TORILO

July 9

2025

Setting Up a Basic Home Lab Running Active Directory (Oracle VitualBox) | Add Users w/PowerShell

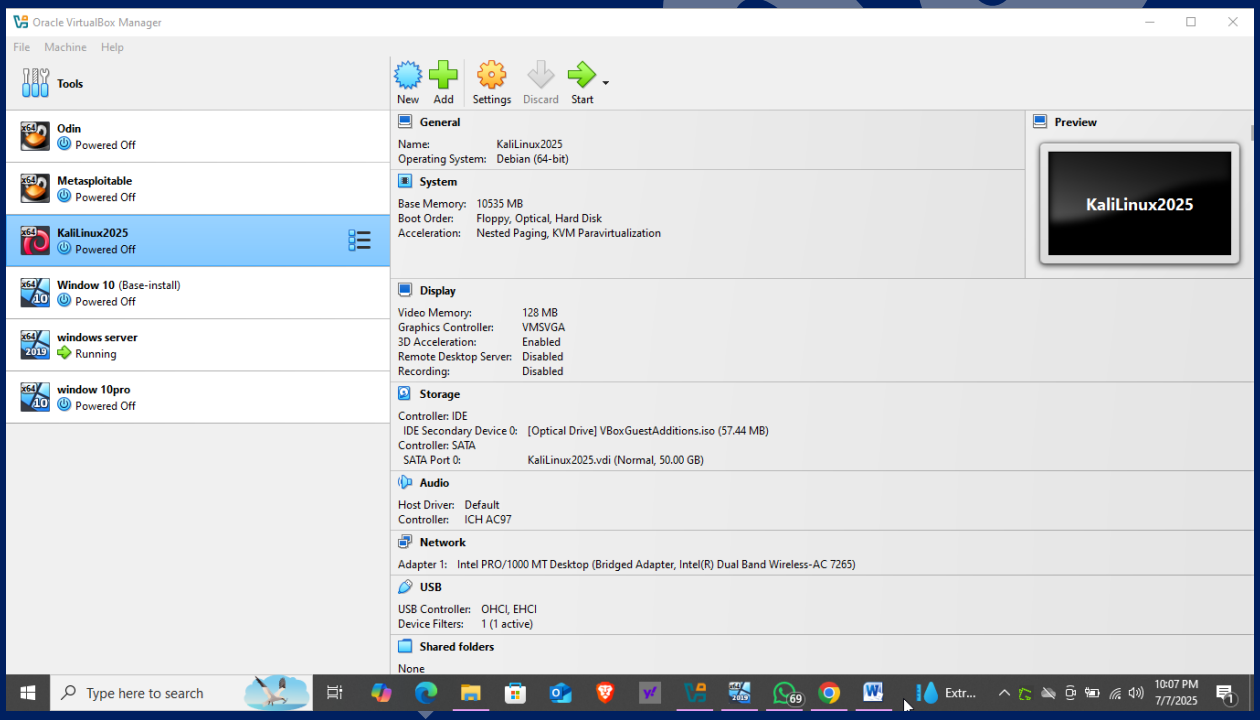
Uyor Chimdi Ebulu

1. Objective

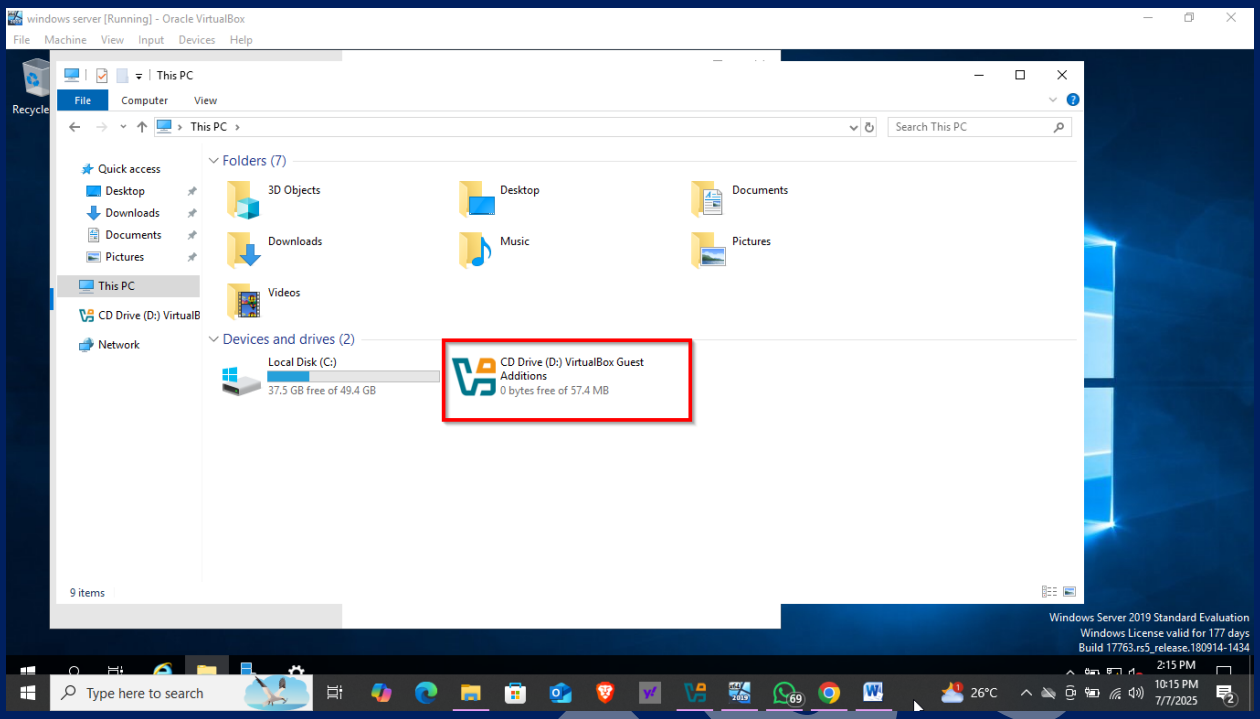
To set up a secure and functional **Active Directory (AD)** lab environment using **Oracle VirtualBox**, simulating a real-world domain controller and client machine setup for testing, user management, DHCP configuration, and network services.

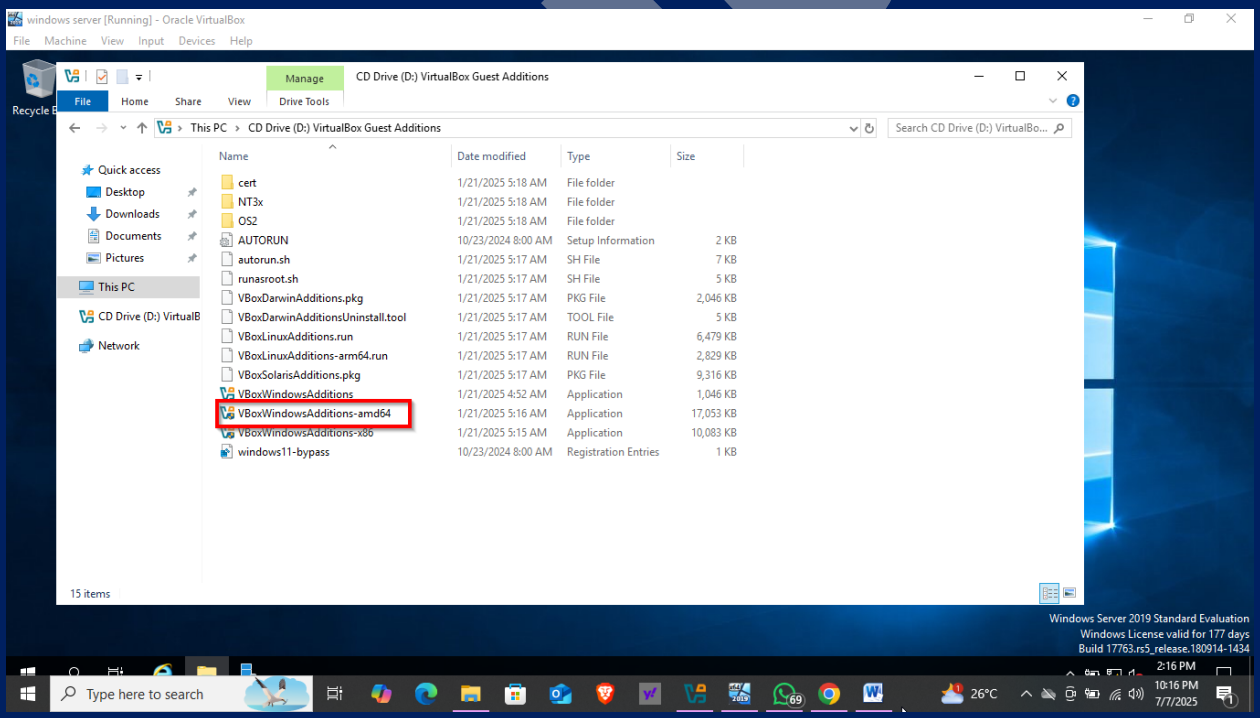
2. Lab Infrastructure Overview

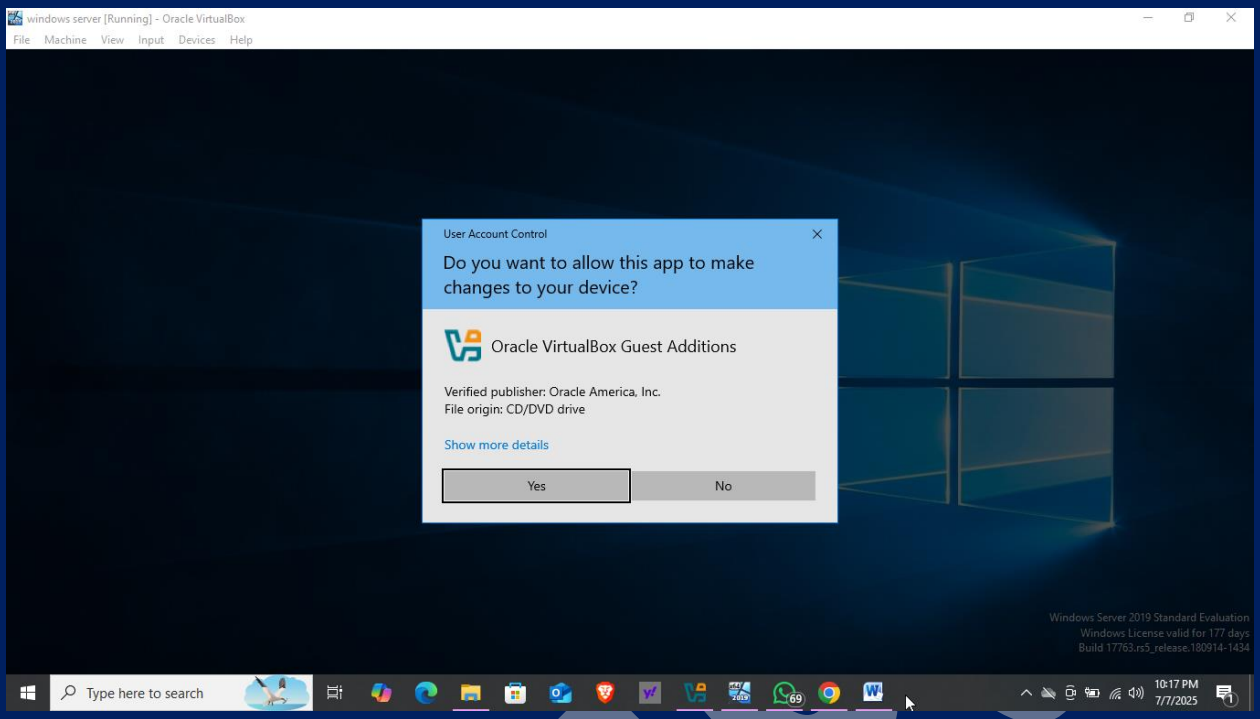
Component	Specification
Virtualization	Oracle VirtualBox
Domain Controller	Windows Server (64-bit), 2GB RAM
Client Machine	Windows 10 Pro, 2GB RAM
Network Interfaces	Adapter 1: NAT, Adapter 2: Internal
Services Configured	AD DS, DHCP, Routing and Remote Access

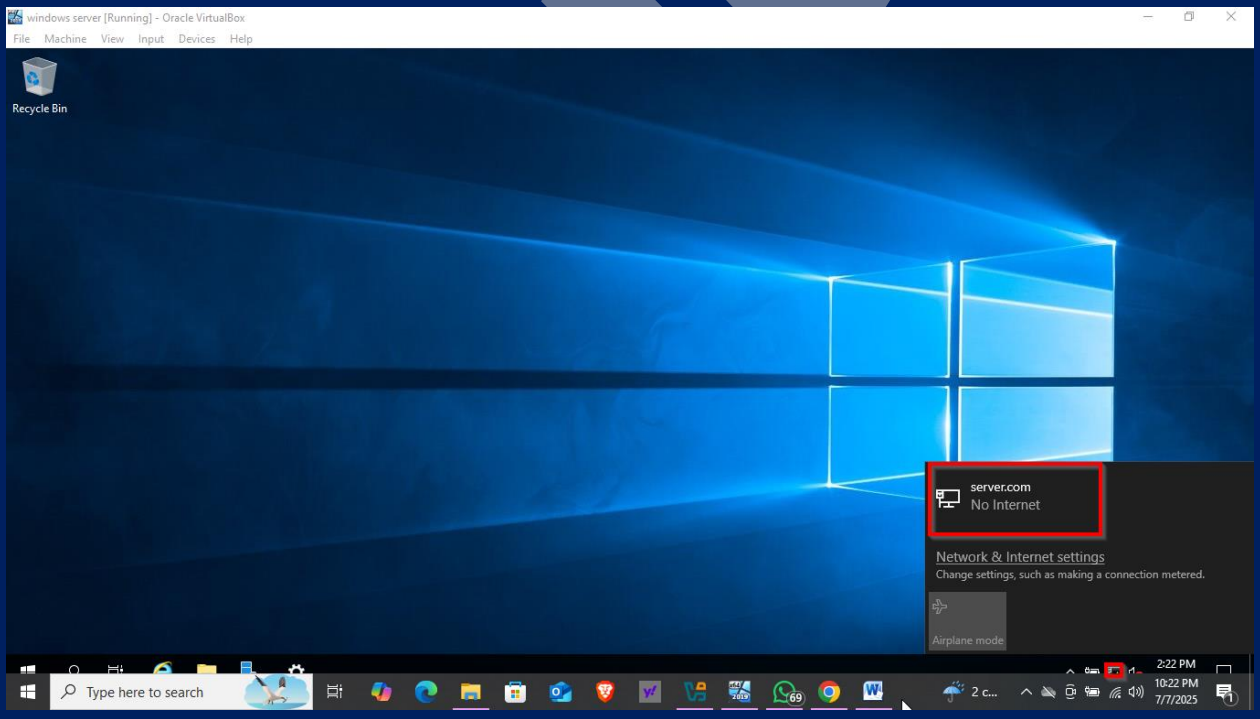


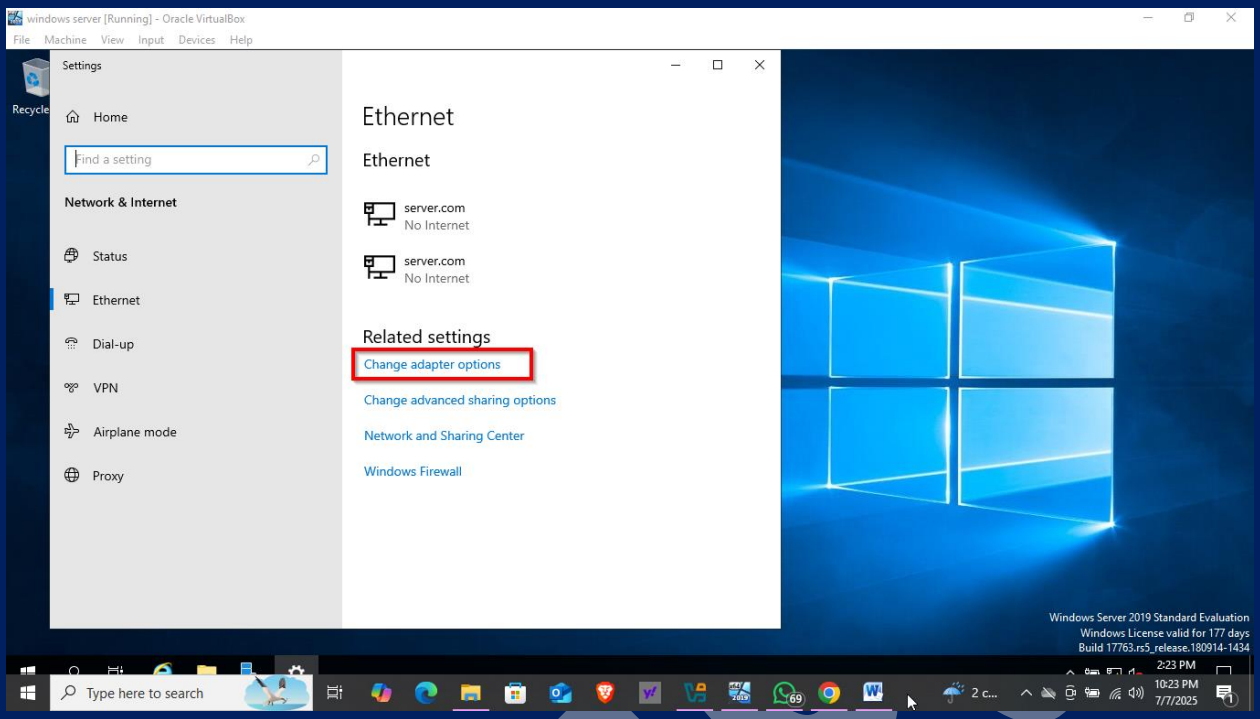
Insert Guest Additions Cd Image


windows server [Running] - Oracle VirtualBox
File Machine View Input Devices Help
This PC
File Computer View
Search This PC
Quick access
Desktop
Downloads
Documents
Pictures
This PC
CD Drive (D:) VirtualB
Network
Folders (7)
3D Objects
Desktop
Documents
Downloads
Music
Pictures
Videos
Devices and drives (2)
Local Disk (C:)
37.5 GB free of 49.4 GB
CD Drive (D:) VirtualBox Guest Additions
0 bytes free of 57.4 MB
9 items
Windows Server 2019 Standard Evaluation
Windows License valid for 177 days
Build 17763.rs5_release.180914-1434
Type here to search
26°C
2:15 PM
10:15 PM
7/7/2025


windows server [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Manage
CD Drive (D:) VirtualBox Guest Additions
File Home Share View Drive Tools
This PC › CD Drive (D:) VirtualBox Guest Additions
Search CD Drive (D:) VirtualBo...
Quick access
Desktop
Downloads
Documents
Pictures
This PC
CD Drive (D:) VirtualB
Network
Name
Date modified
Type
Size
cert 1/21/2025 5:18 AM File folder
NT3x 1/21/2025 5:18 AM File folder
OS2 1/21/2025 5:18 AM File folder
AUTORUN 10/23/2024 8:00 AM Setup Information 2 KB
autorun.sh 1/21/2025 5:17 AM SH File 7 KB
runasroot.sh 1/21/2025 5:17 AM SH File 5 KB
VBoxDarwinAdditions.pkg 1/21/2025 5:17 AM PKG File 2,046 KB
VBoxDarwinAdditionsUninstall.tool 1/21/2025 5:17 AM TOOL File 5 KB
VBoxLinuxAdditions.run 1/21/2025 5:17 AM RUN File 6,479 KB
VBoxLinuxAdditions-arm64.run 1/21/2025 5:17 AM RUN File 2,829 KB
VBoxSolarisAdditions.pkg 1/21/2025 5:17 AM PKG File 9,316 KB
VBoxWindowsAdditions 1/21/2025 4:52 AM Application 1,046 KB
VBoxWindowsAdditions-amd64 1/21/2025 5:16 AM Application 17,053 KB
VBoxWindowsAdditions-x86 1/21/2025 5:15 AM Application 10,083 KB
windows11-bypass 10/23/2024 8:00 AM Registration Entries 1 KB
15 items
Windows Server 2019 Standard Evaluation
Windows License valid for 177 days
Build 17763.rs5_release.180914-1434
Type here to search
26°C
2:16 PM
10:16 PM
7/7/2025


windows server [Running] - Oracle VirtualBox
File Machine View Input Devices Help
User Account Control
Do you want to allow this app to make changes to your device?
Oracle VirtualBox Guest Additions
Verified publisher: Oracle America, Inc.
File origin: CD/DVD drive
Show more details
Yes
No
Windows Server 2019 Standard Evaluation
Windows License valid for 177 days
Build 17763.rs5_release.180914-1434
Type here to search
10:17 PM
7/7/2025

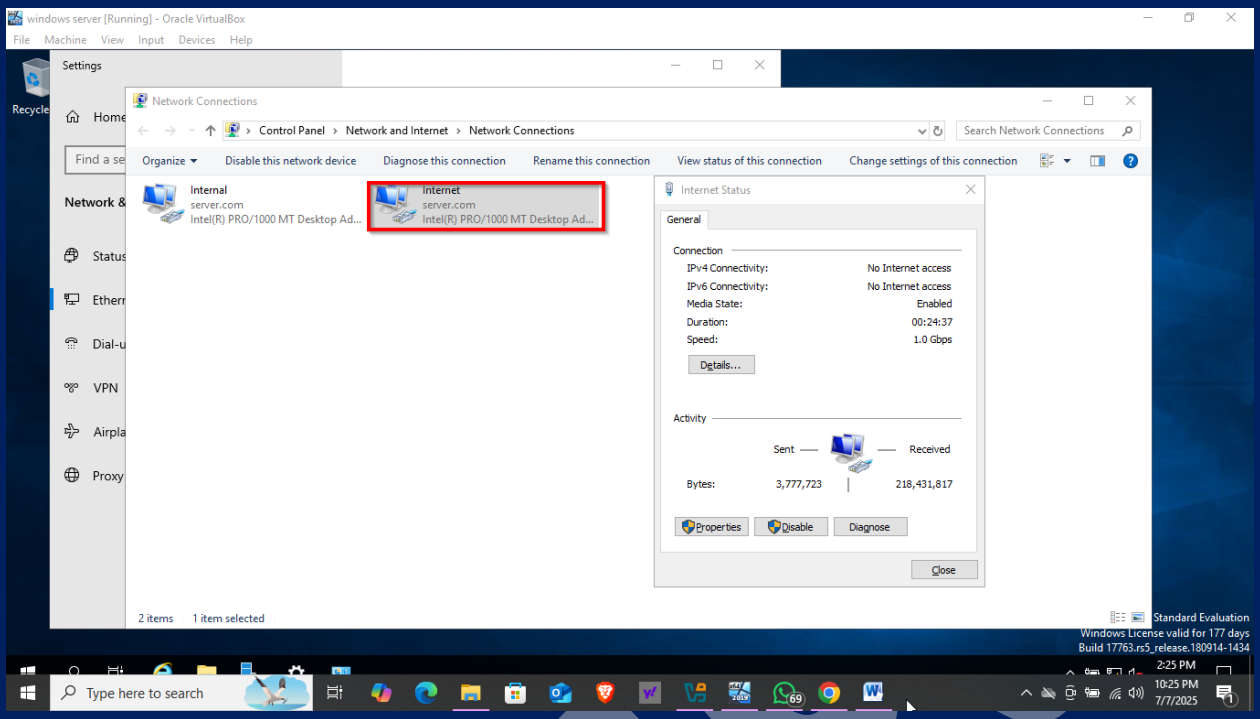

windows server [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Recycle Bin
server.com
No Internet
Network & Internet settings
Change settings, such as making a connection metered.
Airplane mode
Type here to search
2:22 PM
10:22 PM
7/7/2025



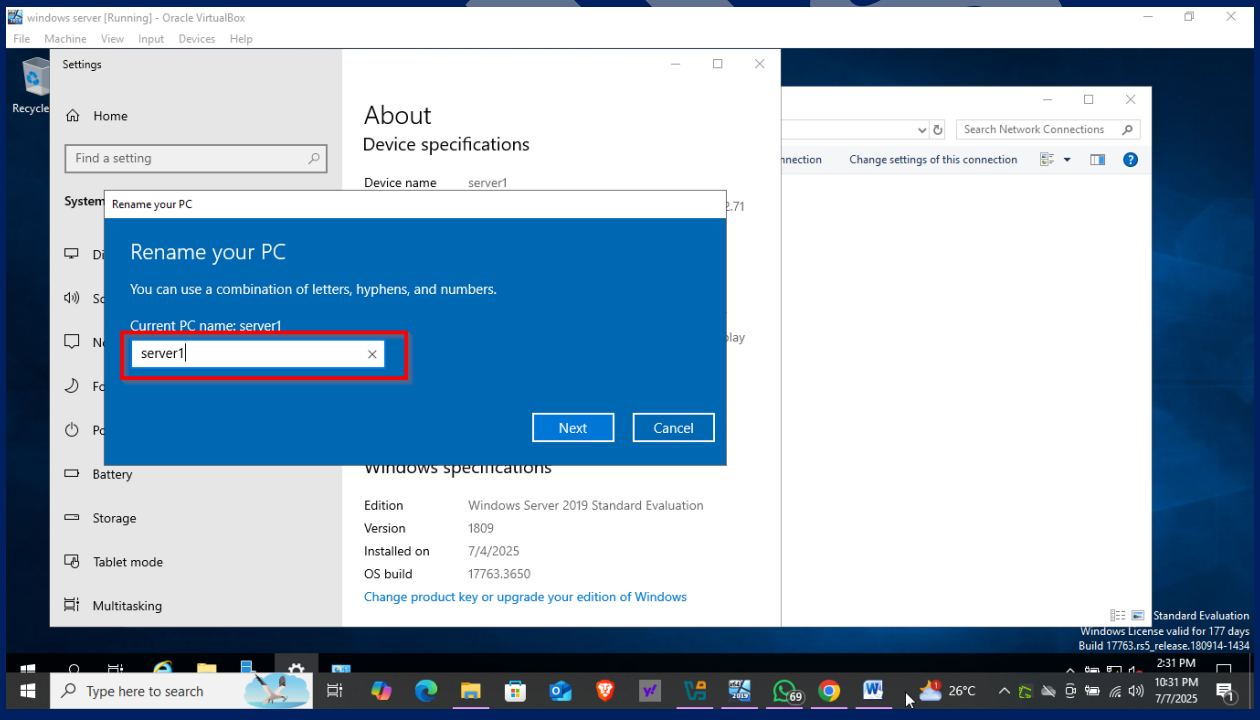
3. Lab Setup Steps

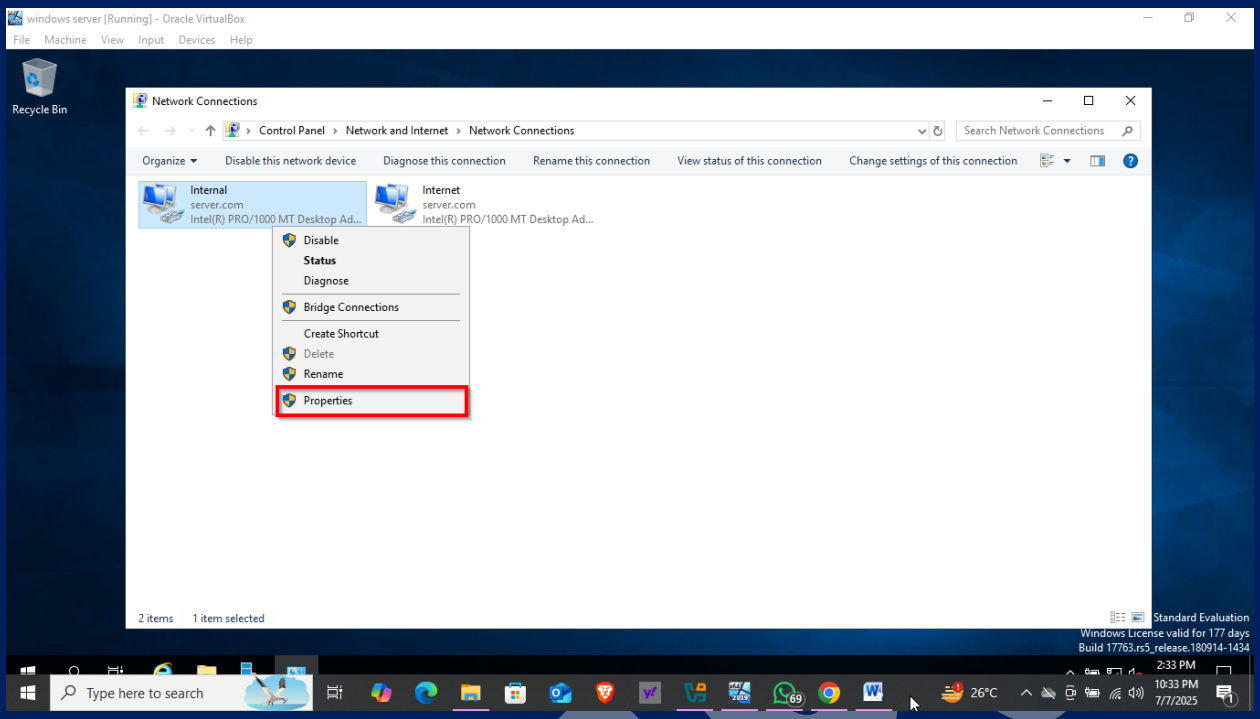
3.1. Virtual Machine Configuration

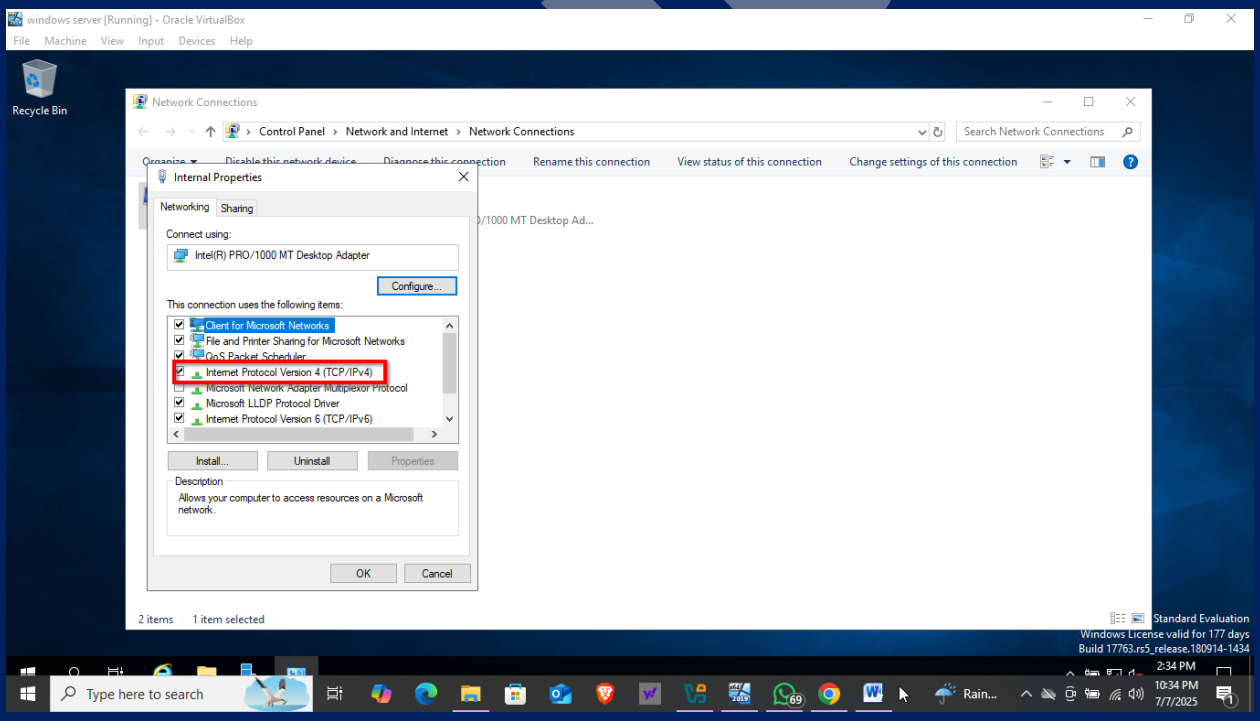
- Created a VM named **DC** for the domain controller.
- OS: Windows Server 64-bit
- Resources: 2GB RAM, 1 CPU core
- Network:
  - **Adapter 1** (NAT) for internet access
  - **Adapter 2** (Internal Network) for local domain traffic



Rename this Pc

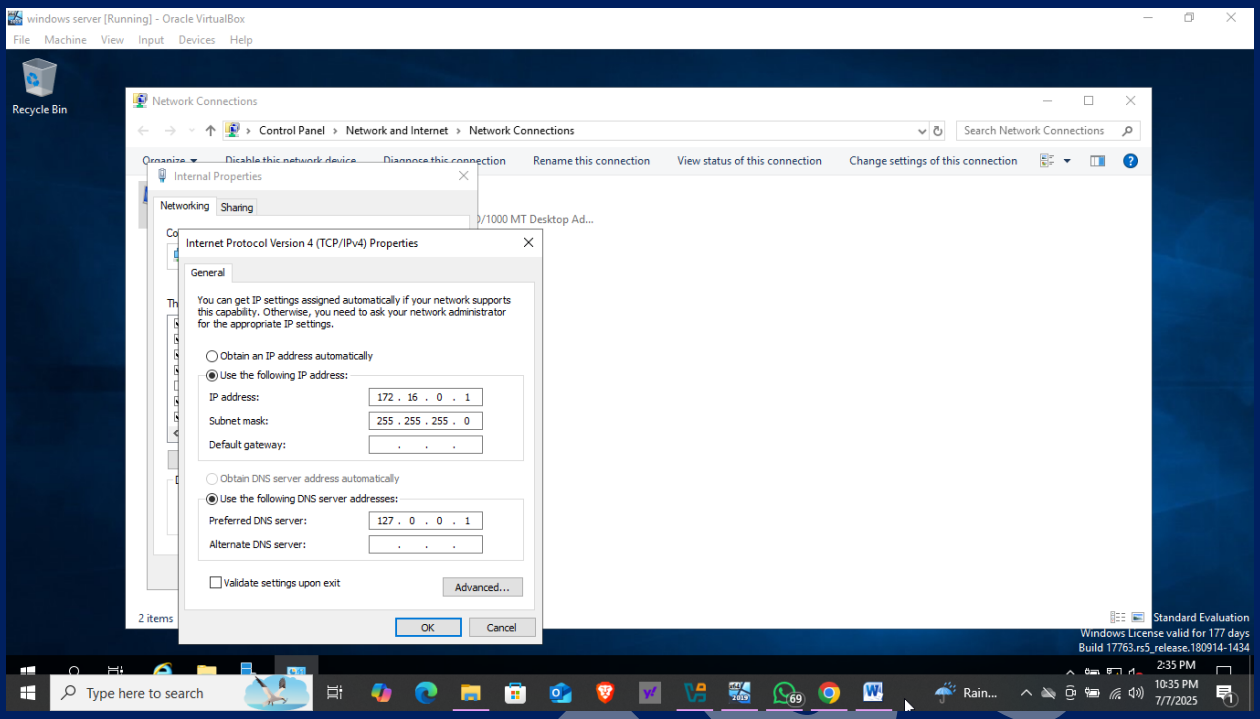






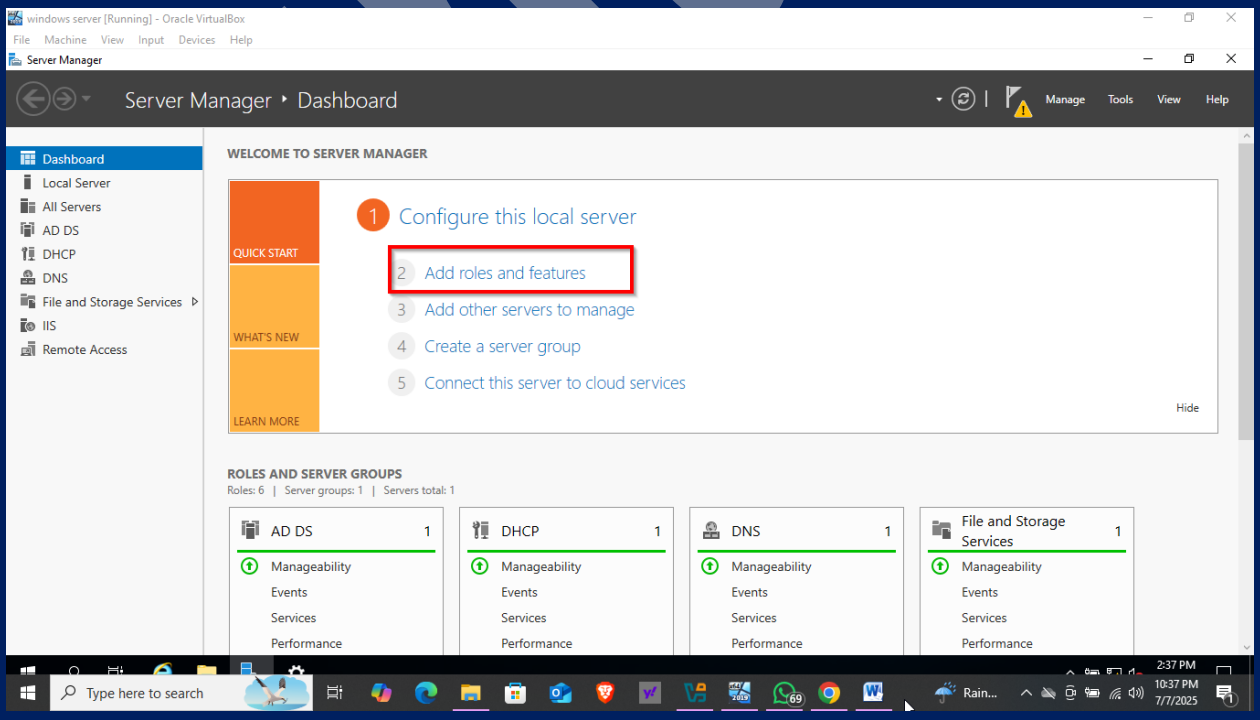
3.2. Network Renaming & IP Assignment

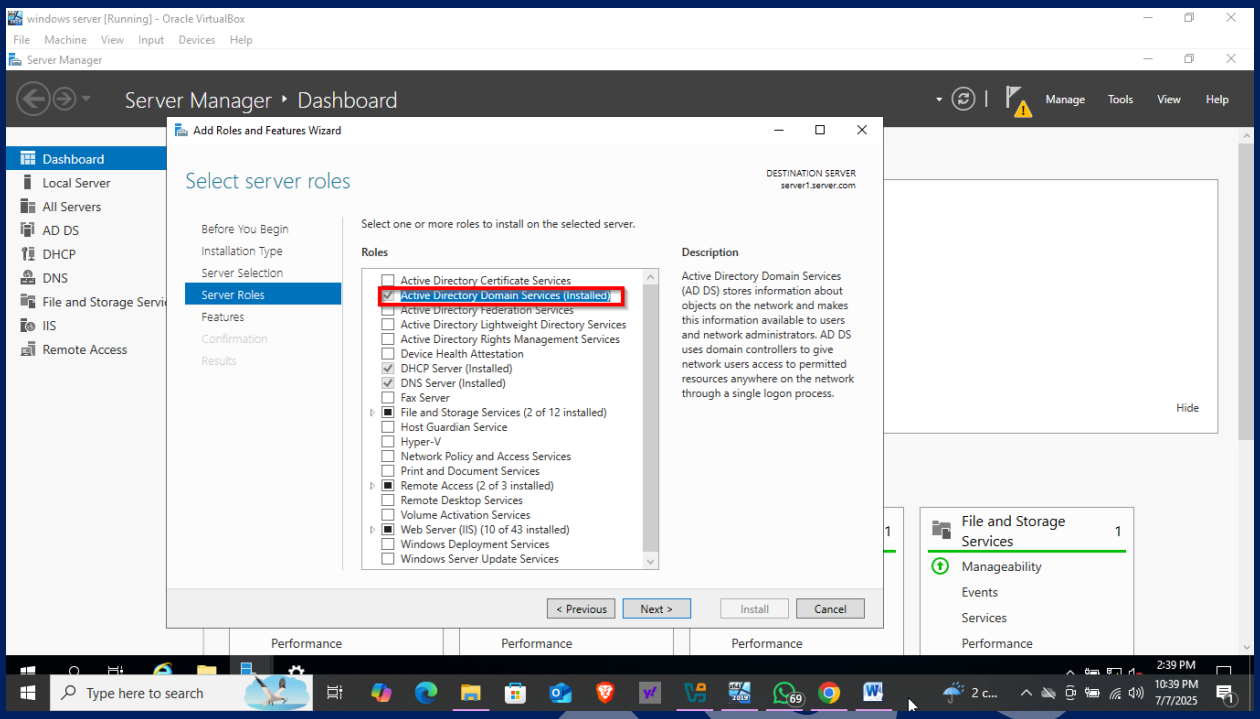
- Renamed adapters for clarity: **Internet** and **Internal**.
- Assigned a static IP to the internal adapter.
- Set DNS to loopback address `127.0.0.1` (to reference itself).

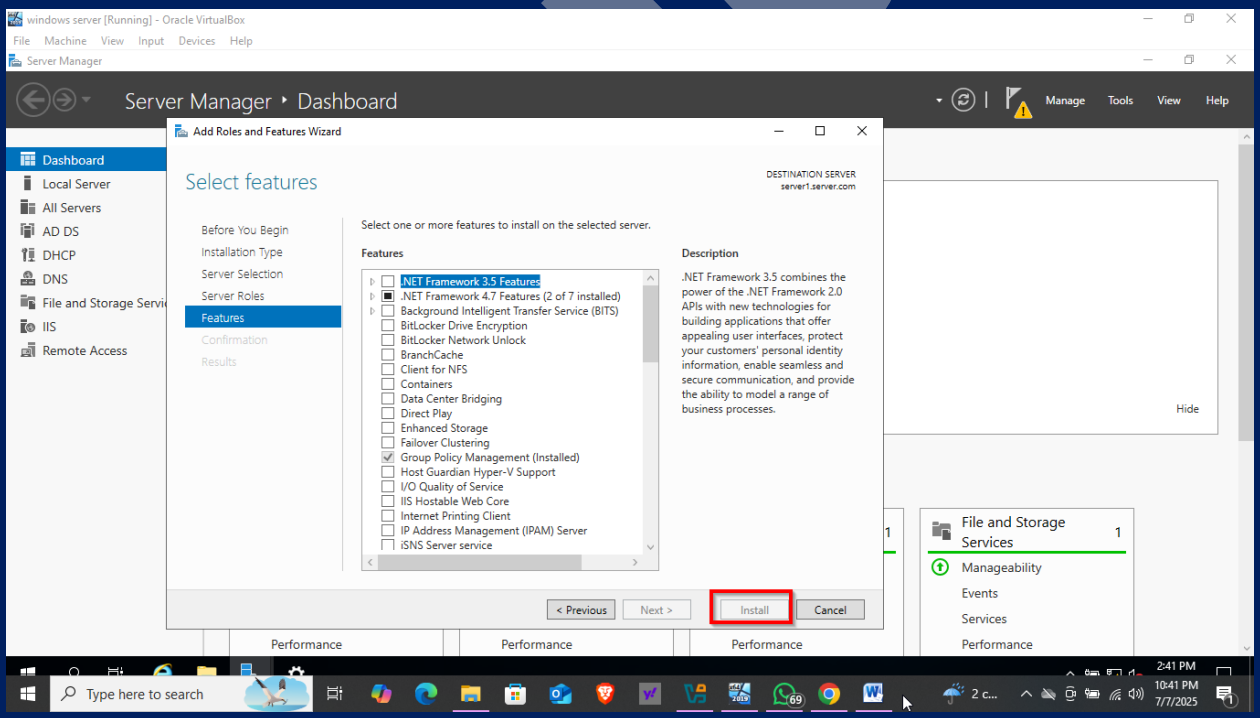


4. Active Directory Setup

- Installed **Active Directory Domain Services (AD DS)** via *Server Manager*.
- Created a new forest with domain: `mydomain.com`.
- Post-installation reboot completed, logged in as `MYDOMAIN\Administrator`.





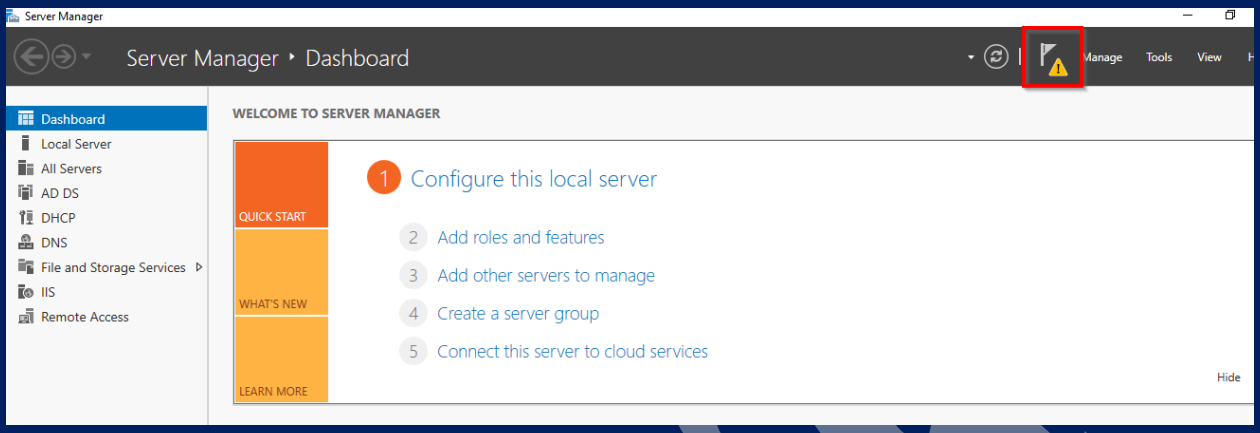


5. Domain Configuration

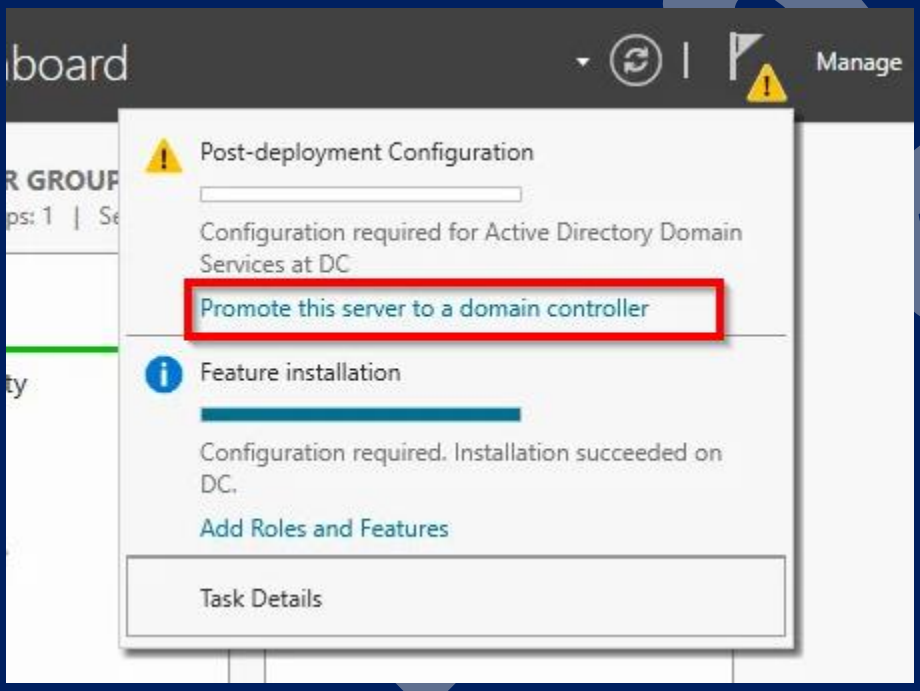
5.1. Account & Organizational Structure

- Created:
  - A dedicated **Domain Admin** account.

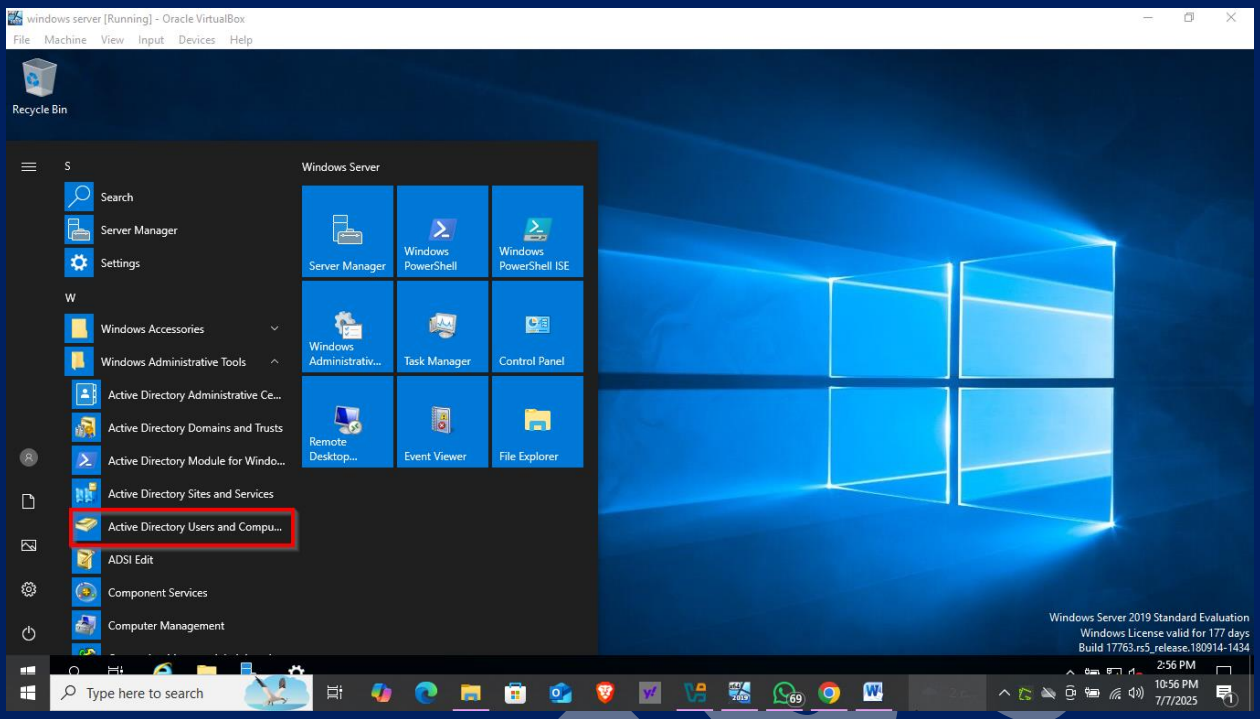
- A new **Organizational Unit (OU)**.
- Several **users** within the OU.



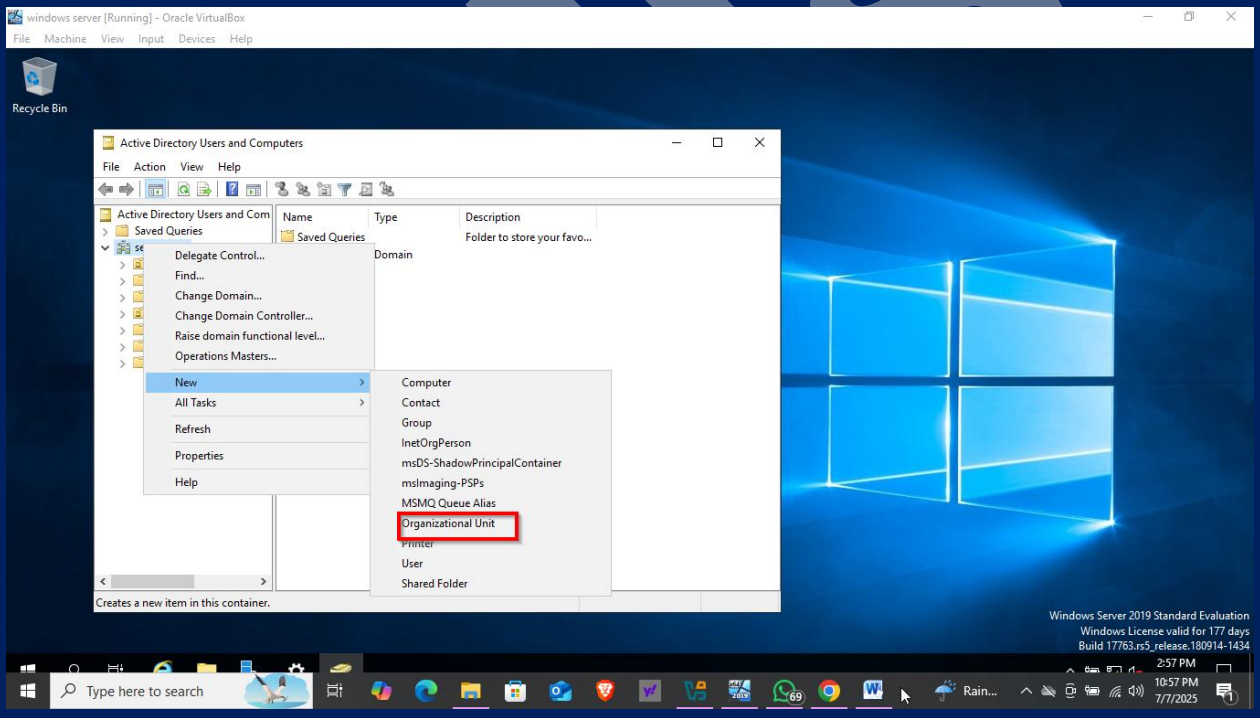
Post Deployment Configuration

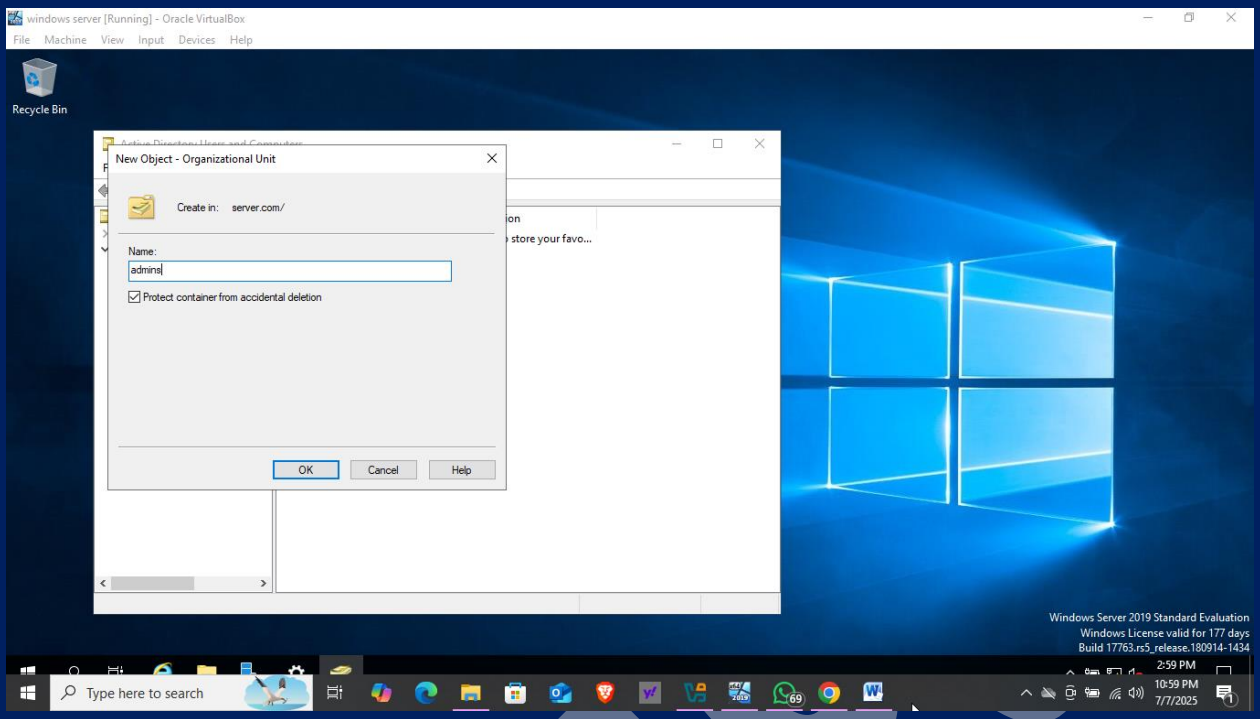


Create Our Own Dedicated Domain Admin Account

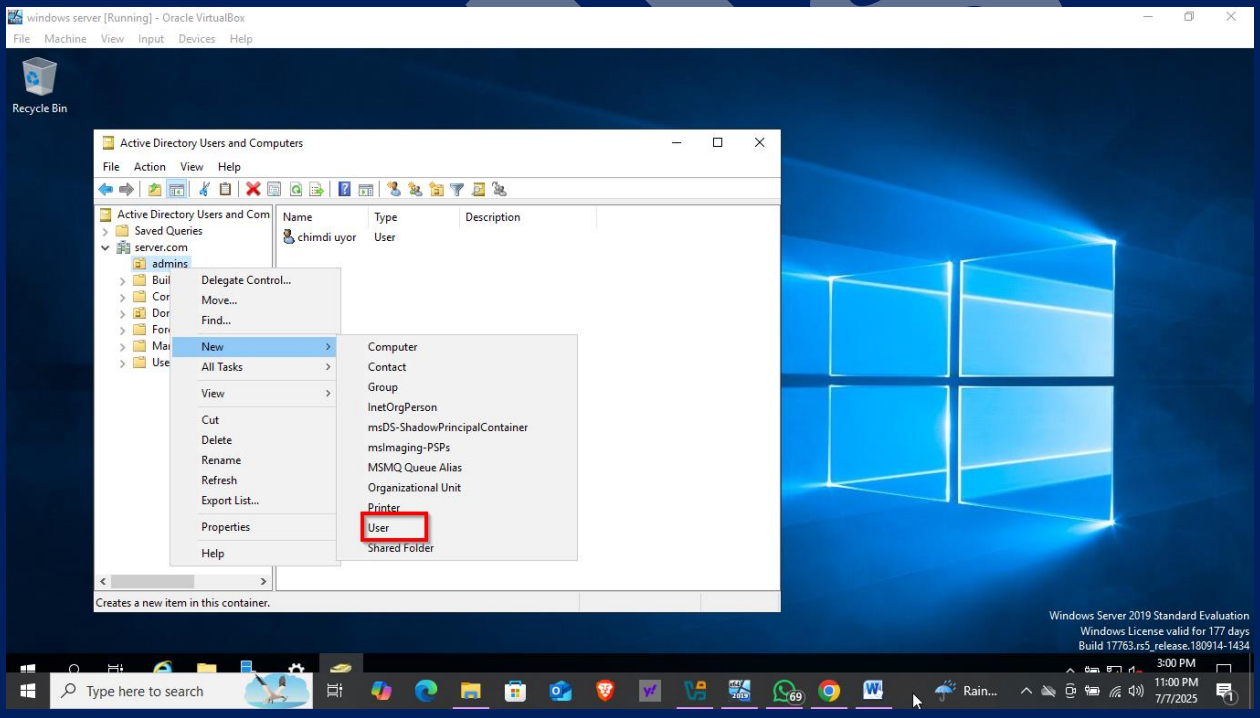


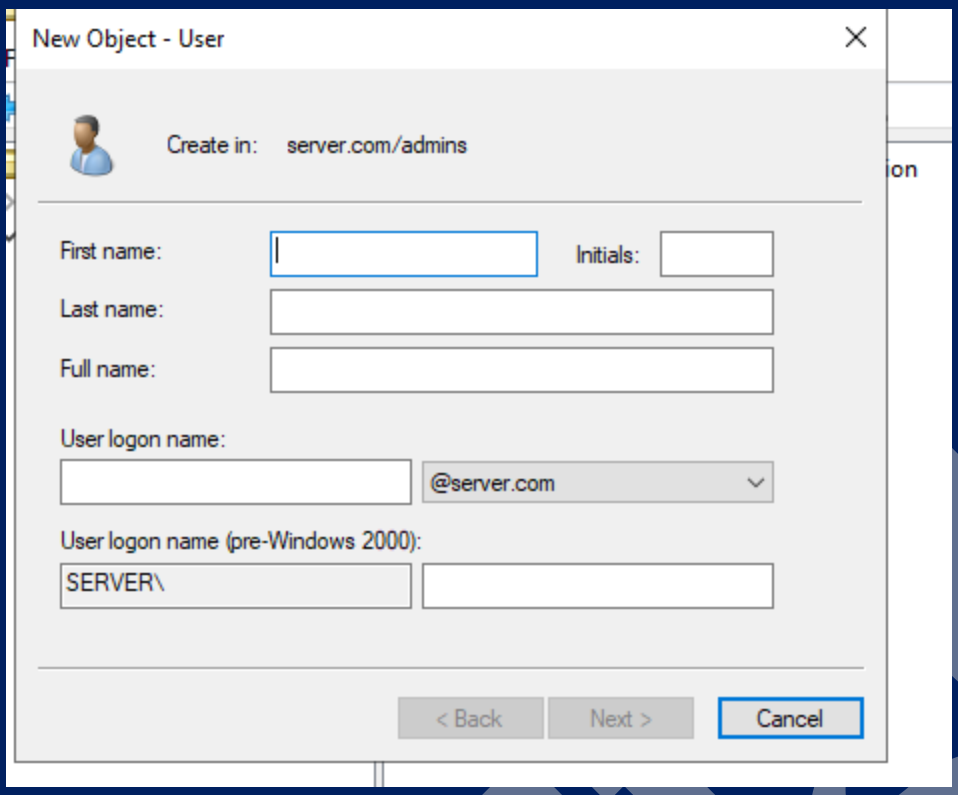
Create an Organization Unit



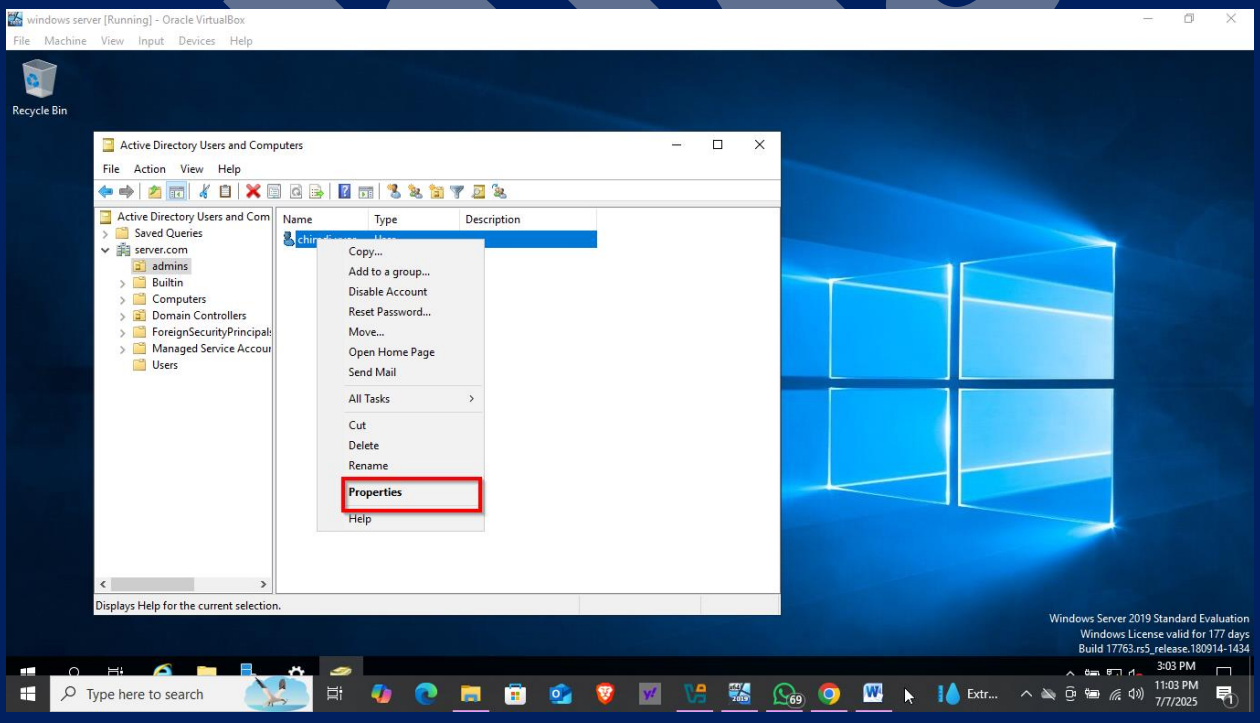


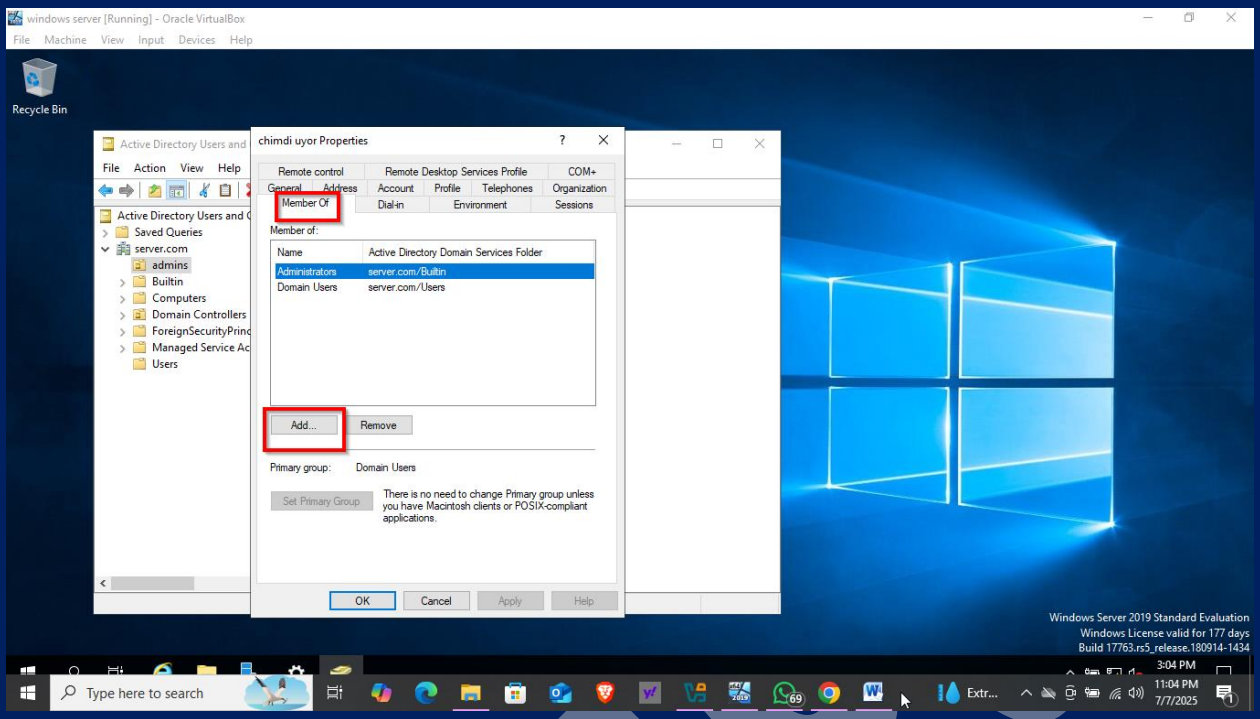
Create a New User

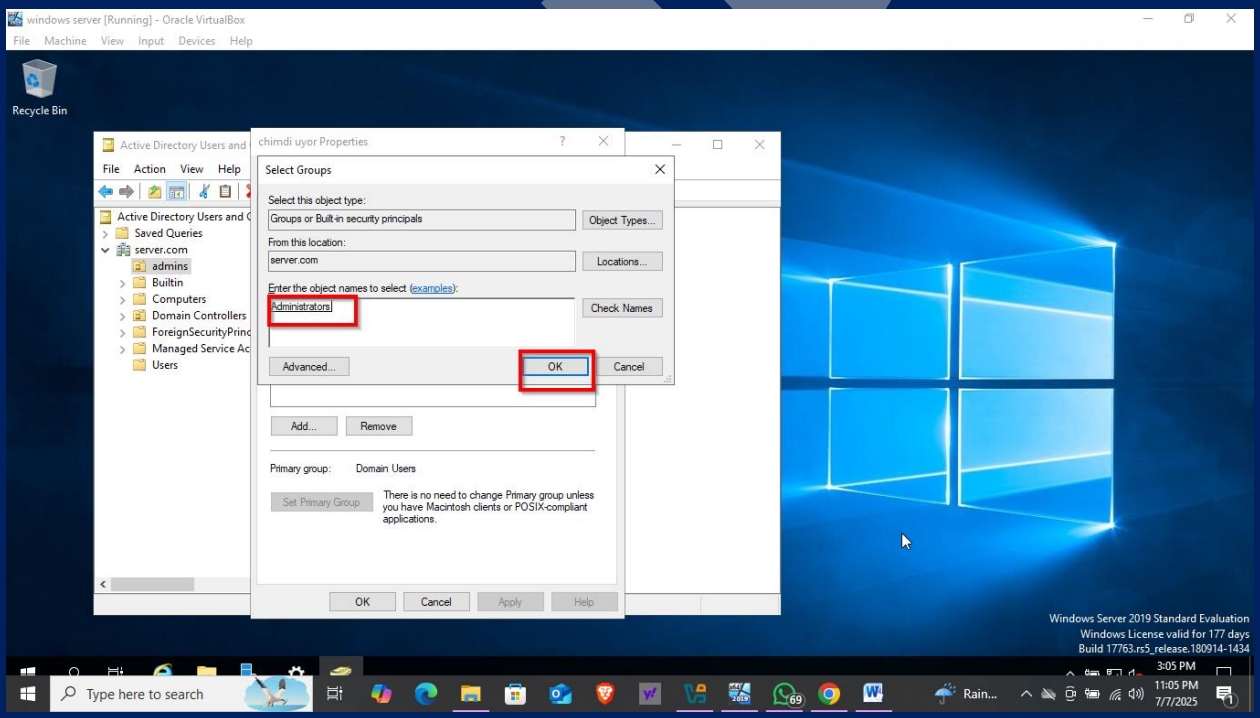




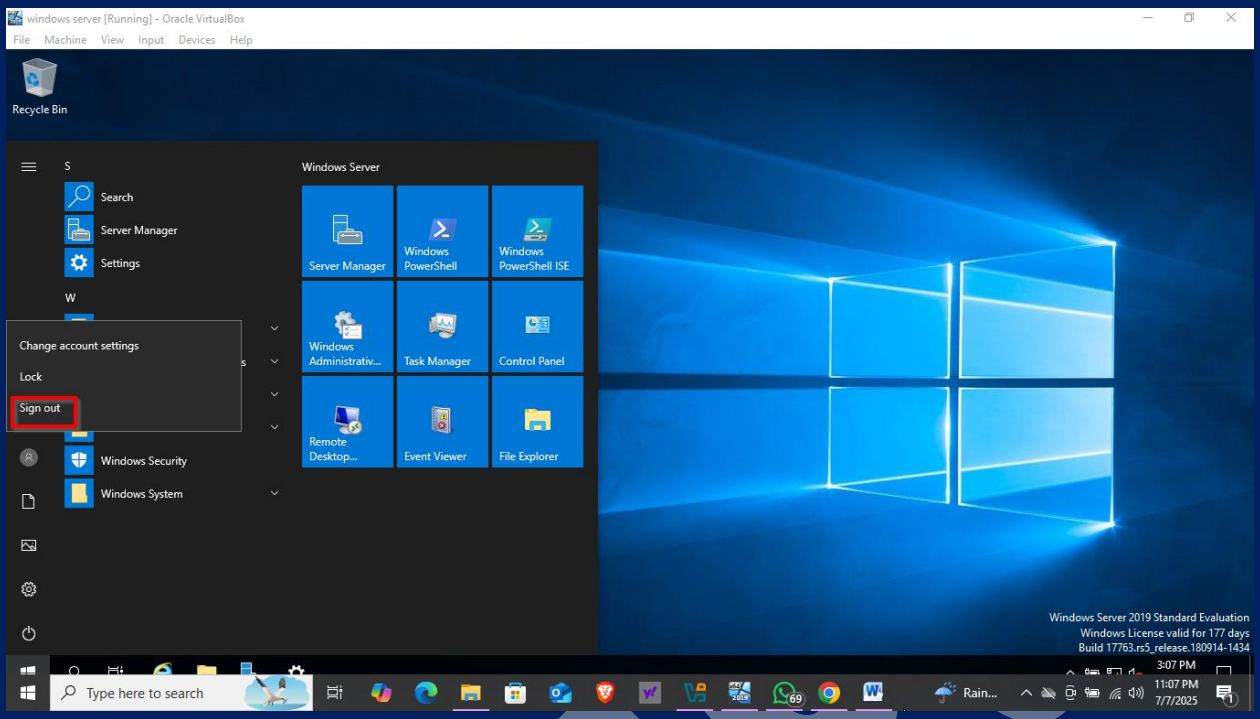
To Make a Domain Admin

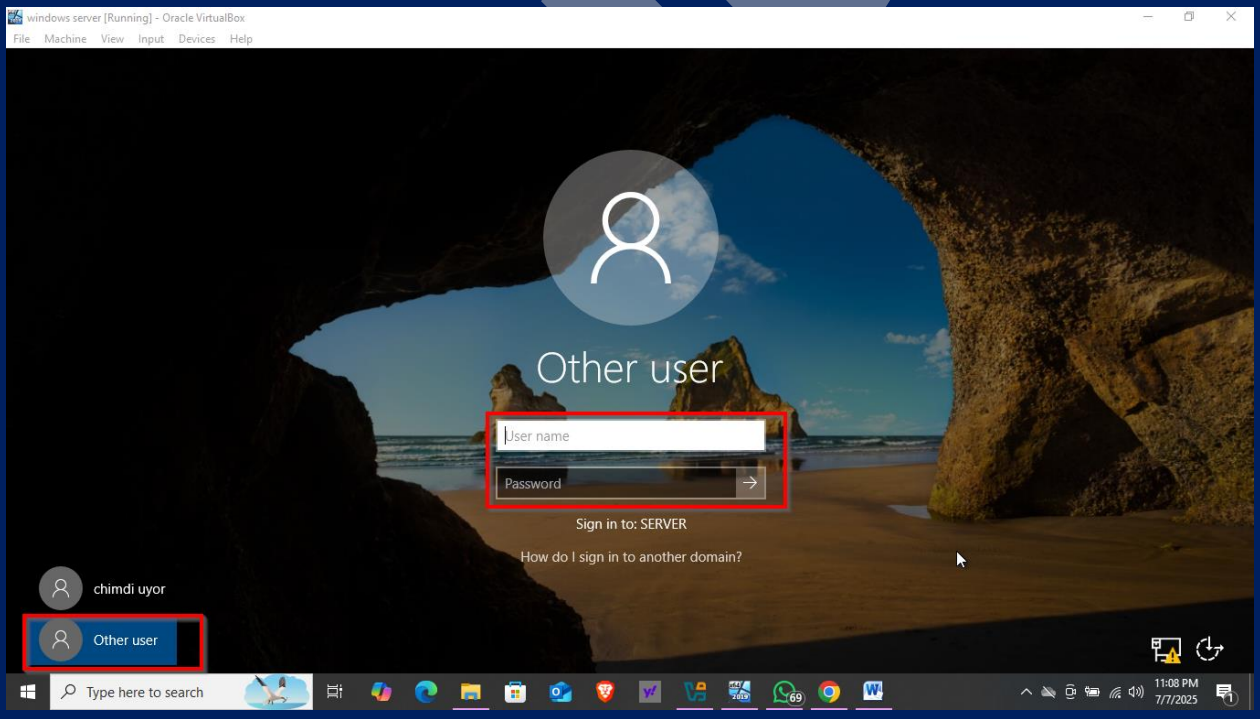






I sign out to login to the other account

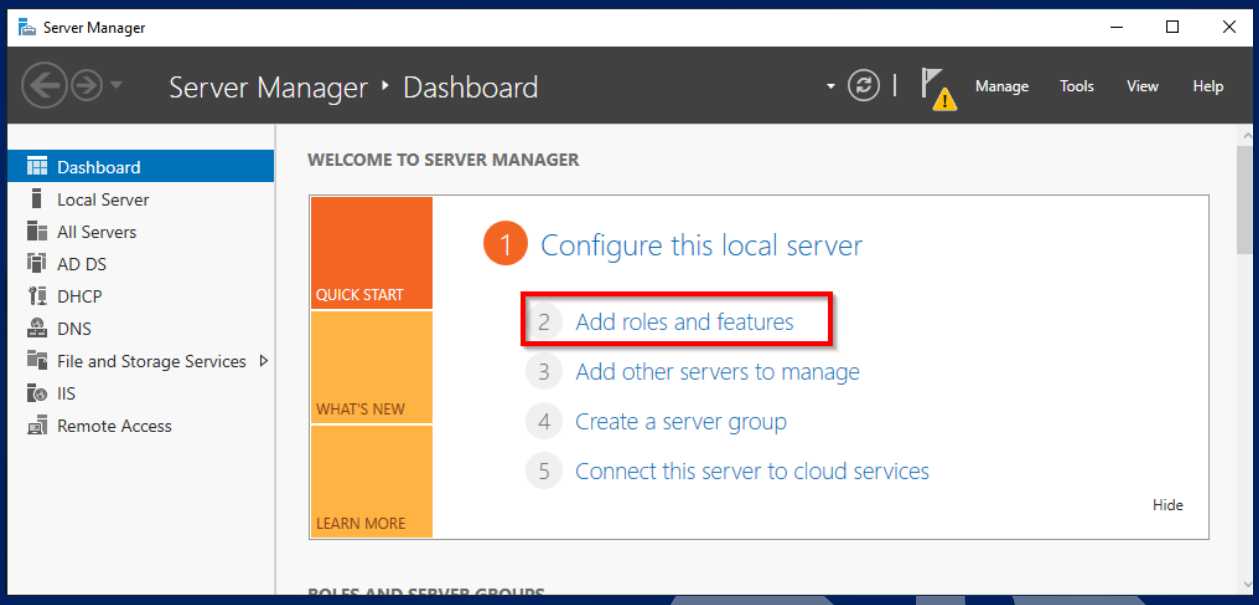


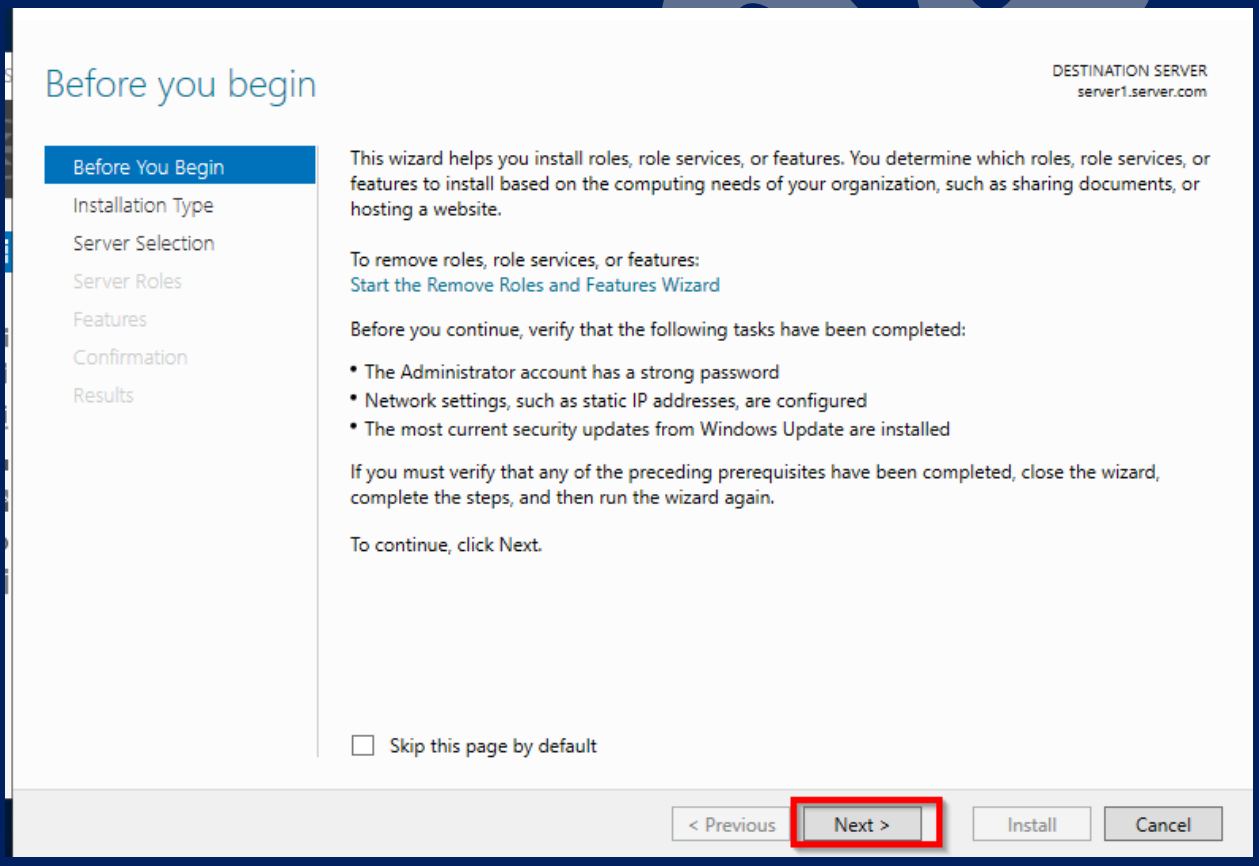


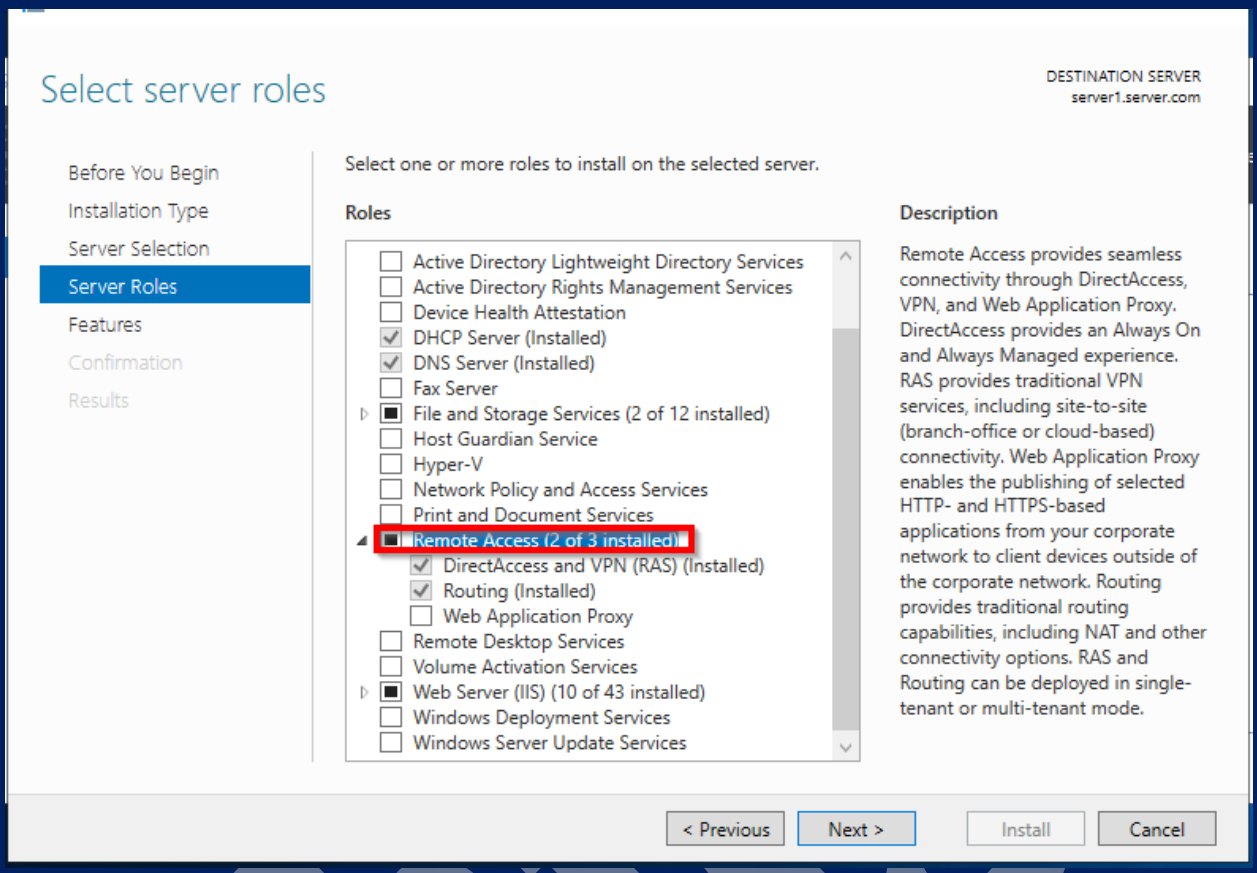
6. Network Services Configuration

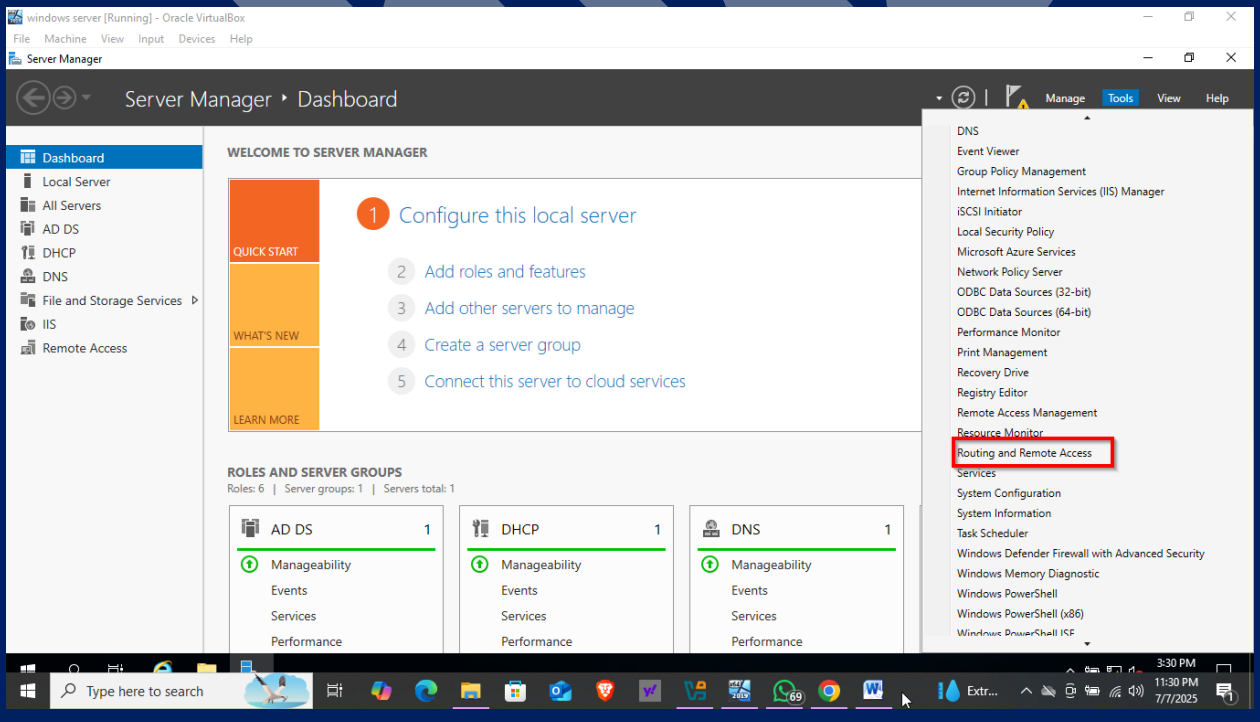
6.1. Routing and Remote Access

- Enabled **Routing and Remote Access** from Server Manager.
- Installed **NAT role** to allow internal machines to access the internet.


Server Manager
Server Manager ▸ Dashboard
Manage
Tools
View
Help
Dashboard
Local Server
All Servers
AD DS
DHCP
DNS
File and Storage Services
IIS
Remote Access
WELCOME TO SERVER MANAGER
QUICK START
WHAT'S NEW
LEARN MORE
1 Configure this local server
2 Add roles and features
3 Add other servers to manage
4 Create a server group
5 Connect this server to cloud services
Hide

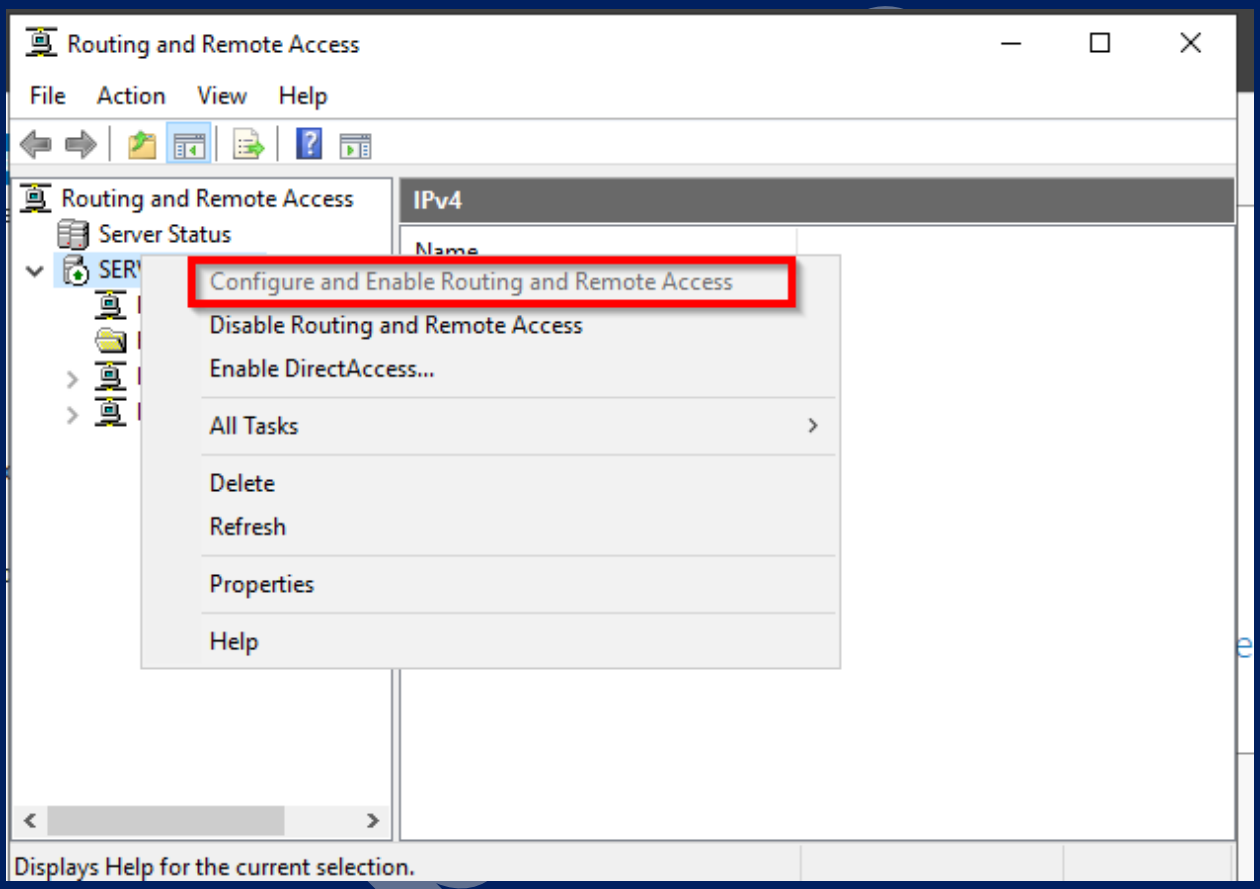

Before you begin
DESTINATION SERVER
server1.server.com
Before You Begin
Installation Type
Server Selection
Server Roles
Features
Confirmation
Results
This wizard helps you install roles, role services, or features. You determine which roles, role services, or features to install based on the computing needs of your organization, such as sharing documents, or hosting a website.
To remove roles, role services, or features:
Start the Remove Roles and Features Wizard
Before you continue, verify that the following tasks have been completed:
• The Administrator account has a strong password
• Network settings, such as static IP addresses, are configured
• The most current security updates from Windows Update are installed
If you must verify that any of the preceding prerequisites have been completed, close the wizard, complete the steps, and then run the wizard again.
To continue, click Next.
Skip this page by default
< Previous
Next >
Install
Cancel


Select server roles
DESTINATION SERVER
server1.server.com
Before You Begin
Installation Type
Server Selection
Server Roles
Features
Confirmation
Results
Select one or more roles to install on the selected server.
Roles
Active Directory Lightweight Directory Services
Active Directory Rights Management Services
Device Health Attestation
DHCP Server (Installed)
DNS Server (Installed)
Fax Server
File and Storage Services (2 of 12 installed)
Host Guardian Service
Hyper-V
Network Policy and Access Services
Print and Document Services
Remote Access (2 of 3 installed)
DirectAccess and VPN (RAS) (Installed)
Routing (Installed)
Web Application Proxy
Remote Desktop Services
Volume Activation Services
Web Server (IIS) (10 of 43 installed)
Windows Deployment Services
Windows Server Update Services
Description
Remote Access provides seamless connectivity through DirectAccess, VPN, and Web Application Proxy. DirectAccess provides an Always On and Always Managed experience. RAS provides traditional VPN services, including site-to-site (branch-office or cloud-based) connectivity. Web Application Proxy enables the publishing of selected HTTP- and HTTPS-based applications from your corporate network to client devices outside of the corporate network. Routing provides traditional routing capabilities, including NAT and other connectivity options. RAS and Routing can be deployed in single-tenant or multi-tenant mode.
< Previous
Next >
Install
Cancel

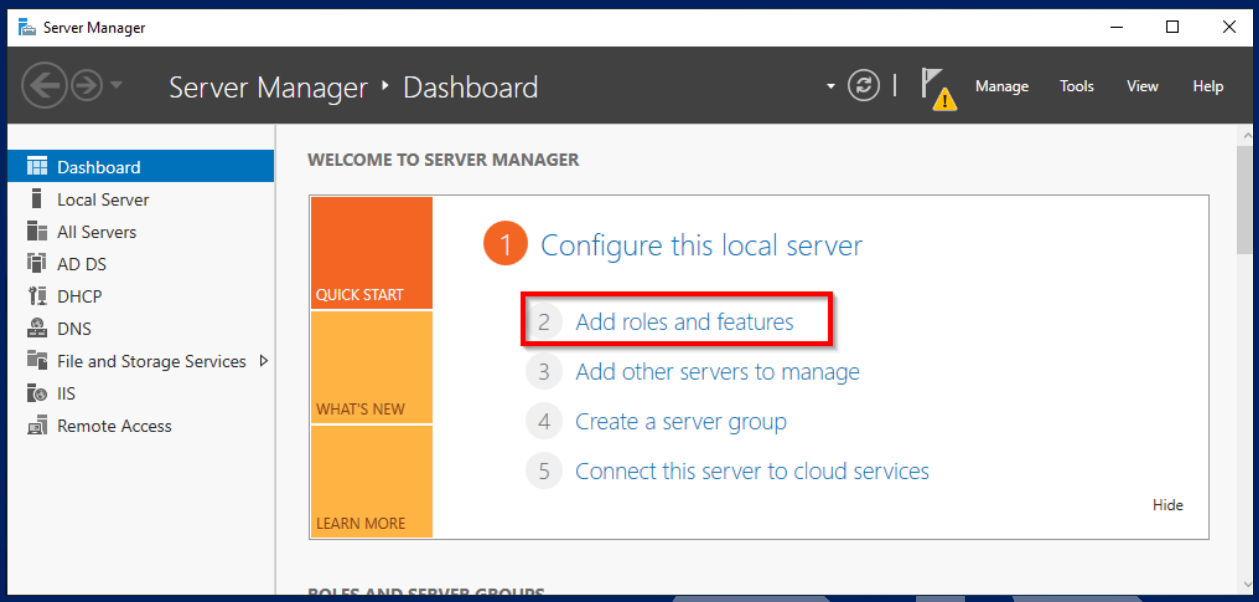

windows server [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Server Manager
Server Manager ‣ Dashboard
Manage Tools View Help
Dashboard
Local Server
All Servers
AD DS
DHCP
DNS
File and Storage Services
IIS
Remote Access
WELCOME TO SERVER MANAGER
QUICK START
WHAT'S NEW
LEARN MORE
1 Configure this local server
2 Add roles and features
3 Add other servers to manage
4 Create a server group
5 Connect this server to cloud services
ROLES AND SERVER GROUPS
Roles: 6 | Server groups: 1 | Servers total: 1
AD DS 1
DHCP 1
DNS 1
Manageability
Events
Services
Performance
DNS
Event Viewer
Group Policy Management
Internet Information Services (IIS) Manager
iSCSI Initiator
Local Security Policy
Microsoft Azure Services
Network Policy Server
ODBC Data Sources (32-bit)
ODBC Data Sources (64-bit)
Performance Monitor
Print Management
Recovery Drive
Registry Editor
Remote Access Management
Resource Monitor
Routing and Remote Access
Services
System Configuration
System Information
Task Scheduler
Windows Defender Firewall with Advanced Security
Windows Memory Diagnostic
Windows PowerShell
Windows PowerShell (x86)
Type here to search
3:30 PM
11:30 PM
7/7/2025

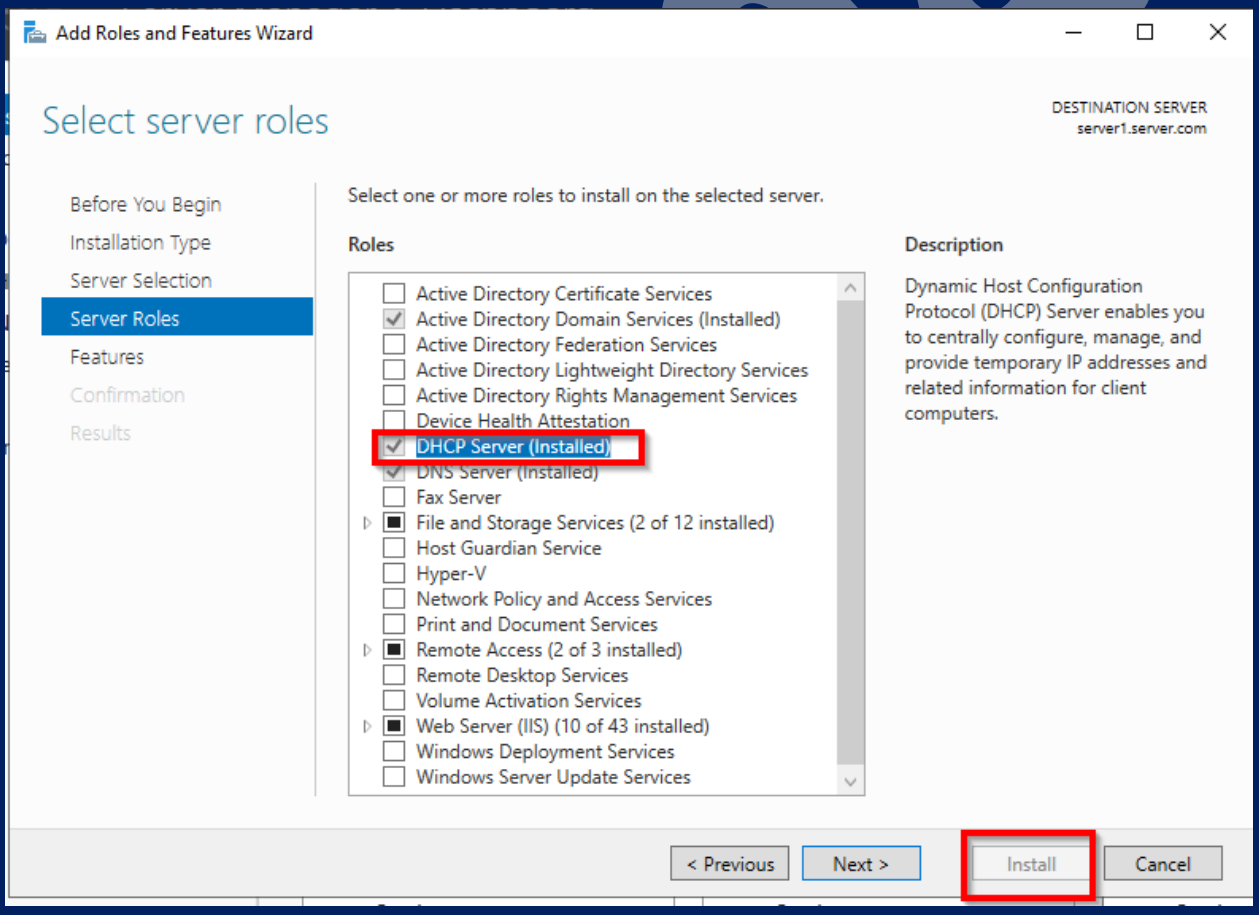
6.2. DHCP Server Installation

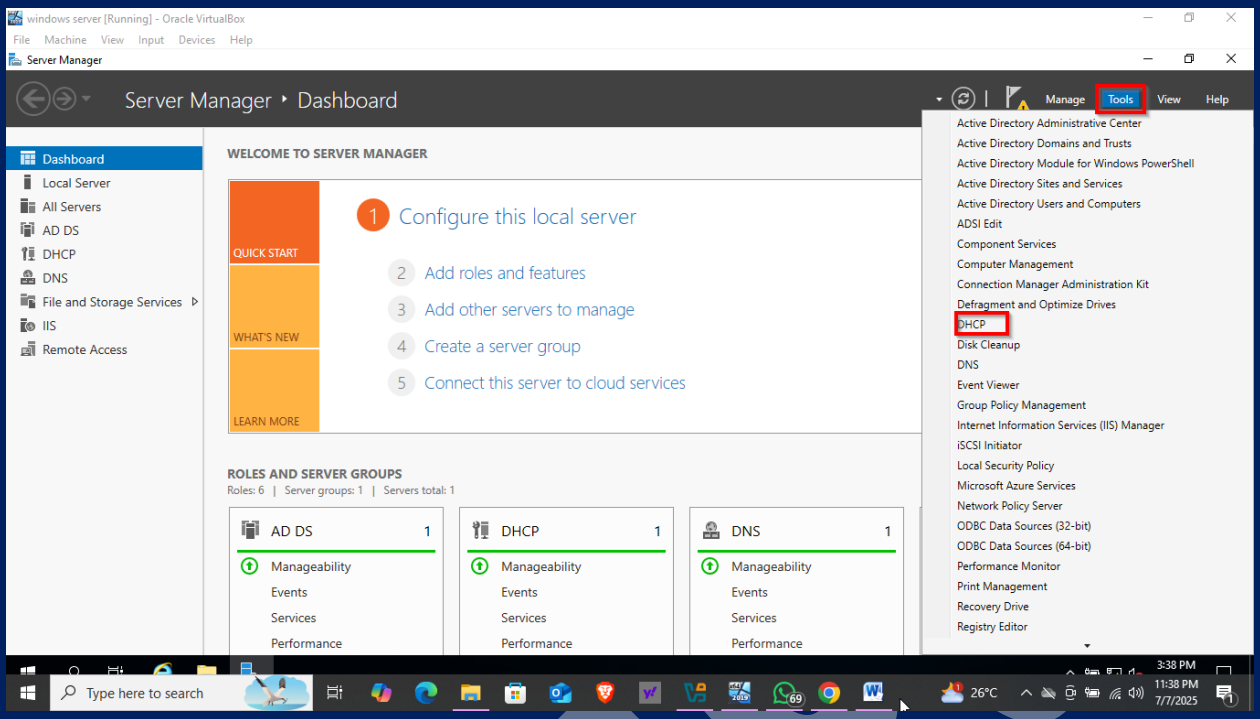
- Installed and configured **DHCP Server** on the DC.
- Defined:
  - IP address pool for internal clients.
  - Default gateway (router IP).
  - DNS settings linked to domain controller.
- Ensured client machine could obtain IP dynamically.



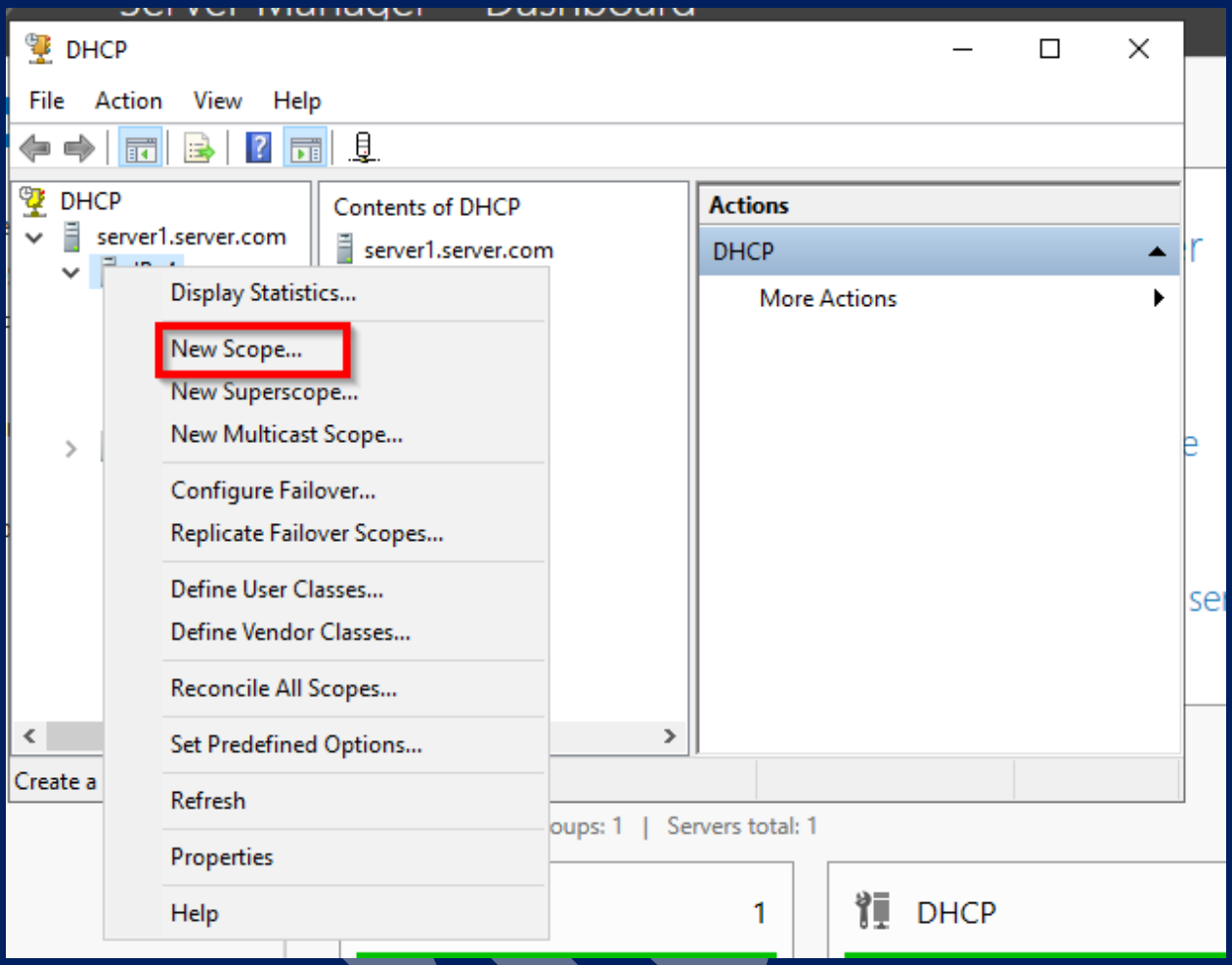
Setting up a DHCP Server on Our Domain Controller

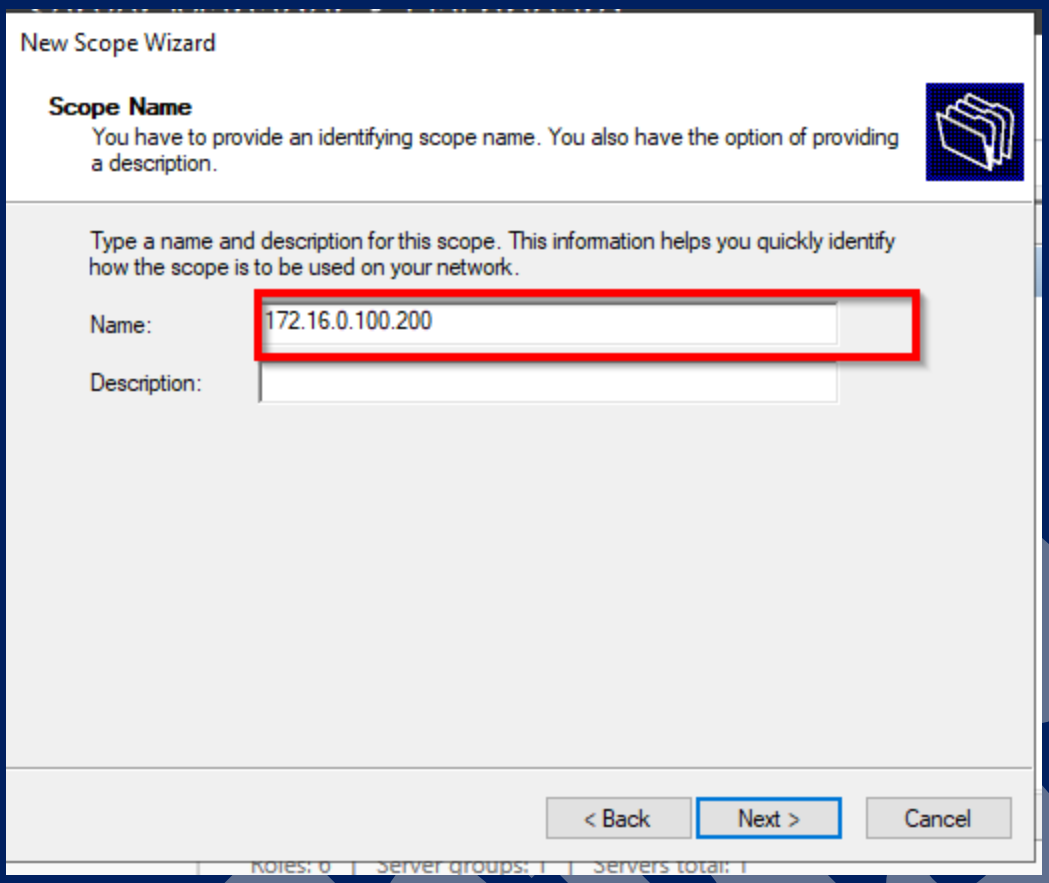

Server Manager
Server Manager ‣ Dashboard
Manage
Tools
View
Help
Dashboard
Local Server
All Servers
AD DS
DHCP
DNS
File and Storage Services
IIS
Remote Access
WELCOME TO SERVER MANAGER
QUICK START
WHAT'S NEW
LEARN MORE
1 Configure this local server
2 Add roles and features
3 Add other servers to manage
4 Create a server group
5 Connect this server to cloud services
Hide

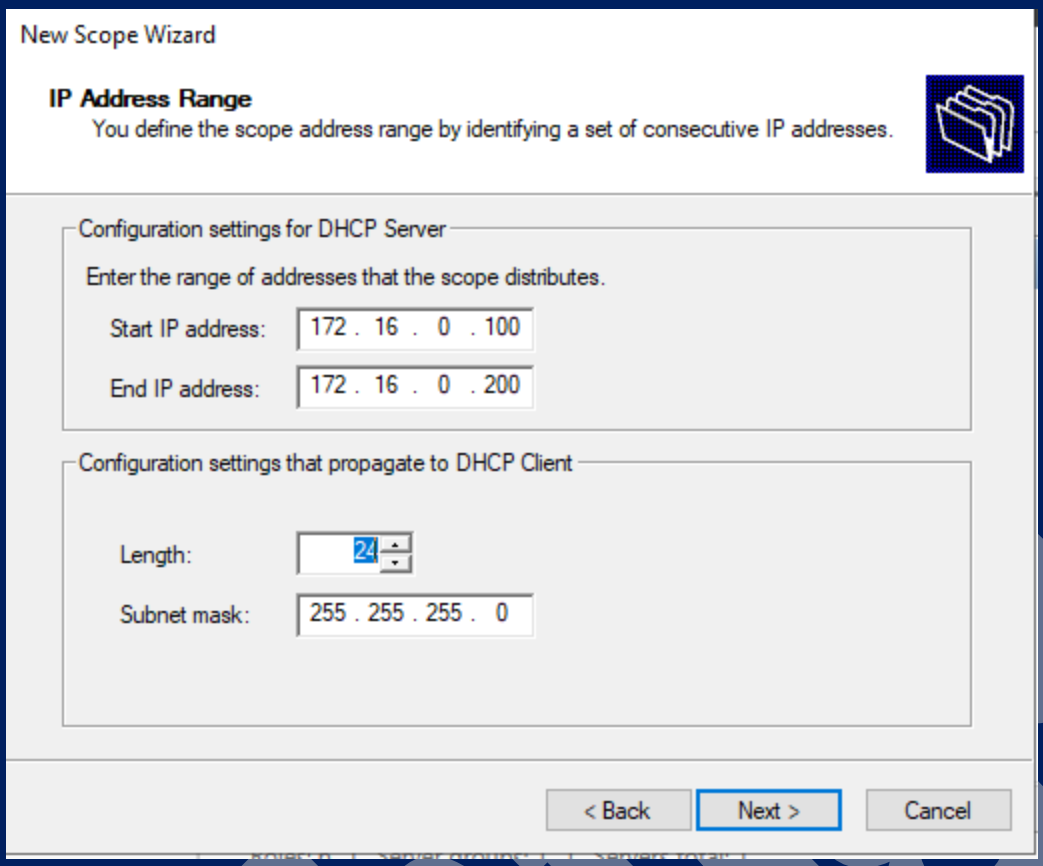

Add Roles and Features Wizard
Select server roles
DESTINATION SERVER
server1.server.com
Before You Begin
Installation Type
Server Selection
Server Roles
Features
Confirmation
Results
Select one or more roles to install on the selected server.
Roles
Active Directory Certificate Services
Active Directory Domain Services (Installed)
Active Directory Federation Services
Active Directory Lightweight Directory Services
Active Directory Rights Management Services
Device Health Attestation
DHCP Server (Installed)
DNS Server (Installed)
Fax Server
File and Storage Services (2 of 12 installed)
Host Guardian Service
Hyper-V
Network Policy and Access Services
Print and Document Services
Remote Access (2 of 3 installed)
Remote Desktop Services
Volume Activation Services
Web Server (IIS) (10 of 43 installed)
Windows Deployment Services
Windows Server Update Services
Description
Dynamic Host Configuration Protocol (DHCP) Server enables you to centrally configure, manage, and provide temporary IP addresses and related information for client computers.
< Previous
Next >
Install
Cancel

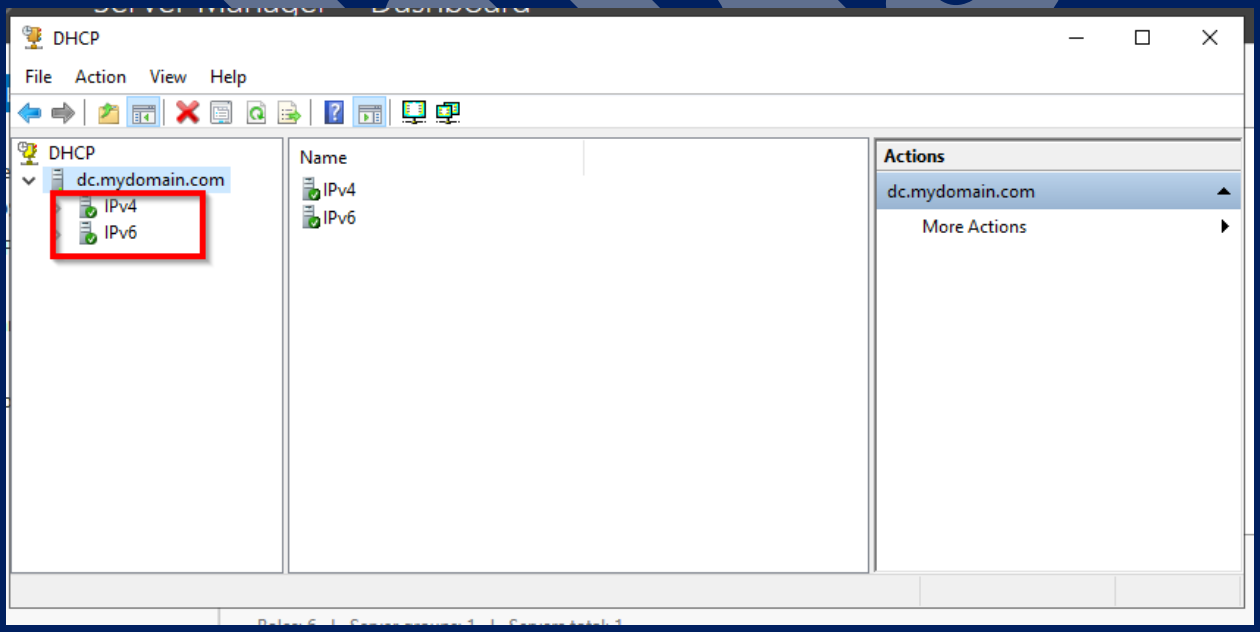


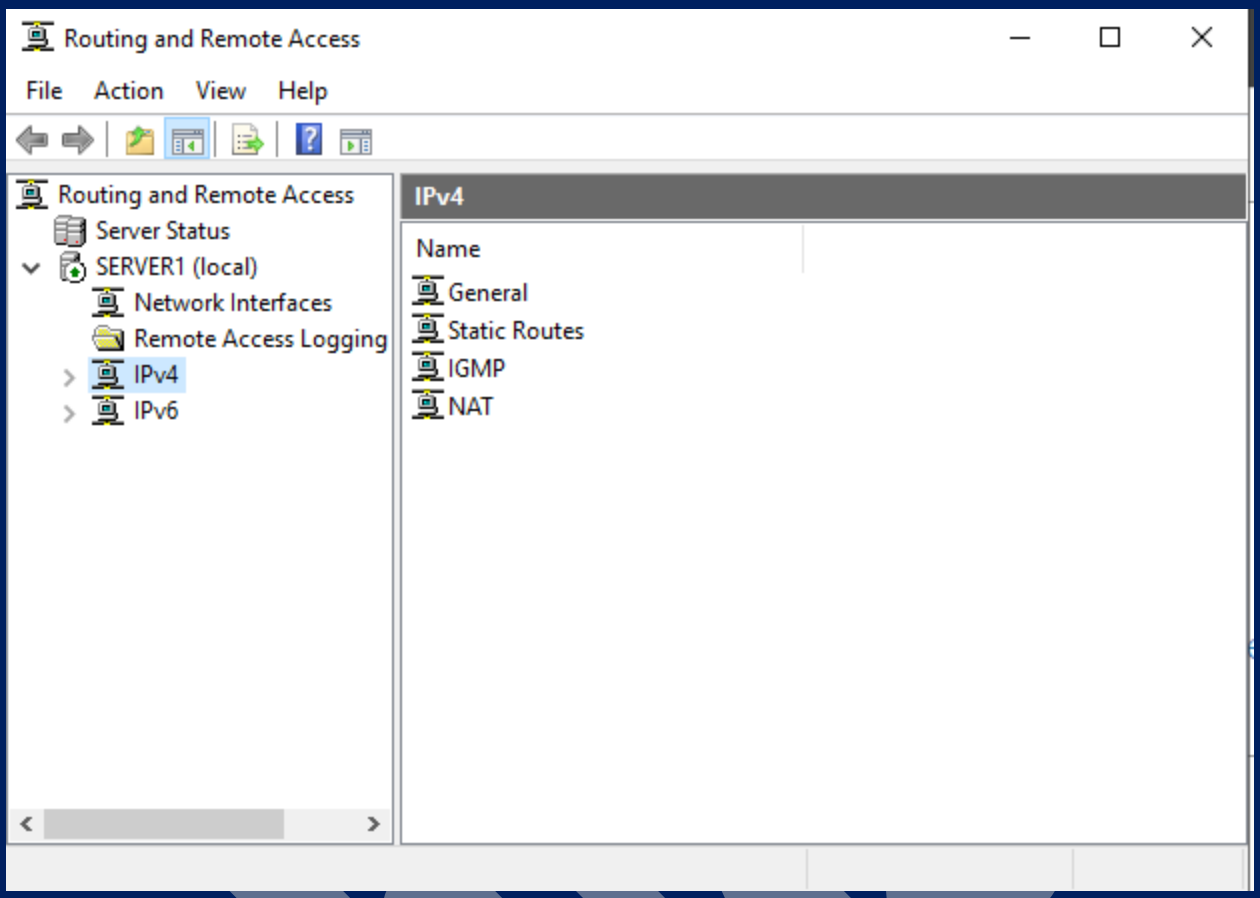
Configure the DHCP options and adding IP Address for a Router

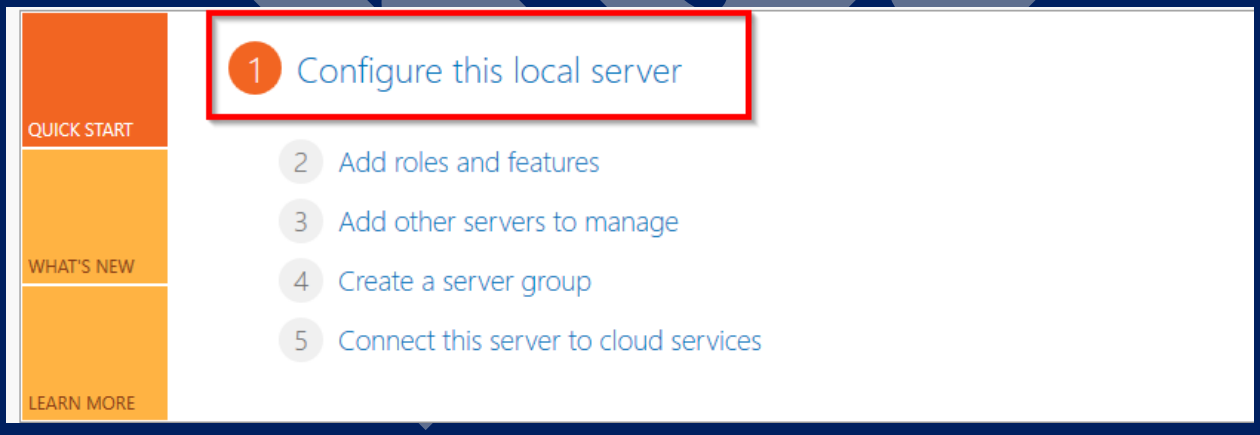

DHCP
File
Action
View
Help
DHCP
server1.server.com
Contents of DHCP
server1.server.com
Actions
DHCP
More Actions
Display Statistics...
New Scope...
New Superscope...
New Multicast Scope...
Configure Failover...
Replicate Failover Scopes...
Define User Classes...
Define Vendor Classes...
Reconcile All Scopes...
Set Predefined Options...
Refresh
Properties
Help
Create a
oups: 1 | Servers total: 1
1
DHCP


New Scope Wizard
Scope Name
You have to provide an identifying scope name. You also have the option of providing a description.
Type a name and description for this scope. This information helps you quickly identify how the scope is to be used on your network.
Name:
172.16.0.100.200
Description:
< Back
Next >
Cancel


New Scope Wizard
IP Address Range
You define the scope address range by identifying a set of consecutive IP addresses.
Configuration settings for DHCP Server
Enter the range of addresses that the scope distributes.
Start IP address: 172 . 16 . 0 . 100
End IP address: 172 . 16 . 0 . 200
Configuration settings that propagate to DHCP Client
Length: 24
Subnet mask: 255 . 255 . 255 . 0
< Back
Next >
Cancel


DHCP
File Action View Help
DHCP
dc.mydomain.com
IPv4
IPv6
Name
IPv4
IPv6
Actions
dc.mydomain.com
More Actions

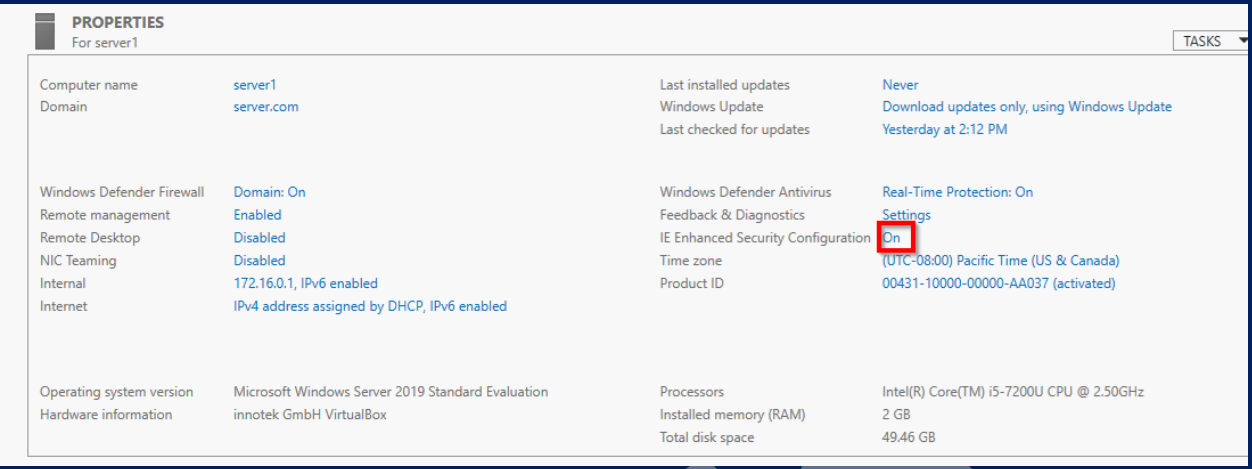




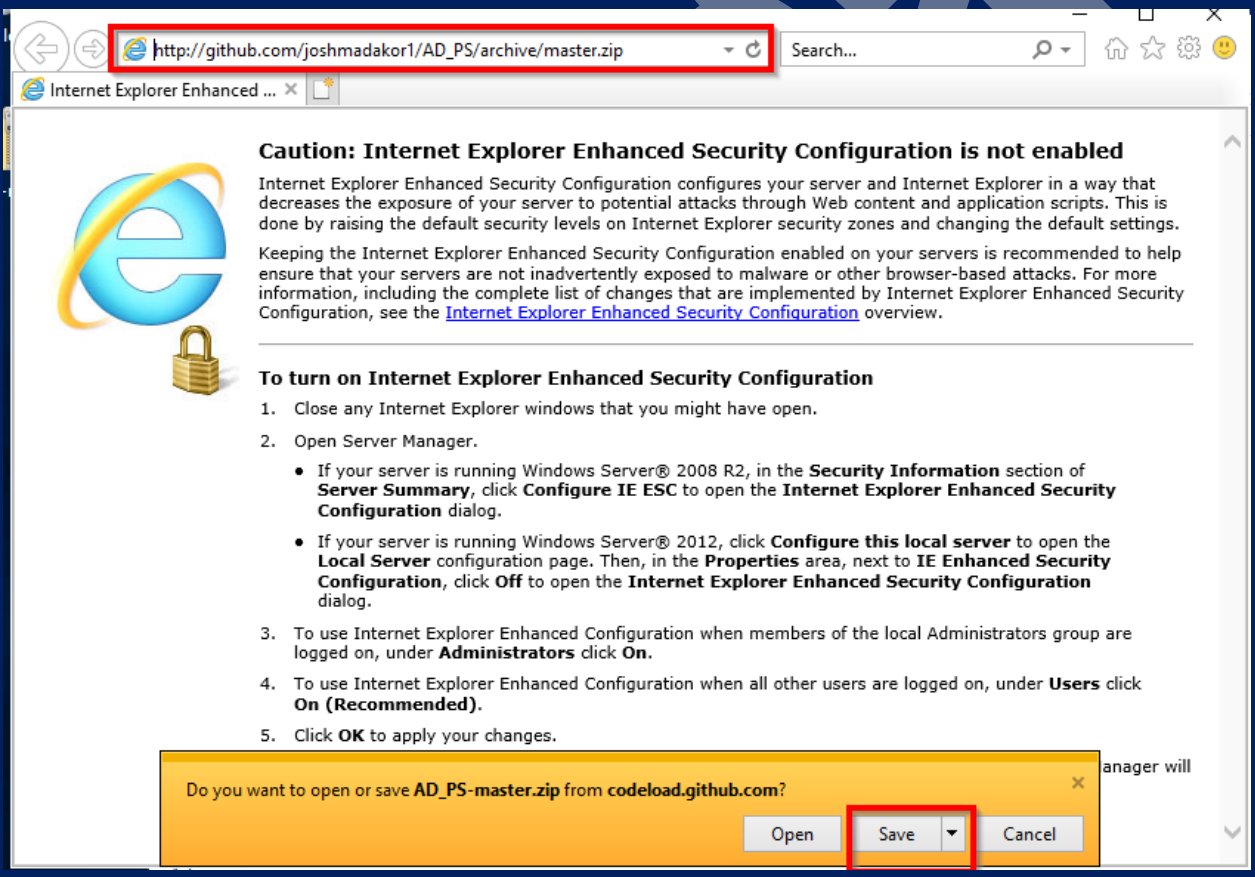
I have to turn off the security before using the browser

7. Security Note

- Temporarily disabled Windows Defender for browser-based operations during setup.
- Restored security settings post-configuration.



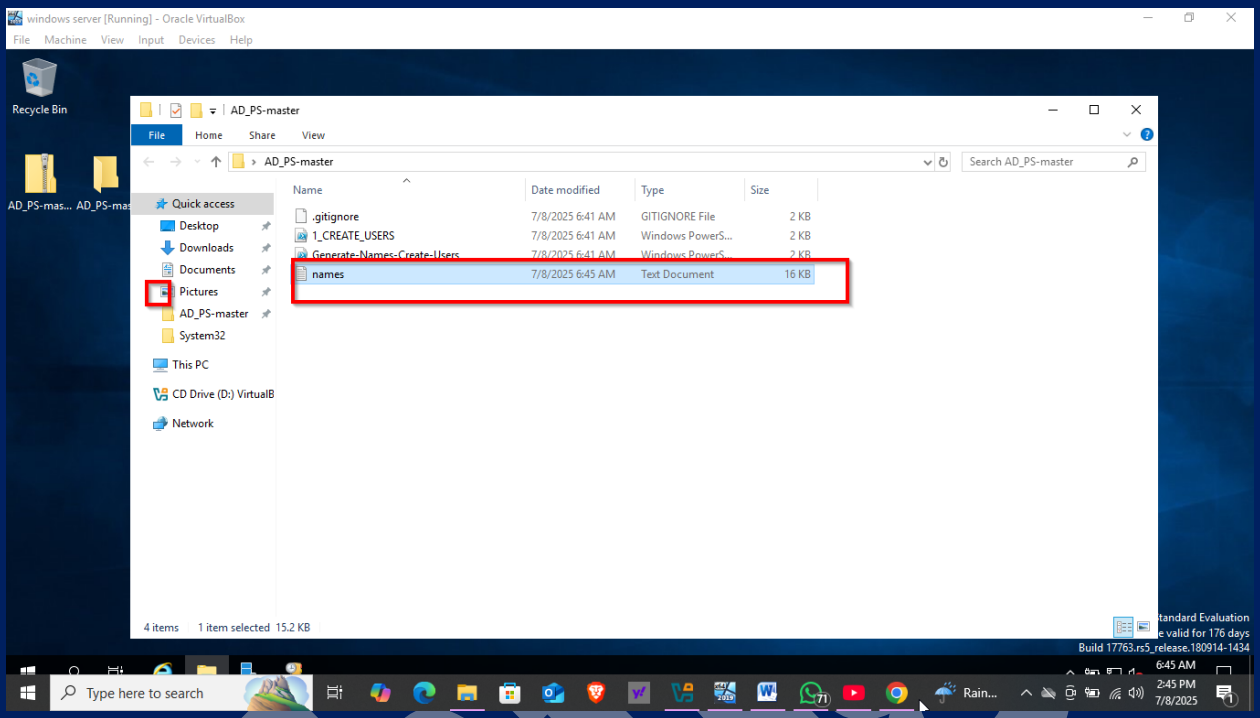
Link I use in getting the source code I use in PowerShell script

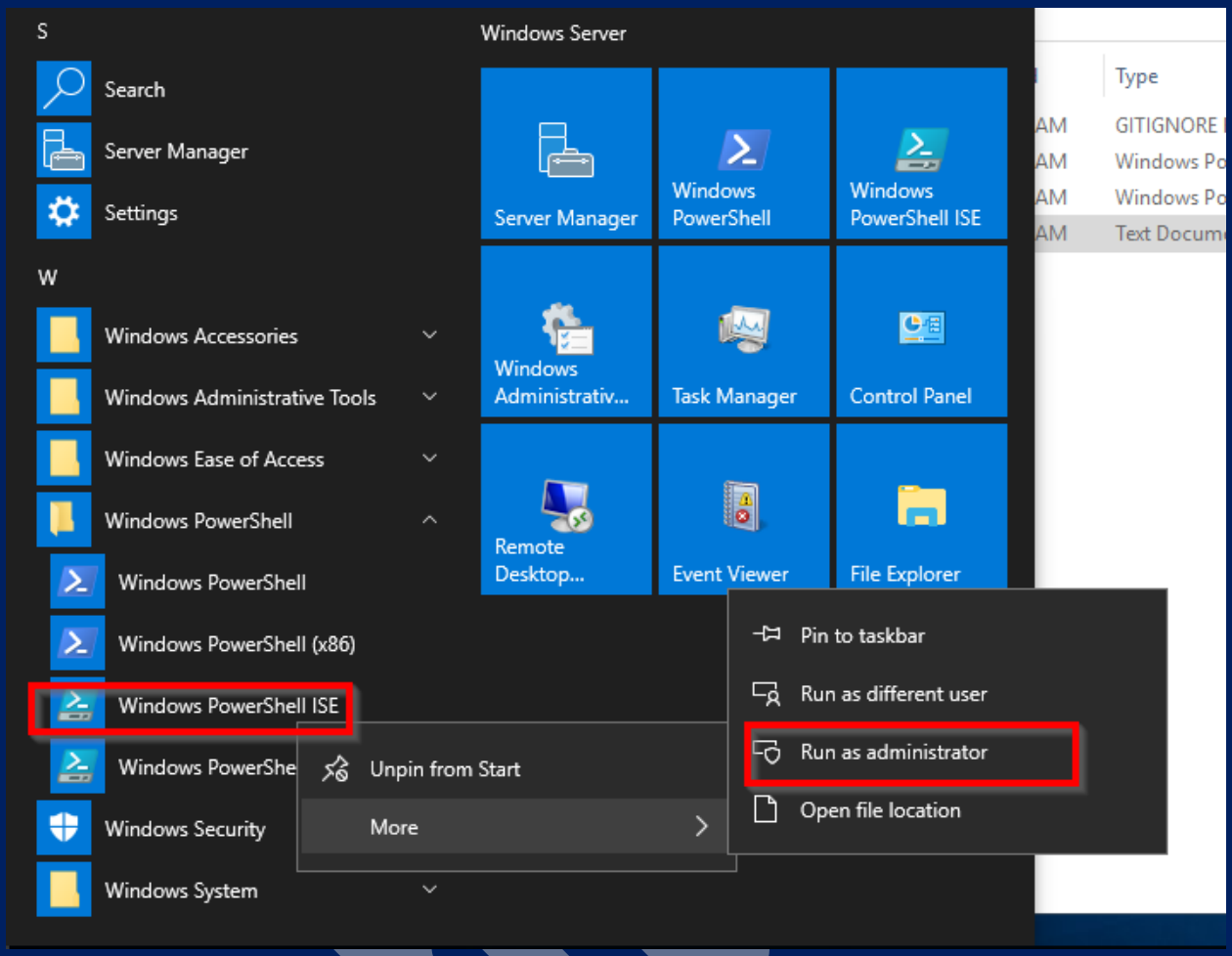


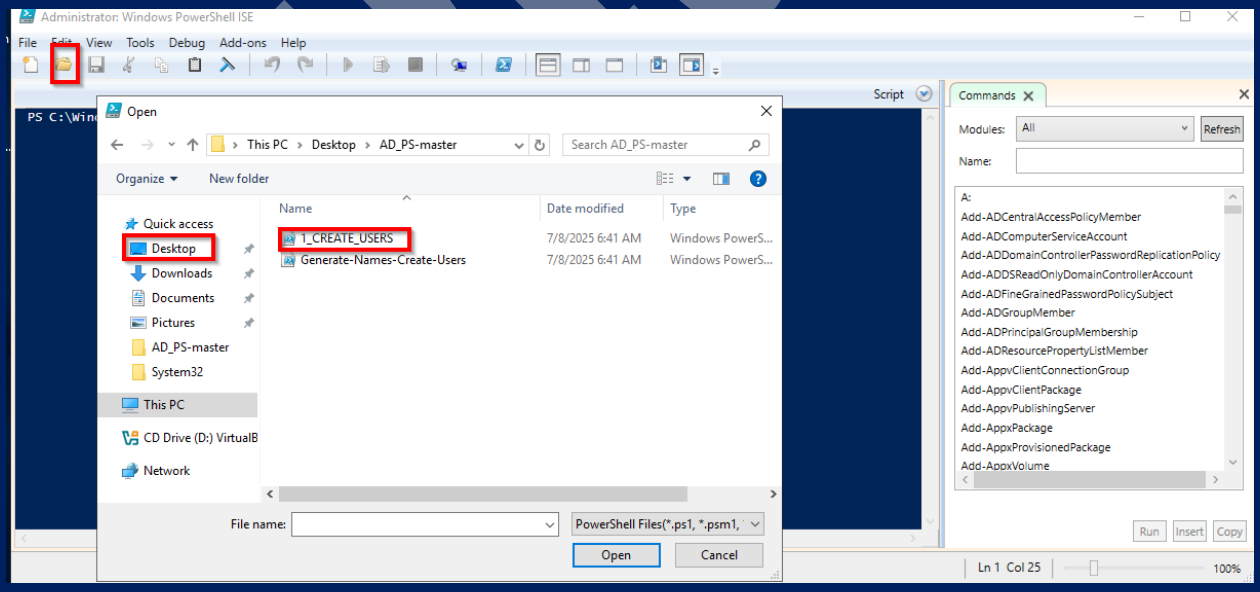
8. PowerShell Automation for User Creation

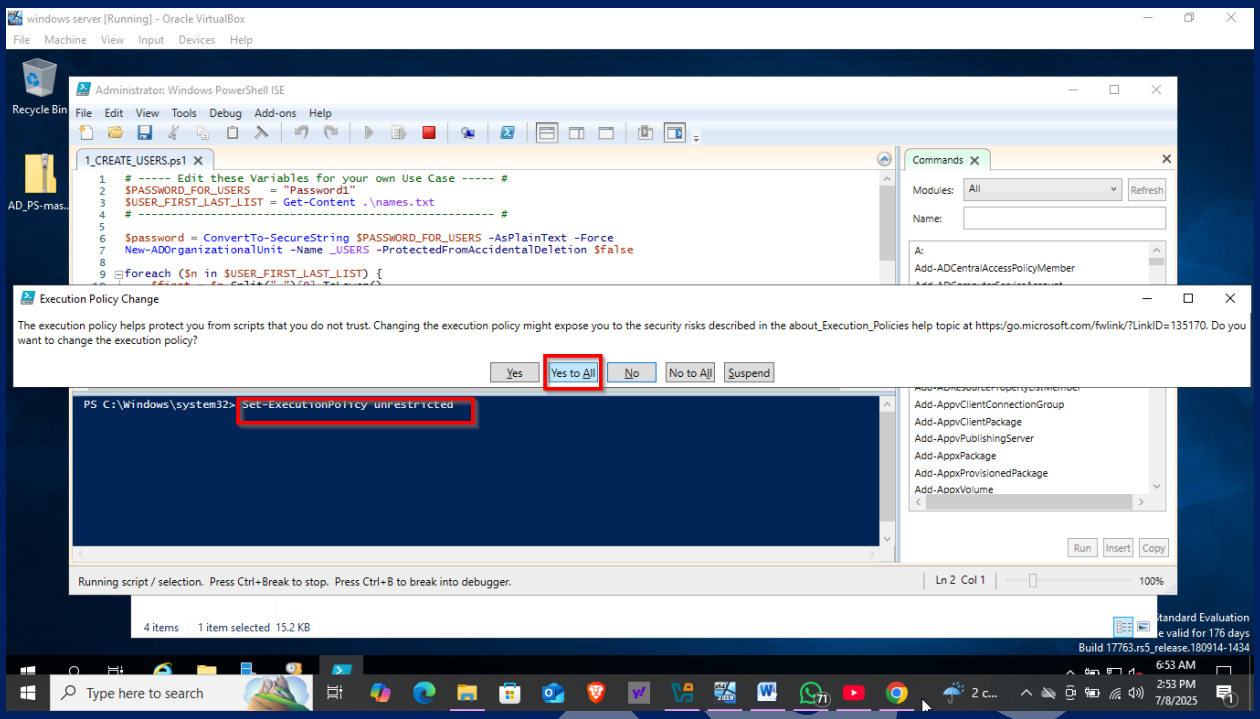
- Used a provided PowerShell script to bulk-create ~1000 users.
- Script Details:
  - Source: `names.txt` (first/last names list).
  - Username format: First initial + Last name (e.g., jdoe).
  - Default password: `Password1`.

- Script ran in loop mode to automate user creation.
- Modified execution policy in PowerShell ISE to allow unrestricted script execution.
- Verified functionality by inserting my name at the top of the list.

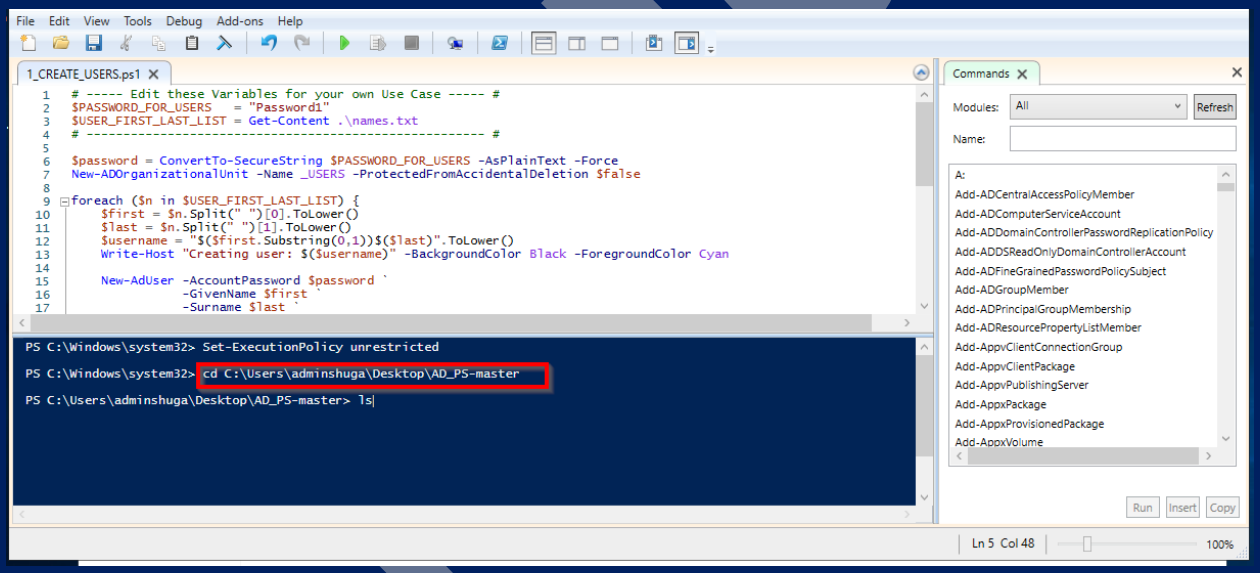



S
Search
Server Manager
Settings
W
Windows Accessories
Windows Administrative Tools
Windows Ease of Access
Windows PowerShell
Windows PowerShell
Windows PowerShell (x86)
Windows PowerShell ISE
Windows PowerShe
Windows Security
Windows System
Windows Server
Server Manager
Windows PowerShell
Windows PowerShell ISE
Windows Administrativ...
Task Manager
Control Panel
Remote Desktop...
Event Viewer
File Explorer
Unpin from Start
More
Pin to taskbar
Run as different user
Run as administrator
Open file location
Type
AM GITIGNORE
AM Windows Po
AM Windows Po
AM Text Docum

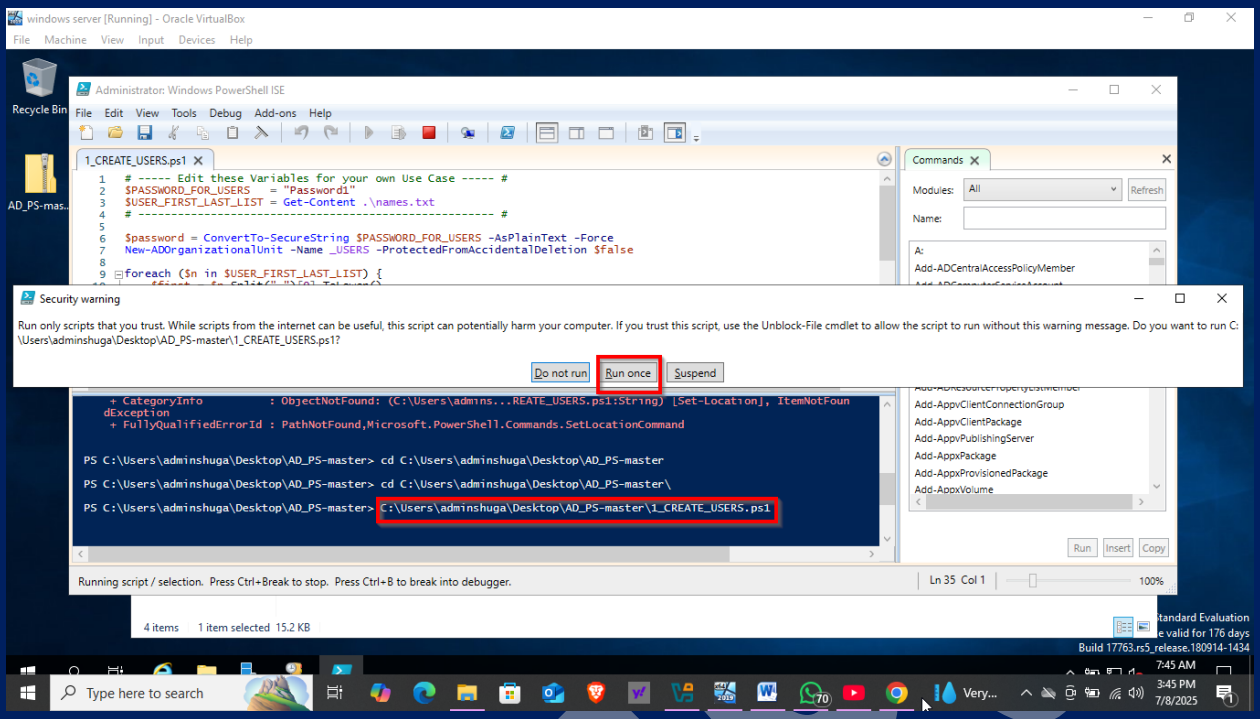

Administrator: Windows PowerShell ISE
File Edit View Tools Debug Add-ons Help
Open
This PC › Desktop › AD_PS-master
Search AD_PS-master
Organize
New folder
Quick access
Desktop
Downloads
Documents
Pictures
AD_PS-master
System32
This PC
CD Drive (D:) VirtualB
Network
Name
Date modified
Type
1_CREATE_USERS
7/8/2025 6:41 AM
Windows PowerS...
Generate-Names-Create-Users
7/8/2025 6:41 AM
Windows PowerS...
File name:
PowerShell Files(*.ps1, *.psm1,
Open
Cancel
Script
Commands
Modules:
All
Refresh
Name:
Add-ADCentralAccessPolicyMember
Add-ADComputerServiceAccount
Add-ADDomainControllerPasswordReplicationPolicy
Add-ADDSReadOnlyDomainControllerAccount
Add-ADFineGrainedPasswordPolicySubject
Add-ADGroupMember
Add-ADPrincipalGroupMembership
Add-ADResourcePropertyListMember
Add-AppvClientConnectionGroup
Add-AppvClientPackage
Add-AppvPublishingServer
Add-AppxPackage
Add-AppxProvisionedPackage
Add-AppxVolume
Run
Insert
Copy
Ln 1 Col 25
100%

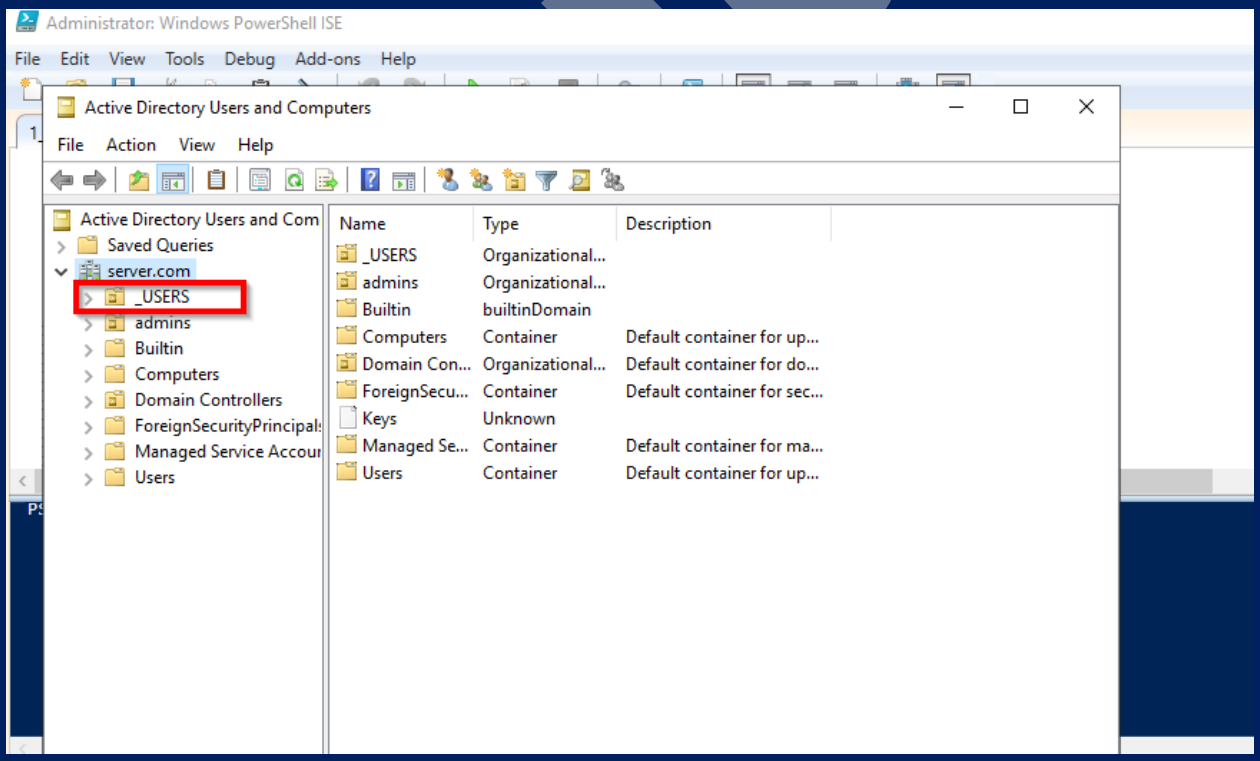

windows server [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Recycle Bin
AD_PS-mas...
Administrator: Windows PowerShell ISE
File Edit View Tools Debug Add-ons Help
1_CREATE_USERS.ps1
----- Edit these Variables for your own Use Case -----
$PASSWORD_FOR_USERS = "Password1"
$USER_FIRST_LAST_LIST = Get-Content .\names.txt

$password = ConvertTo-SecureString $PASSWORD_FOR_USERS -AsPlainText -Force
New-ADOrganizationalUnit -Name _USERS -ProtectedFromAccidentalDeletion $false
foreach ($n in $USER_FIRST_LAST_LIST) {
Commands
Modules: All
Refresh
Name:
Add-ADCentralAccessPolicyMember
Execution Policy Change
The execution policy helps protect you from scripts that you do not trust. Changing the execution policy might expose you to the security risks described in the about_Execution_Policies help topic at https:/go.microsoft.com/fwlink/?LinkID=135170. Do you want to change the execution policy?
Yes
Yes to All
No
No to All
Suspend
PS C:\Windows\system32> Set-ExecutionPolicy unrestricted
Add-AppvClientConnectionGroup
Add-AppvClientPackage
Add-AppvPublishingServer
Add-AppxPackage
Add-AppxProvisionedPackage
Add-AppxVolume
Run
Insert
Copy
Running script / selection. Press Ctrl+Break to stop. Press Ctrl+B to break into debugger.
Ln 2 Col 1
100%
4 items
1 item selected 15.2 KB
Type here to search
6:53 AM
2:53 PM
7/8/2025


File Edit View Tools Debug Add-ons Help
1_CREATE_USERS.ps1
----- Edit these Variables for your own Use Case -----
$PASSWORD_FOR_USERS = "Password1"
$USER_FIRST_LAST_LIST = Get-Content .\names.txt

$password = ConvertTo-SecureString $PASSWORD_FOR_USERS -AsPlainText -Force
New-ADOrganizationalUnit -Name _USERS -ProtectedFromAccidentalDeletion $false
foreach ($n in $USER_FIRST_LAST_LIST) {
$first = $n.Split(" ")[0].ToLower()
$last = $n.Split(" ")[1].ToLower()
$username = "$($first.Substring(0,1))$($last)".ToLower()
Write-Host "Creating user: $($username)" -BackgroundColor Black -ForegroundColor Cyan
New-AdUser -AccountPassword $password `
-GivenName $first `
-Surname $last `
Commands
Modules: All
Refresh
Name:
Add-ADCentralAccessPolicyMember
Add-ADComputerServiceAccount
Add-ADDomainControllerPasswordReplicationPolicy
Add-ADDSReadOnlyDomainControllerAccount
Add-ADFineGrainedPasswordPolicySubject
Add-ADGroupMember
Add-ADPrincipalGroupMembership
Add-ADResourcePropertyListMember
Add-AppvClientConnectionGroup
Add-AppvClientPackage
Add-AppvPublishingServer
Add-AppxPackage
Add-AppxProvisionedPackage
Add-AppxVolume
Run
Insert
Copy
PS C:\Windows\system32> Set-ExecutionPolicy unrestricted
PS C:\Windows\system32> cd C:\Users\adminshuga\Desktop\AD_PS-master
PS C:\Users\adminshuga\Desktop\AD_PS-master> ls
Ln 5 Col 48
100%

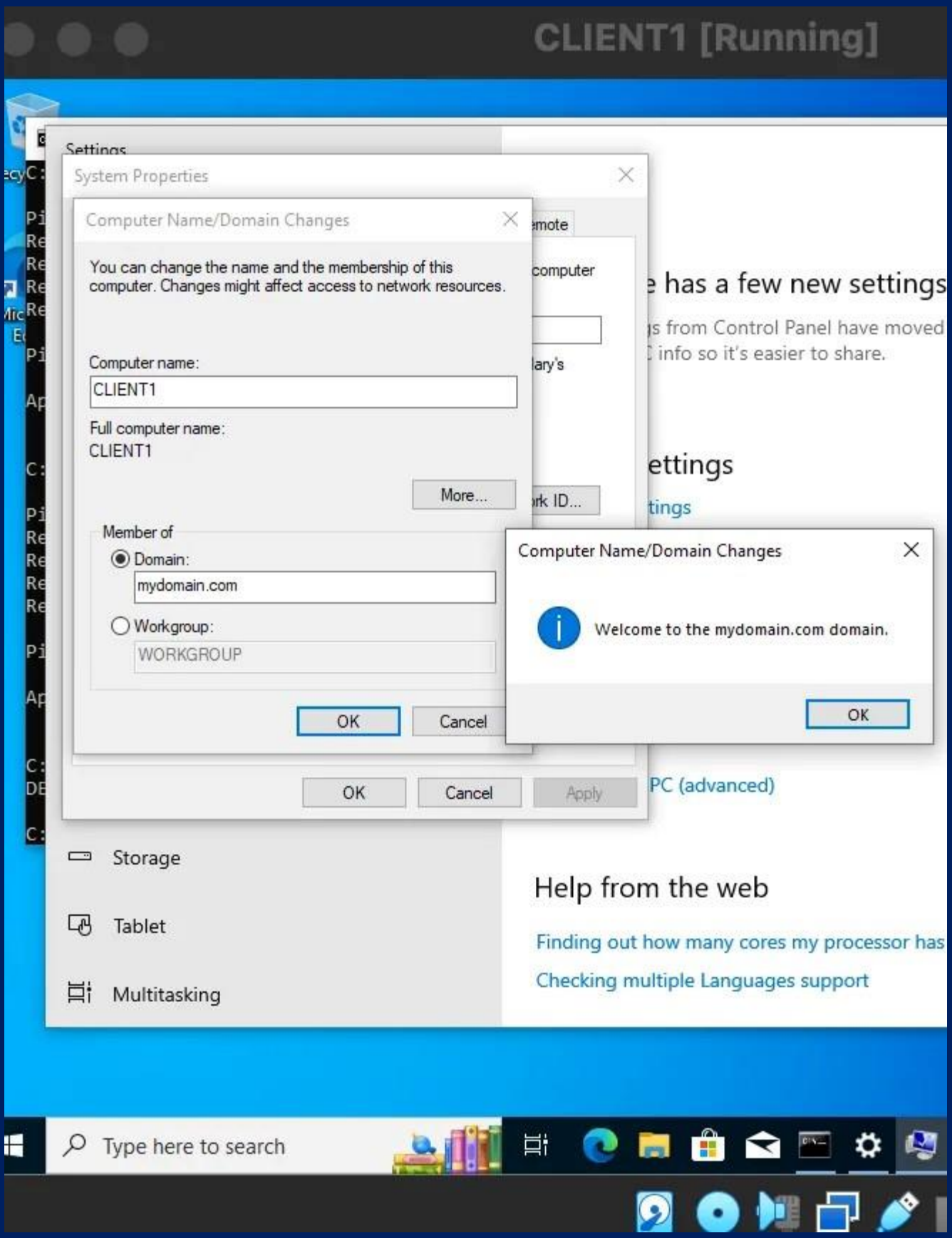


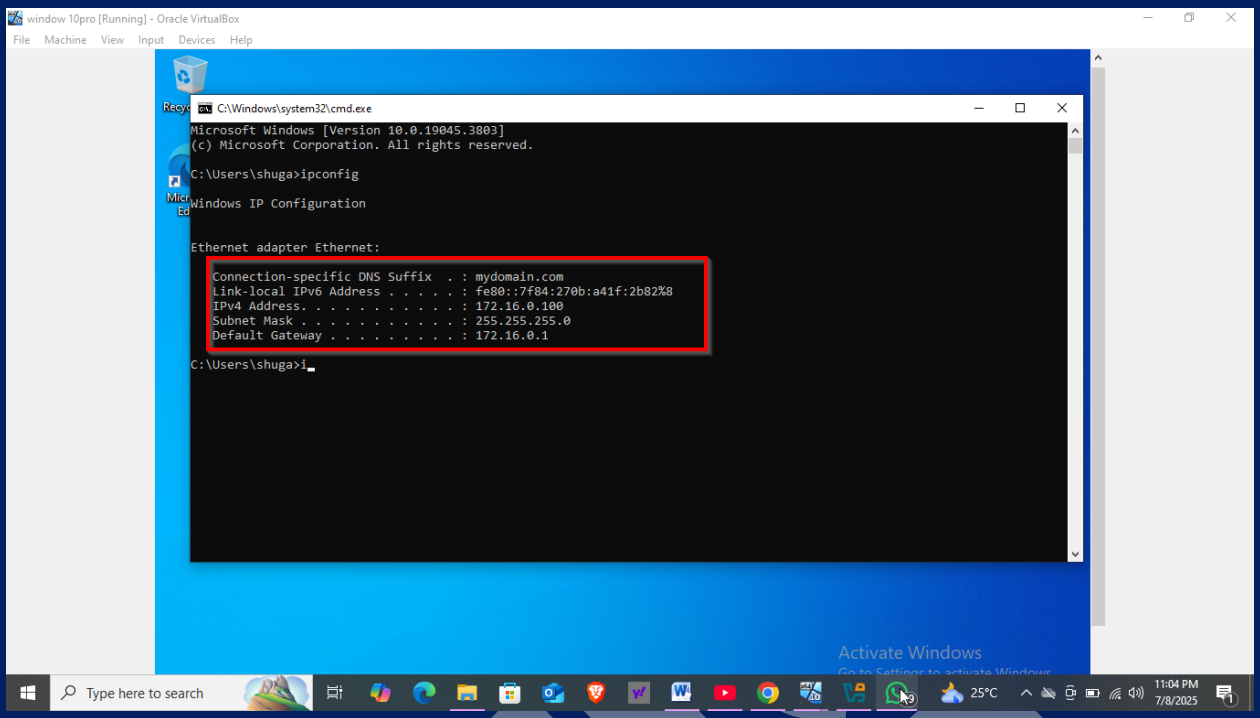


9. Client Machine Deployment

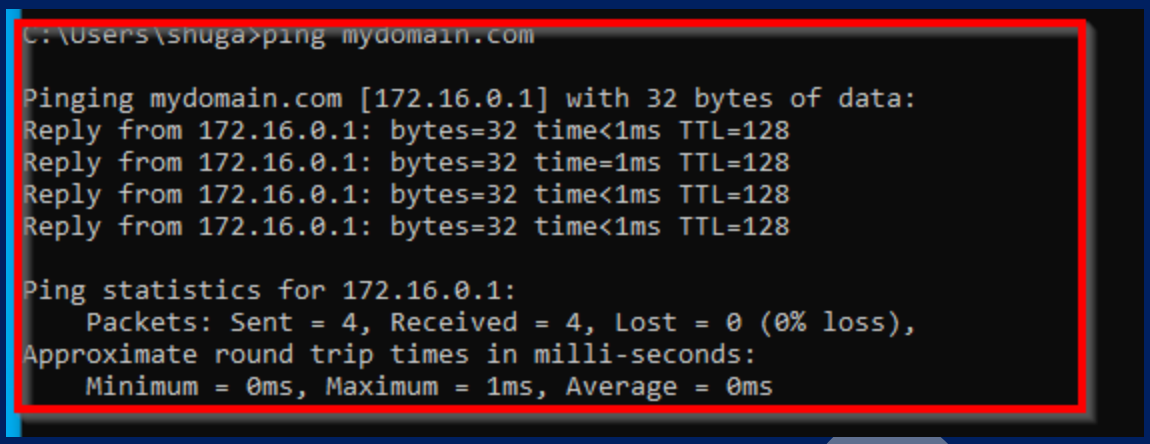
- Created a second VM: **Client1**.
- OS: Windows 10 Pro
- Network: Internal adapter only (to receive DHCP from DC).

- Mounted Windows 10 ISO and completed installation.
- Verified:
  - Network connectivity via `ipconfig`.
  - Domain connectivity via `ping` to DC.


CLIENT1 [Running]
Settings
System Properties
Computer Name/Domain Changes
You can change the name and the membership of this computer. Changes might affect access to network resources.
Computer name:
CLIENT1
Full computer name:
CLIENT1
More...
Member of
Domain:
mydomain.com
Workgroup:
WORKGROUP
OK
Cancel
Apply
Computer Name/Domain Changes
Welcome to the mydomain.com domain.
OK
has a few new settings
Storage
Tablet
Multitasking
Help from the web
Finding out how many cores my processor has
Checking multiple Languages support
Type here to search




```
C:\Users\shuga>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . : mydomain.com
   Link-local IPv6 Address . . . . . : fe80::7f84:270b:a41f:2b82%8
   IPv4 Address. . . . . . . . . . . : 172.16.0.100
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 172.16.0.1

C:\Users\shuga>ping www.google.com

Pinging www.google.com [216.58.223.228] with 32 bytes of data:
Reply from 216.58.223.228: bytes=32 time=25ms TTL=254
Reply from 216.58.223.228: bytes=32 time=319ms TTL=254
Reply from 216.58.223.228: bytes=32 time=31ms TTL=254
Reply from 216.58.223.228: bytes=32 time=28ms TTL=254

Ping statistics for 216.58.223.228:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 25ms, Maximum = 319ms, Average = 100ms

C:\Users\shuga>
```



9. Conclusion

This lab offered an end-to-end simulation of a Windows domain environment. I gained hands-on experience with:

- Active Directory structure and deployment
- User and OU management
- Automated user provisioning with PowerShell
- DHCP and NAT configuration
- Virtual networking in a secure internal lab

This exercise enhanced my understanding of centralized network management, domain authentication, and secure user provisioning—core components of enterprise cybersecurity infrastructure.