

Final Project – Part I (CIS 216 Spring 2026)

Michael Nobles

Task 1: Explain and demonstrate with screenshots the difference between Education, Professional and Home versions of a Windows installation. Using screenshots (you can use your previous lab screenshots) – show when you make this decision in the installation process.

Explanation:

Home is for personal use (no domain join, no Group Policy, no BitLocker, no Hyper-V).

Professional adds business features (domain join, Group Policy, BitLocker, Remote Desktop host, Hyper-V).

Education matches Pro with extra academic/volume-licensing features for schools.

The choice appears on the “Which edition of Windows do you want to install?” screen during clean setup (when ISO/media contains multiple editions).

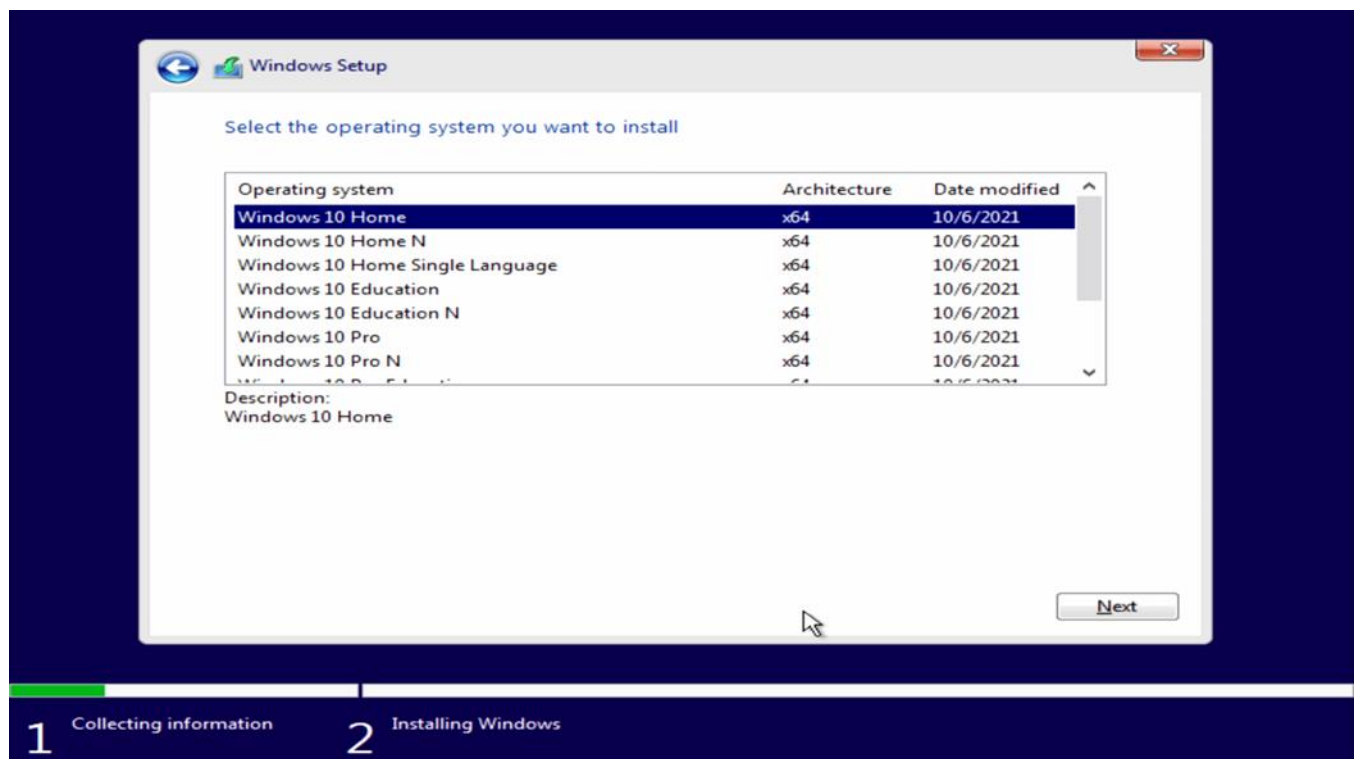


Figure 1 – Windows Setup Edition Selection Screen

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Reference: Microsoft. (2026). Compare Windows 11 versions: Windows 11 Home & Pro vs. Windows 10. <https://www.microsoft.com/en-us/windows/compare-windows-11-home-vs-pro-versions>

Task 2: Explain why you should not install your VMs on the OneDrive and why you were directed to install on the C: drive in a new folder instead. Provide screenshots of how to identify where your VM is located (using your VMWare).

Explanation:

OneDrive syncs constantly; large, changing VM files (.vmdk, .vmx) cause high CPU/memory use, slow performance, and risk of corruption or incomplete sync. Local C: drive folder gives fast direct I/O with no cloud overhead.

To identify where your VM is stored in VMware Workstation: right-click the VM → Settings → Options tab → Working Directory. The file path shown is where all VM files are saved.

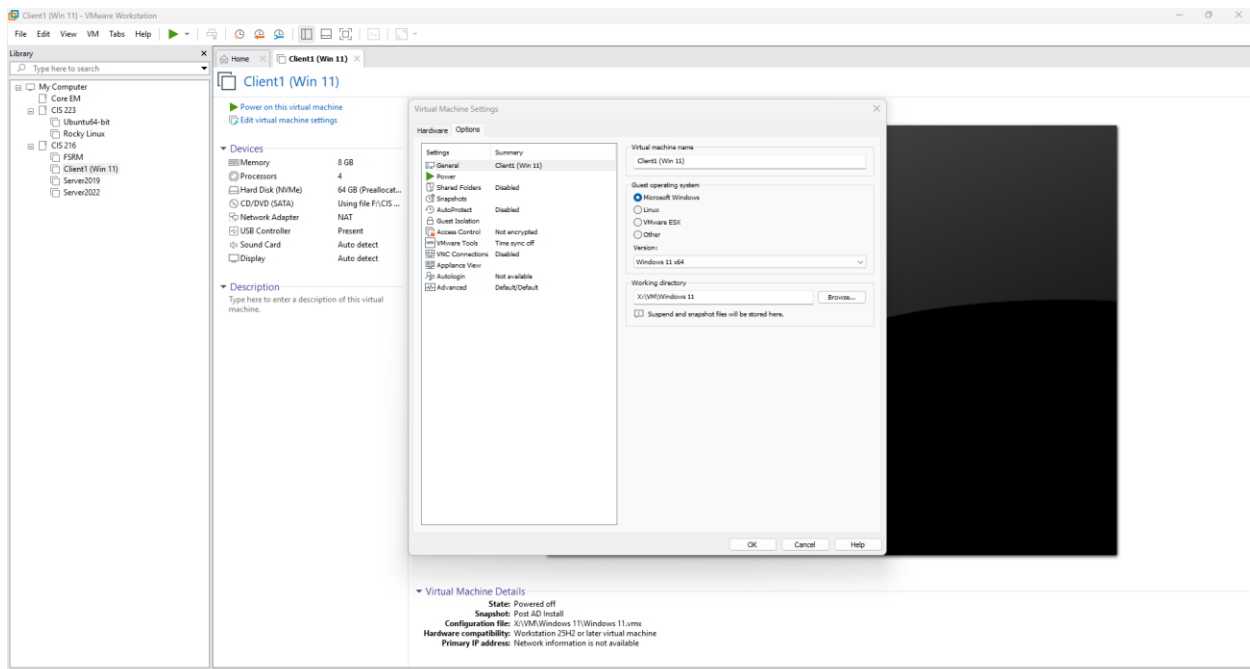


Figure 2 – VMware Workstation Showing The Working Directory Path of Client1's VM

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Reference: VMware by Broadcom. (2024). Using VMware Workstation Pro.

<https://techdocs.broadcom.com/us/en/vmware-cis/desktop-hypervisors/workstation-pro/17-0/using-vmware-workstation-pro.html>

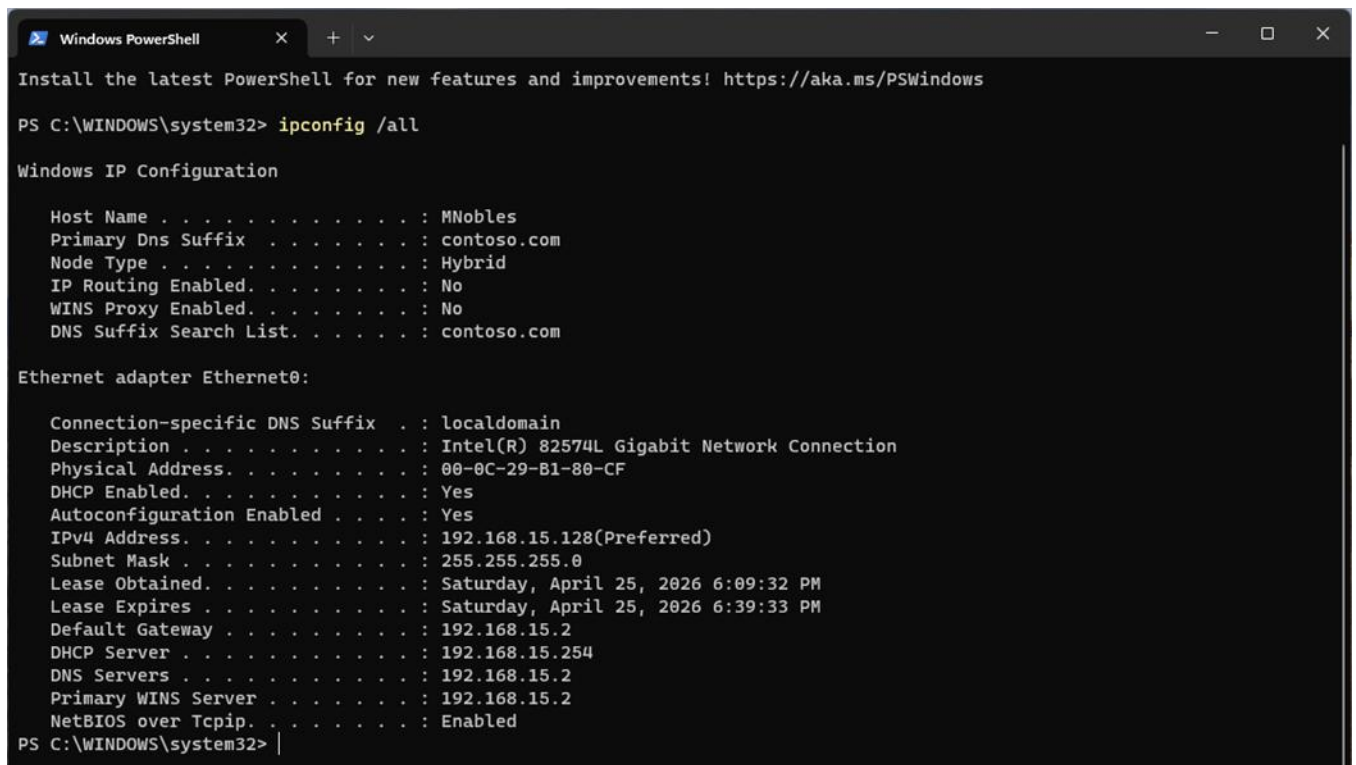
Task 3: Explain the difference between a static and a dynamic IP address. Show how you can determine whether your server has a dynamic or static IP address on your VMs. Provide a screenshot.

Explanation:

Static = manually set fixed address (no DHCP).

Dynamic = automatically assigned by DHCP server (can change).

Determine with `ipconfig /all`: “DHCP Enabled: No” = static; “Yes” = dynamic.



```
Windows PowerShell
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\WINDOWS\system32> ipconfig /all

Windows IP Configuration

Host Name . . . . . : MNobles
Primary Dns Suffix . . . . . : contoso.com
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : contoso.com

Ethernet adapter Ethernet0:

Connection-specific DNS Suffix . : localdomain
Description . . . . . : Intel(R) 82574L Gigabit Network Connection
Physical Address. . . . . : 00-0C-29-B1-80-CF
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
IPv4 Address. . . . . : 192.168.15.128(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : Saturday, April 25, 2026 6:09:32 PM
Lease Expires . . . . . : Saturday, April 25, 2026 6:39:33 PM
Default Gateway . . . . . : 192.168.15.2
DHCP Server . . . . . : 192.168.15.254
DNS Servers . . . . . : 192.168.15.2
Primary WINS Server . . . . . : 192.168.15.2
NetBIOS over Tcpip. . . . . : Enabled

PS C:\WINDOWS\system32>
```

Figure 3 – `ipconfig /all` Results Showing Client IP is Dynamic

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Reference: Microsoft. (2025). What is DHCP Server in Windows Server?

<https://learn.microsoft.com/en-us/windows-server/networking/technologies/dhcp/dhcp-top>

Task 4: You are testing your network for communication. You receive a Destination Host Unreachable error. What are the most likely issues and how do you resolve them? Provide a screenshot.

Explanation:

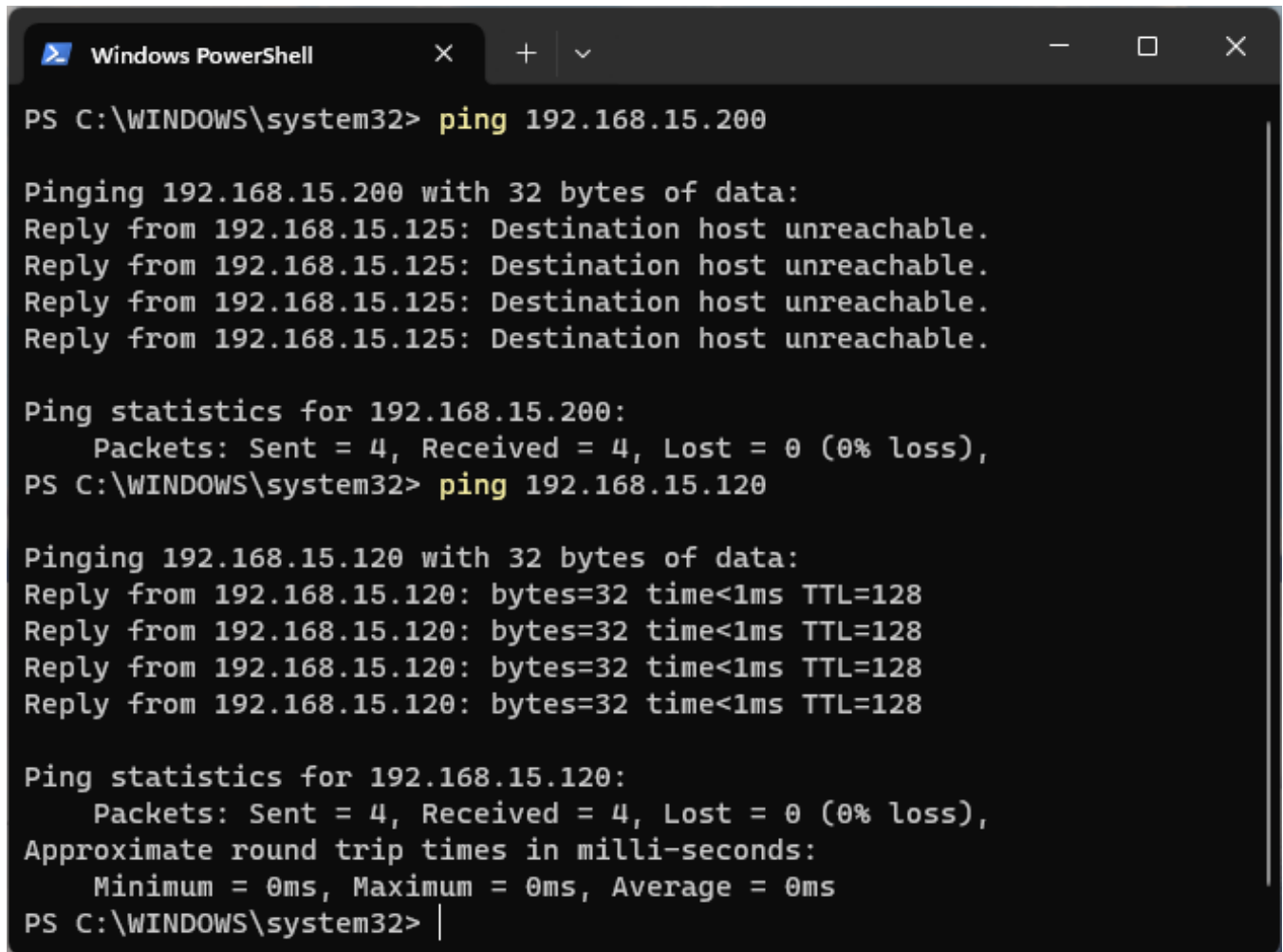
Most likely causes: no route to host (wrong gateway/subnet), firewall blocking ICMP, VMware virtual NIC disconnected, or NAT misconfiguration.

Resolution:

- Ping gateway first.
- Verify IP/subnet/gateway match on both VMs..
- Check VMware Network Editor (VMnet8 connected).
- Temporarily disable Windows Firewall.

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A screenshot of a Windows PowerShell terminal window. The title bar shows 'Windows PowerShell' with standard window controls. The command prompt is at 'PS C:\WINDOWS\system32>'. The user enters 'ping 192.168.15.200'. The output shows four 'Destination host unreachable' replies from 192.168.15.125. Then, the user enters 'ping 192.168.15.120'. The output shows four successful replies from 192.168.15.120 with 32 bytes, time < 1ms, and TTL=128. Finally, the user enters 'ping 192.168.15.120' again, and the output shows four successful replies with 32 bytes, time < 1ms, and TTL=128. The command prompt is now at 'PS C:\WINDOWS\system32> |'.

```
PS C:\WINDOWS\system32> ping 192.168.15.200

Pinging 192.168.15.200 with 32 bytes of data:
Reply from 192.168.15.125: Destination host unreachable.
Reply from 192.168.15.125: Destination host unreachable.
Reply from 192.168.15.125: Destination host unreachable.
Reply from 192.168.15.125: Destination host unreachable.

Ping statistics for 192.168.15.200:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
PS C:\WINDOWS\system32> ping 192.168.15.120

Pinging 192.168.15.120 with 32 bytes of data:
Reply from 192.168.15.120: bytes=32 time<1ms TTL=128
Reply from 192.168.15.120: bytes=32 time<1ms TTL=128
Reply from 192.168.15.120: bytes=32 time<1ms TTL=128
Reply from 192.168.15.120: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.15.120:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
PS C:\WINDOWS\system32> |
```

Figure 4 – Command Prompt showing “Destination host unreachable” error (top) and successful ping to Server (192.168.15.120) (bottom).

Reference: Microsoft. (2025). ping. <https://learn.microsoft.com/en-us/windows-server/administration/windows-commands/ping>

Task 5: You are testing your network for communication. Your results show an IP address starting in 169.xxx.xxx.xxx – what is the issue and how can you resolve it? Provide a screenshot.

Explanation:

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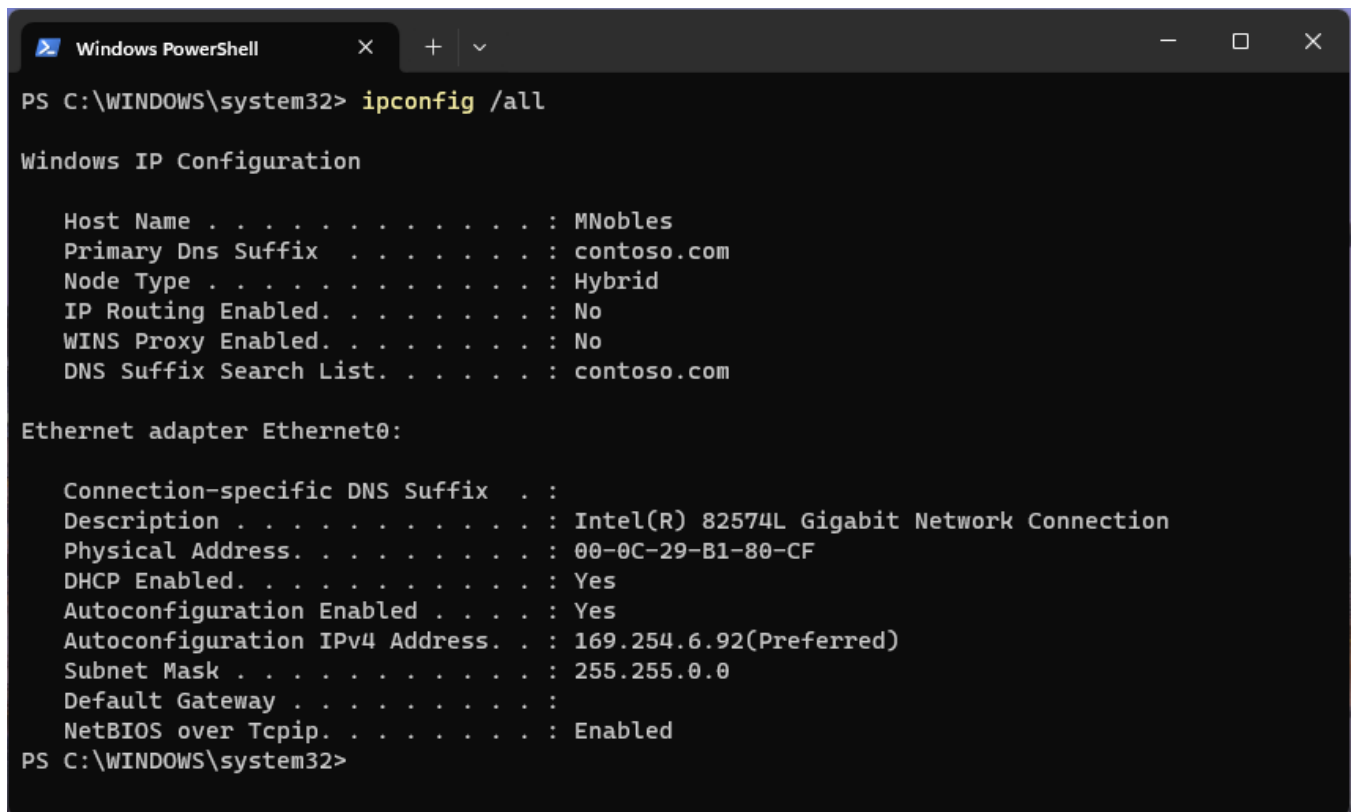
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A 169.254.x.x address is called an APIPA (Automatic Private IP Addressing) address. Windows automatically assigns it when the computer is configured to get an IP address from DHCP but cannot find a DHCP server.

Resolution:

- Start the DHCP Server service on the Windows Server.
- Make sure the DHCP scope is activated.
- Re-enable VMware NAT DHCP service if it was disabled.
- Run `ipconfig /release` then `ipconfig /renew`.

The below APIPA was forced via VMWare's Virtual Network Editor by unchecking "Use local DHCP service to distribute IP address to VMs."



```
Windows PowerShell
PS C:\WINDOWS\system32> ipconfig /all

Windows IP Configuration

Host Name . . . . . : MNobles
Primary Dns Suffix . . . . . : contoso.com
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : contoso.com


Ethernet adapter Ethernet0:

Connection-specific DNS Suffix . : 
Description . . . . . : Intel(R) 82574L Gigabit Network Connection
Physical Address. . . . . : 00-0C-29-B1-80-CF
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Autoconfiguration IPv4 Address. . : 169.254.6.92(Preferred)
Subnet Mask . . . . . : 255.255.0.0
Default Gateway . . . . . : 
NetBIOS over Tcpip. . . . . : Enabled
PS C:\WINDOWS\system32>
```

Figure 5 - Client 1 ipconfig /all output showing the client automatically assigned an APIPA address (169.254.6.92) due to no DHCP server response.

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Reference: Microsoft. (2021). How to use automatic TCP/IP addressing without a DHCP server. <https://learn.microsoft.com/en-us/windows-server/troubleshoot/how-to-use-automatic-tcpip-addressing-without-a-dh>

Task 6: You are testing your network for communication. Your ping results show an FE80:: address instead of IPv4 address. What is the issues and how can you resolve this temporarily? How can you resolve this permanently? Provide a screenshot.

Explanation:

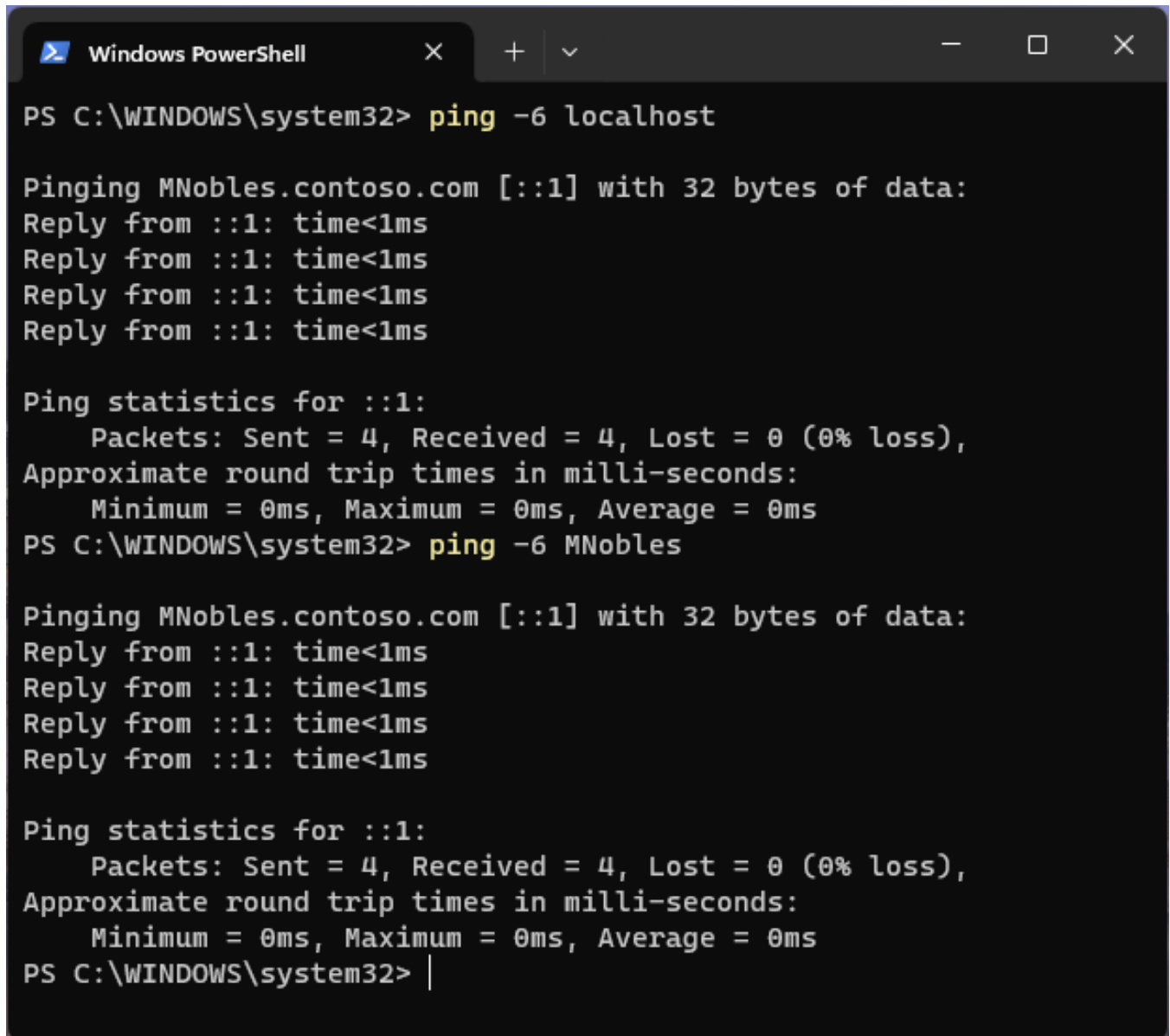
Even though IPv4 is configured and working (as shown in ipconfig /all), Windows prefers IPv6 when it is enabled. This causes ping to return an IPv6 address (:::1 loopback or FE80:: link-local) instead of the expected IPv4 address.

Resolution:

- Temporary fix: Force IPv4 with the -4 switch: **ping -4 MNobles** or **ping -4 192.168.15.120**
- Permanent fix: Disable IPv6 on the Ethernet0 adapter (Network Connections → Ethernet0 Properties → uncheck Internet Protocol Version 6).

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A screenshot of a Windows PowerShell terminal window. The title bar shows 'Windows PowerShell' with standard window controls. The terminal text shows two ping commands and their results. The first command is 'ping -6 localhost', which results in four replies from 'M Nobles. contoso.com' with IPv6 address '>:::1' and times less than 1ms. The second command is 'ping -6 MNobles', which also results in four replies from 'M Nobles. contoso.com' with IPv6 address '>:::1' and times less than 1ms. Both commands show statistics: 4 packets sent and received, 0% loss, and 0ms round trip times.

```
PS C:\WINDOWS\system32> ping -6 localhost

Pinging M Nobles. contoso.com [:::1] with 32 bytes of data:
Reply from :::1: time<1ms
Reply from :::1: time<1ms
Reply from :::1: time<1ms
Reply from :::1: time<1ms

Ping statistics for :::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
PS C:\WINDOWS\system32> ping -6 MNobles

Pinging M Nobles. contoso.com [:::1] with 32 bytes of data:
Reply from :::1: time<1ms
Reply from :::1: time<1ms
Reply from :::1: time<1ms
Reply from :::1: time<1ms

Ping statistics for :::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
PS C:\WINDOWS\system32> |
```

Figure 6 - Command Prompt showing ping -6 localhost and ping -6 MNobles returning IPv6 address (:::1), even though IPv4 is assigned.

Reference: Microsoft. (2022). IPv6 link-local and site-local addresses.

<https://learn.microsoft.com/en-us/windows/win32/winsock/link-local-and-site-local-addresses-2>

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Task 7: You can ping by IP address but not the computer name. What is the most likely cause and what can you do to resolve this? How can you check? Which command? Provide a screenshot.

Explanation:

The most likely cause is incorrect DNS server configuration. The client is pointing to 192.168.15.2 (VMware router) instead of the Windows DNS server at 192.168.15.120. This prevents proper name resolution.

How to Check:

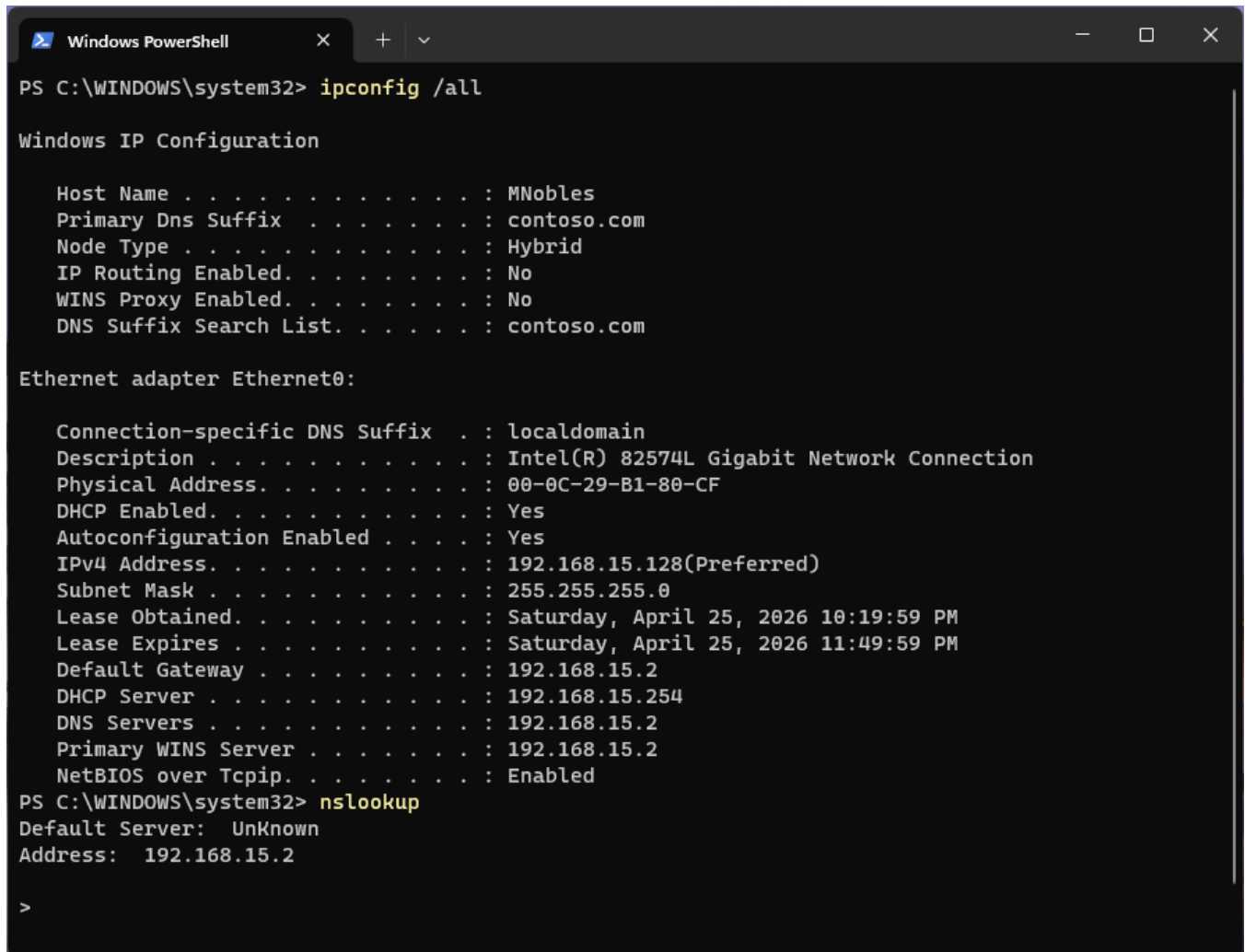
Use `ipconfig /all` (shows DNS Servers) and `nslookup` (shows Default Server).

Resolution:

Set DNS server to 192.168.15.120 (requires admin rights) and ensure the DNS suffix is `contoso.com`.

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A screenshot of a Windows PowerShell window. The title bar says "Windows PowerShell". The command prompt shows "PS C:\WINDOWS\system32> ipconfig /all". The output displays "Windows IP Configuration" with details for Host Name (MNobles), Primary Dns Suffix (contoso.com), Node Type (Hybrid), IP Routing Enabled (No), WINS Proxy Enabled (No), and DNS Suffix Search List (contoso.com). Below this, it shows "Ethernet adapter Ethernet0:" with details for Connection-specific DNS Suffix (localdomain), Description (Intel(R) 82574L Gigabit Network Connection), Physical Address (00-0C-29-B1-80-CF), DHCP Enabled (Yes), Autoconfiguration Enabled (Yes), IPv4 Address (192.168.15.128(Preferred)), Subnet Mask (255.255.255.0), Lease Obtained (Saturday, April 25, 2026 10:19:59 PM), Lease Expires (Saturday, April 25, 2026 11:49:59 PM), Default Gateway (192.168.15.2), DHCP Server (192.168.15.254), DNS Servers (192.168.15.2), Primary WINS Server (192.168.15.2), and NetBIOS over Tcpi (Enabled). The next command is "PS C:\WINDOWS\system32> nslookup", which returns "Default Server: UnKnown" and "Address: 192.168.15.2". The prompt ends with a ">" character.

```
Windows PowerShell
PS C:\WINDOWS\system32> ipconfig /all

Windows IP Configuration

    Host Name . . . . . : MNobles
    Primary Dns Suffix . . . . . : contoso.com
    Node Type . . . . . : Hybrid
    IP Routing Enabled. . . . . : No
    WINS Proxy Enabled. . . . . : No
    DNS Suffix Search List. . . . . : contoso.com

Ethernet adapter Ethernet0:

    Connection-specific DNS Suffix . : localdomain
    Description . . . . . : Intel(R) 82574L Gigabit Network Connection
    Physical Address. . . . . : 00-0C-29-B1-80-CF
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    IPv4 Address. . . . . : 192.168.15.128(Preferred)
    Subnet Mask . . . . . : 255.255.255.0
    Lease Obtained. . . . . : Saturday, April 25, 2026 10:19:59 PM
    Lease Expires . . . . . : Saturday, April 25, 2026 11:49:59 PM
    Default Gateway . . . . . : 192.168.15.2
    DHCP Server . . . . . : 192.168.15.254
    DNS Servers . . . . . : 192.168.15.2
    Primary WINS Server . . . . . : 192.168.15.2
    NetBIOS over Tcpi. . . . . : Enabled
PS C:\WINDOWS\system32> nslookup
Default Server: UnKnown
Address: 192.168.15.2

>
```

Figure 7 - Output showing DNS Servers set to 192.168.15.2 and nslookup returning "UnKnown" — demonstrating why name resolution fails even though IPv4 connectivity works.

Reference: Microsoft. (2025). nslookup. <https://learn.microsoft.com/en-us/windows-server/administration/windows-commands/nslookup>

Task 8: You are using VMWare and have installed DHCP to your server. However, your server does not use the range of IP addresses you have identified. What is the issue and how is it resolved? Provide a screenshot.

Explanation:

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The server uses a static IP address (192.168.15.120) that is intentionally outside the DHCP scope (192.168.15.121–127). This is standard practice so the server always has a consistent, reliable address.

Resolution:

- Manually configure a static IP on the server outside the DHCP scope.
- Activate the scope in the DHCP console.
- Disable VMware's built-in DHCP service.

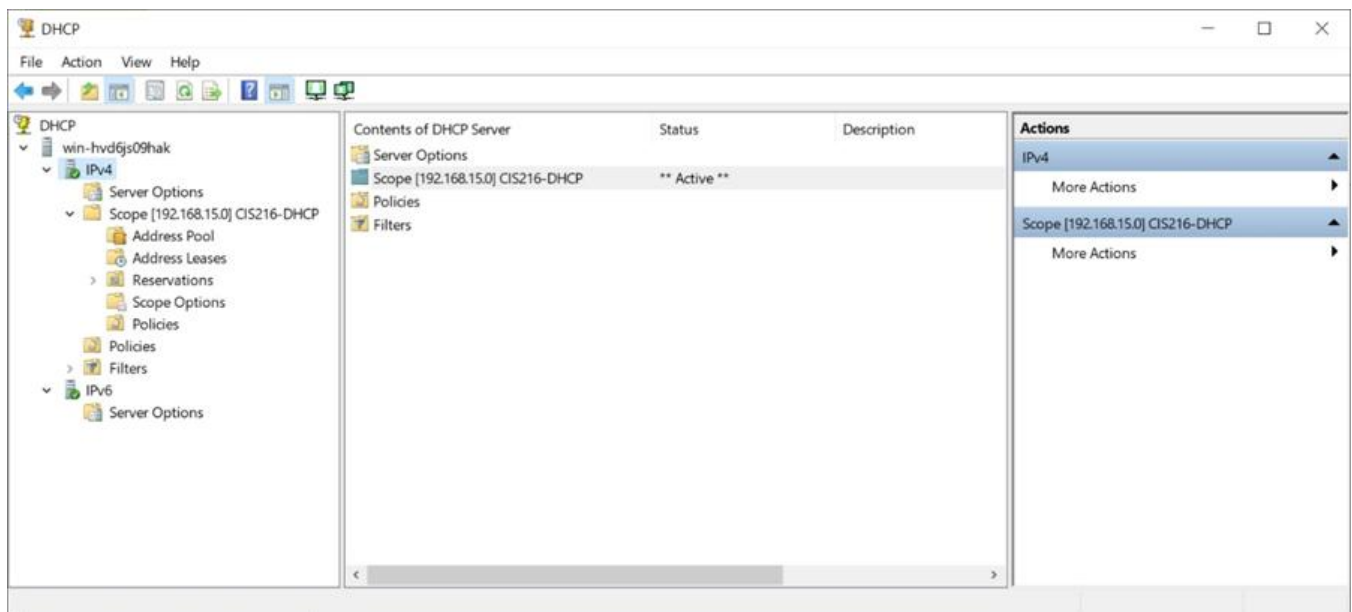


Figure 8 - DHCP console showing activated scope

Reference: VMware by Broadcom. (2024). Using VMware Workstation Pro.

<https://techdocs.broadcom.com/us/en/vmware-cis/desktop-hypervisors/workstation-pro/17-0/using-vmware-workstation-pro.html>