggle to reach the web server in VLAN 51, complicating web access tests.
5. **Organisation Connectivity Issues**: Difficulties in connecting to external organisations could stem from routing misconfigurations or firewall restrictions, impacting our ability to verify inter-organisation communication.
6. **Switch Port Malfunctions**: Physical issues with switch ports or cabling could lead to intermittent connectivity problems within VLANs, necessitating careful hardware checks and troubleshooting.
7. **Insufficient Documentation**: A lack of clear documentation regarding configurations and network setups may hinder troubleshooting efforts and make it challenging to replicate successful configurations in the future.