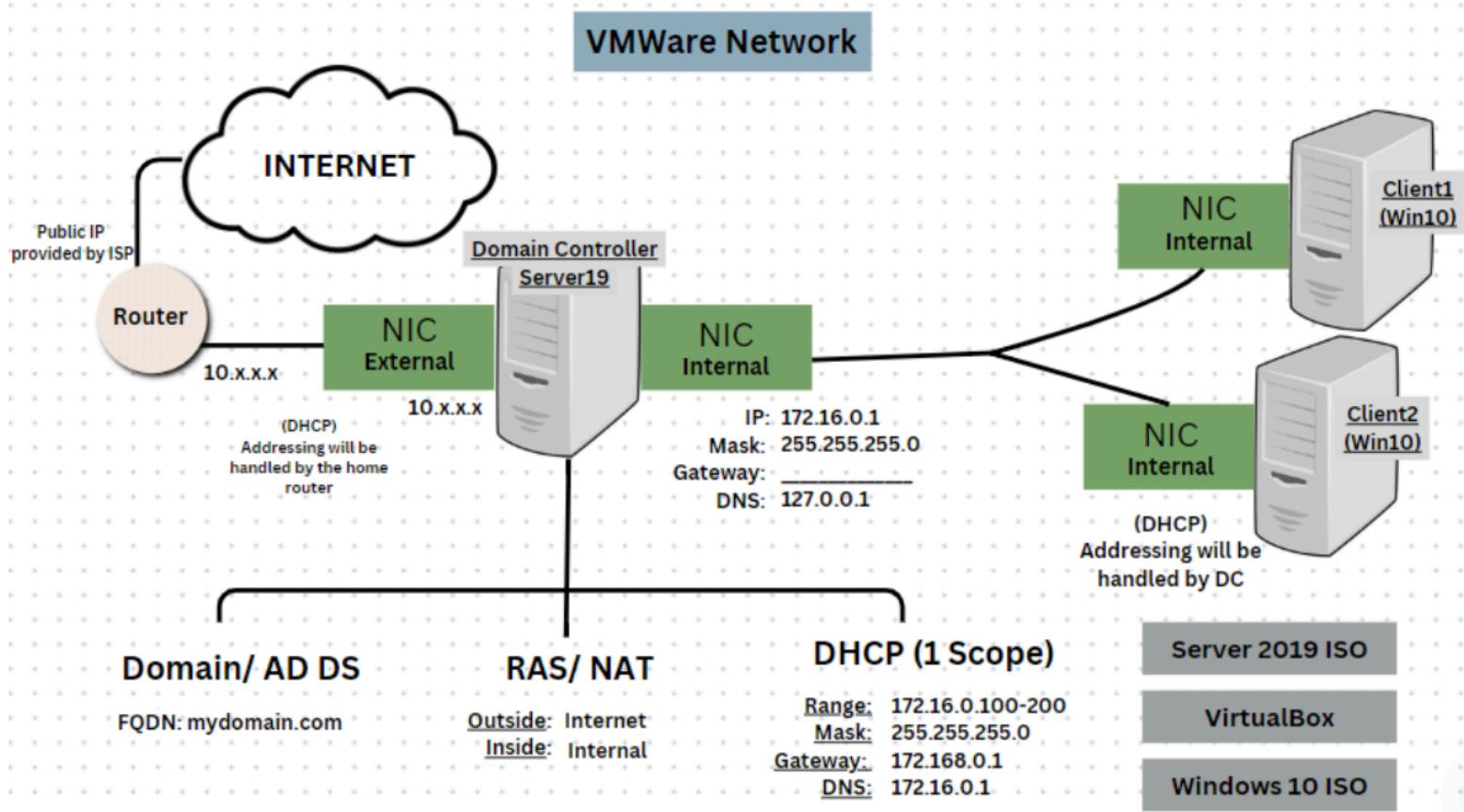


Home Lab Network Topology

w/ Active Directory



Requirements:

Oracle VirtualBox: <https://www.virtualbox.org/wiki/Downloads>

Server 2019 ISO: <https://www.microsoft.com/en-us/evalcenter/download-windows-server-2019>

Windows 10 ISO: <https://www.microsoft.com/en-us/software-download/windows10>

Objective:

This home lab will create an Active Directory environment simulating an organization with over 1,000 users. This setup allows you to:

- Experiment with configurations and settings risk-free, avoiding disruptions to production systems.
- Build valuable IT skills, enhancing your proficiency and confidence.
- Transfer successful configurations to your workplace environment if authorized.

Download Oracle VirtualBox:

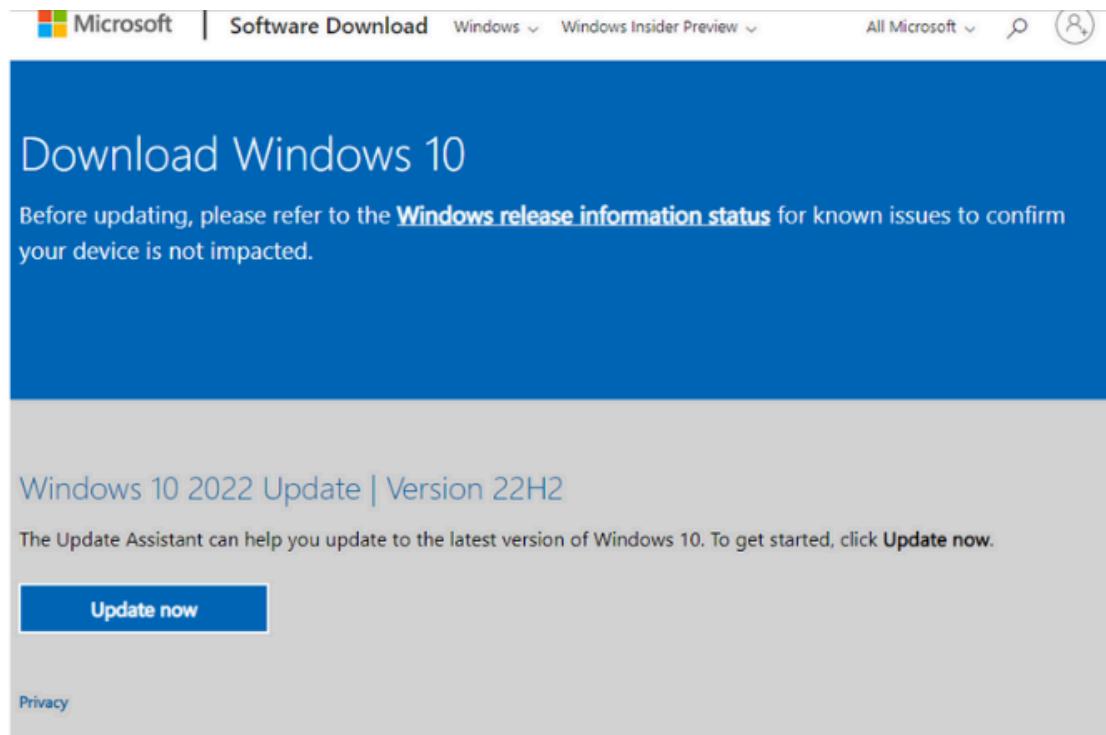
The screenshot shows the Oracle VirtualBox download page. On the left, there's a sidebar with links: About, Screenshots, Downloads, Documentation, End-user docs, Technical docs, Contribute, and Community. The main content area has a large blue header with the word "VirtualBox". Below it, a section titled "Download VirtualBox" says "Here you will find links to VirtualBox binaries and its source code." A sub-section titled "VirtualBox binaries" includes a note about agreeing to terms and conditions. It lists "VirtualBox 7.0.18 platform packages" with links to Windows hosts, macOS / Intel hosts (circled in red with a number 1), Linux distributions, Solaris hosts, and Solaris 11 IPS hosts. Below this, a note states the binaries are released under GPL version 3, and a link to the changelog is provided. A note about checksums is also present. A section for "VirtualBox 7.0.18 Oracle VM VirtualBox Extension Pack" includes a link to "All supported platforms" (circled in red with a number 2).

Download Server 2019 ISO:

The screenshot shows the Microsoft Evaluation Center page for Windows Server 2019. At the top, there are links for Microsoft, Evaluation Center, Windows, Windows Server, SQL Server, More, and All Microsoft. The main heading is "Please select your Windows Server 2019 download". Below this, there are language sections for English (United States), Chinese (Simplified), and French. In the English section, a link "ISO downloads 64-bit edition" is circled in red with a number 1. Other links include "VHD download 64-bit edition" and "Windows Server on Azure Try now". Similar links are available in the Chinese and French sections.

Navigate to the listed URL. Pick the download that works best for you. Make sure you remember the location it is downloaded.

Download Windows 10 ISO:

The screenshot shows the Microsoft Software Download page for Windows 10. At the top, there are navigation links for Microsoft, Software Download, Windows, Windows Insider Preview, All Microsoft, a search bar, and a notifications icon. The main heading is "Download Windows 10". Below it, a message says "Before updating, please refer to the [Windows release information status](#) for known issues to confirm your device is not impacted." A large blue button labeled "Update now" is prominently displayed. Below the update section, there is a "Privacy" link. The overall background is white with blue and grey accents.

Create Windows 10 installation media

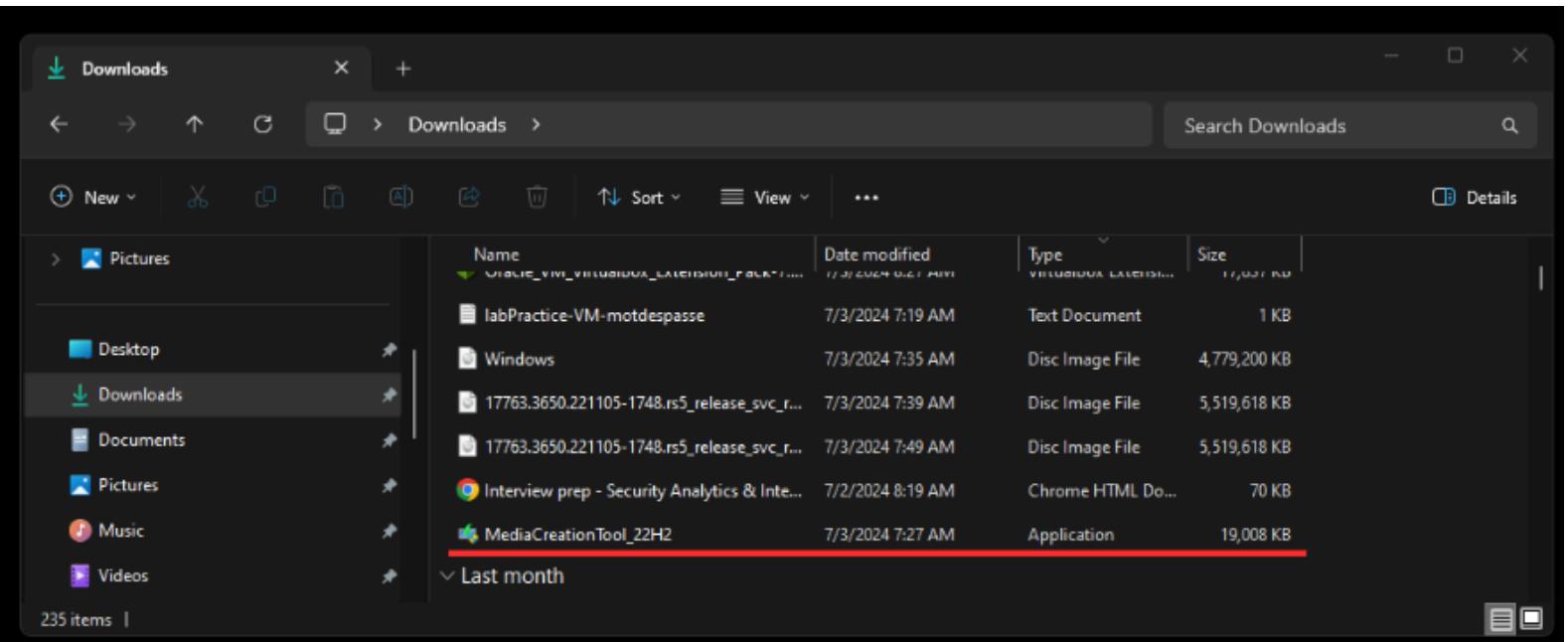
To get started, you will first need to have a license to install Windows 10. You can then download and run the media creation tool. For more information on how to use the tool, see the instructions below.



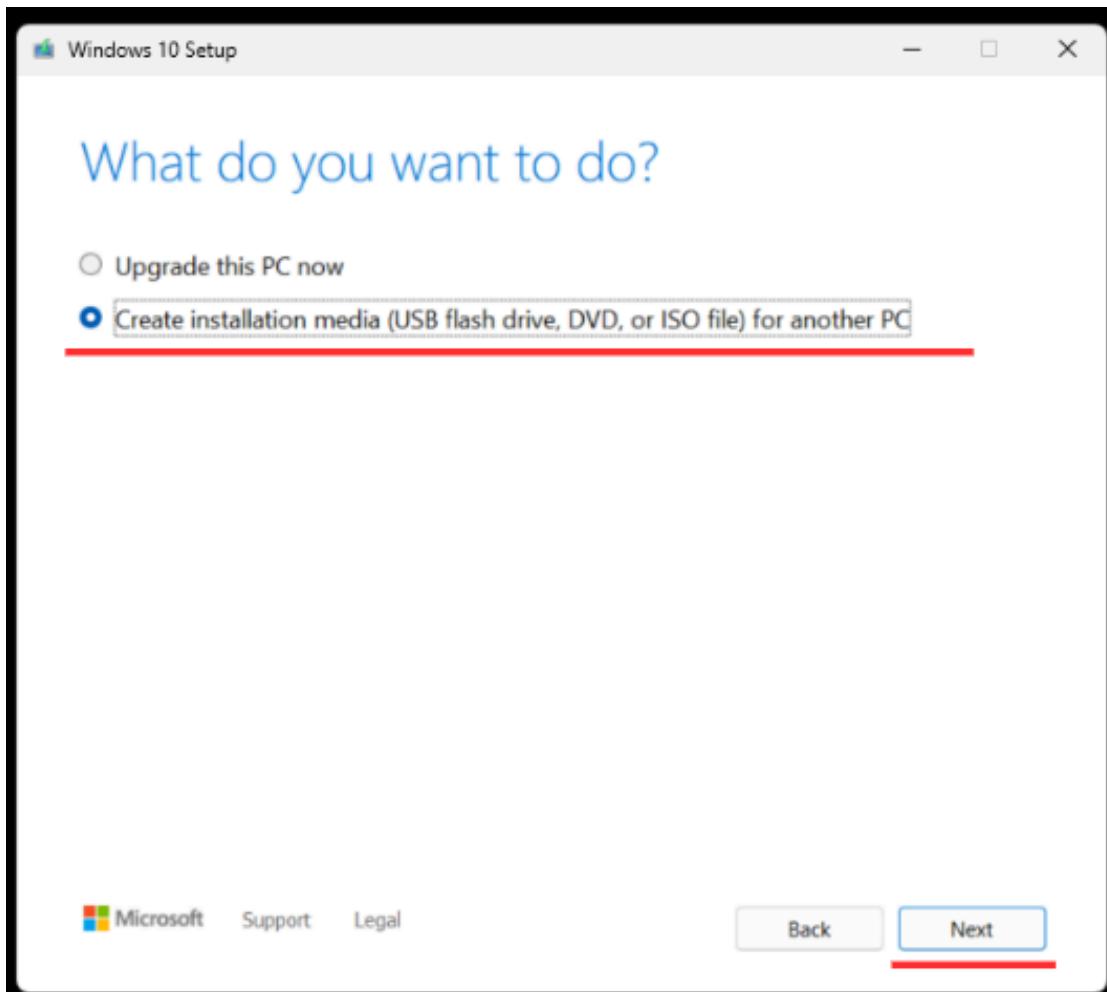
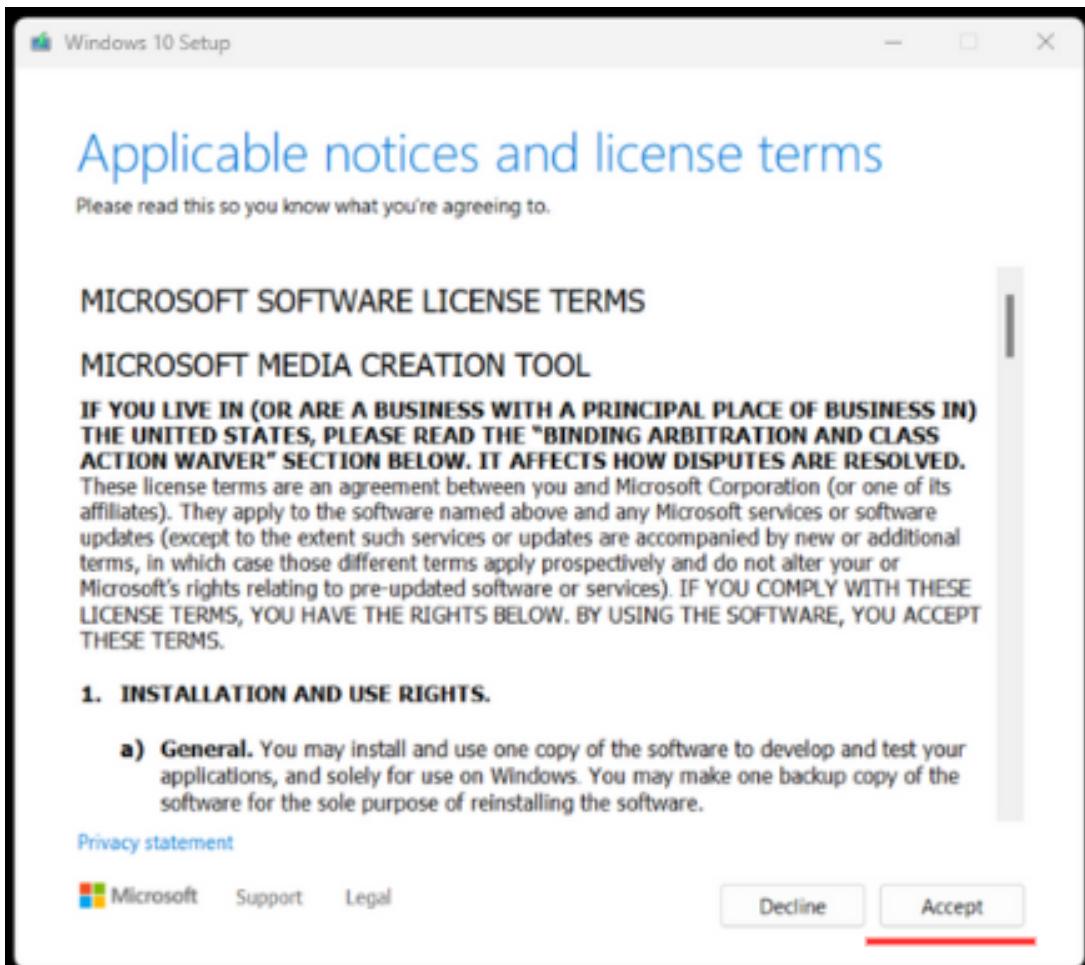
[Download Now](#)

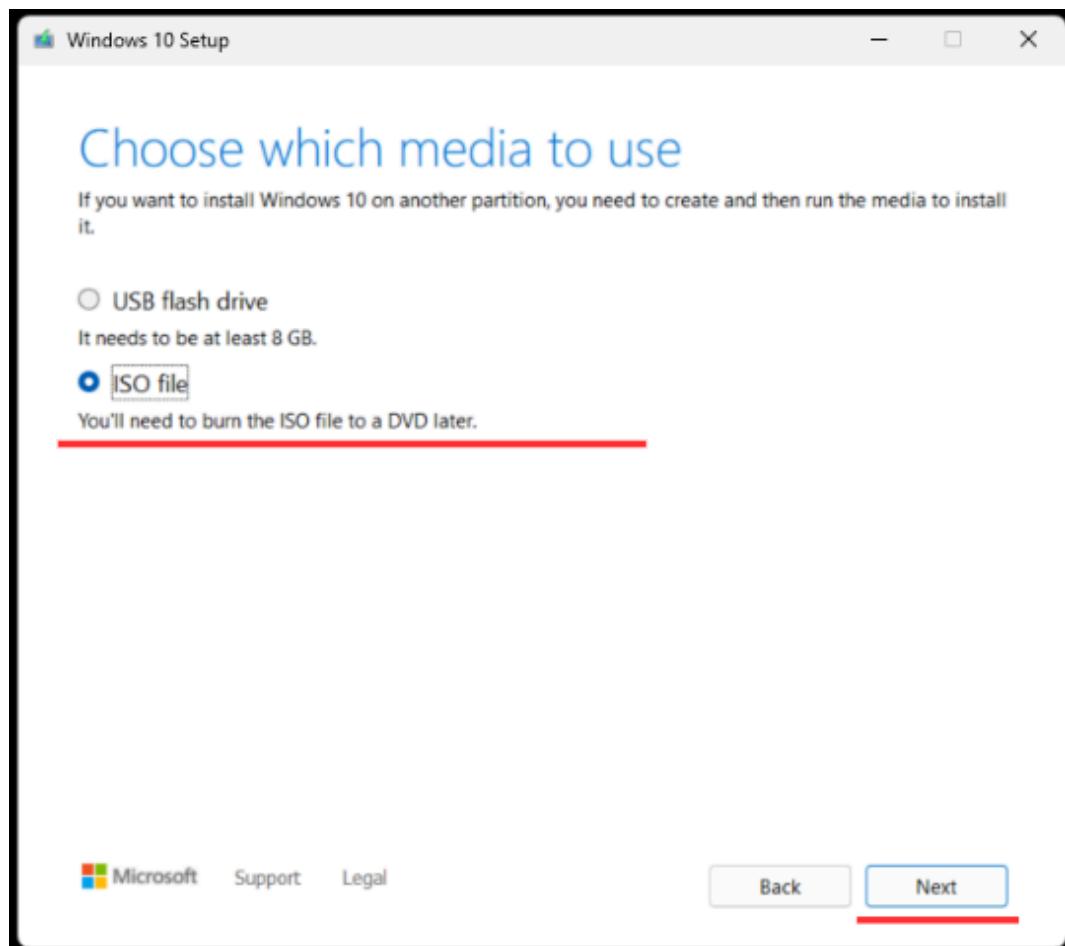
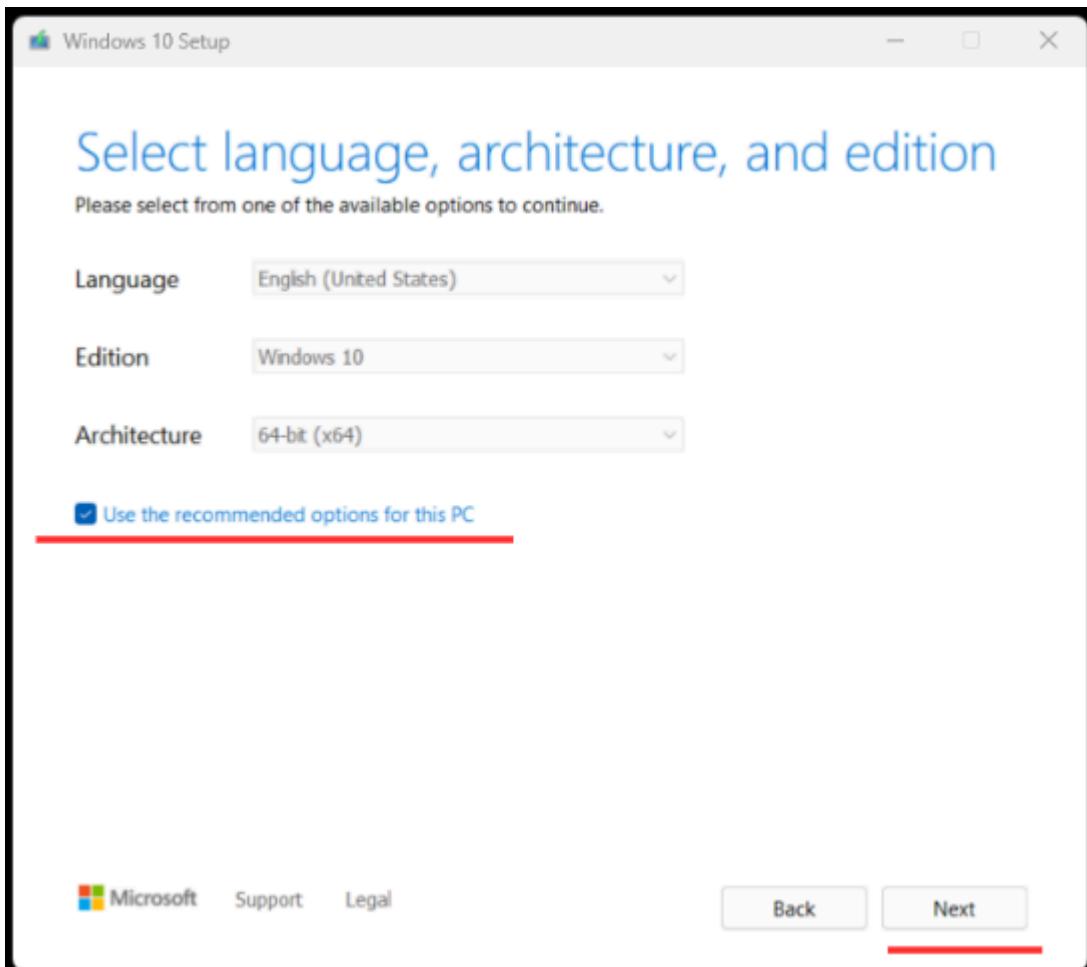
Privacy

Run the downloaded application

A screenshot of a file explorer window titled "Downloads". The left sidebar shows a tree view with "Pictures", "Desktop", "Downloads" (which is selected and highlighted in blue), "Documents", "Pictures", "Music", and "Videos". The main pane lists files in the "Downloads" folder. The table has columns for Name, Date modified, Type, and Size. The "MediaCreationTool_22H2" file is highlighted with a red border. The status bar at the bottom left shows "235 items |".

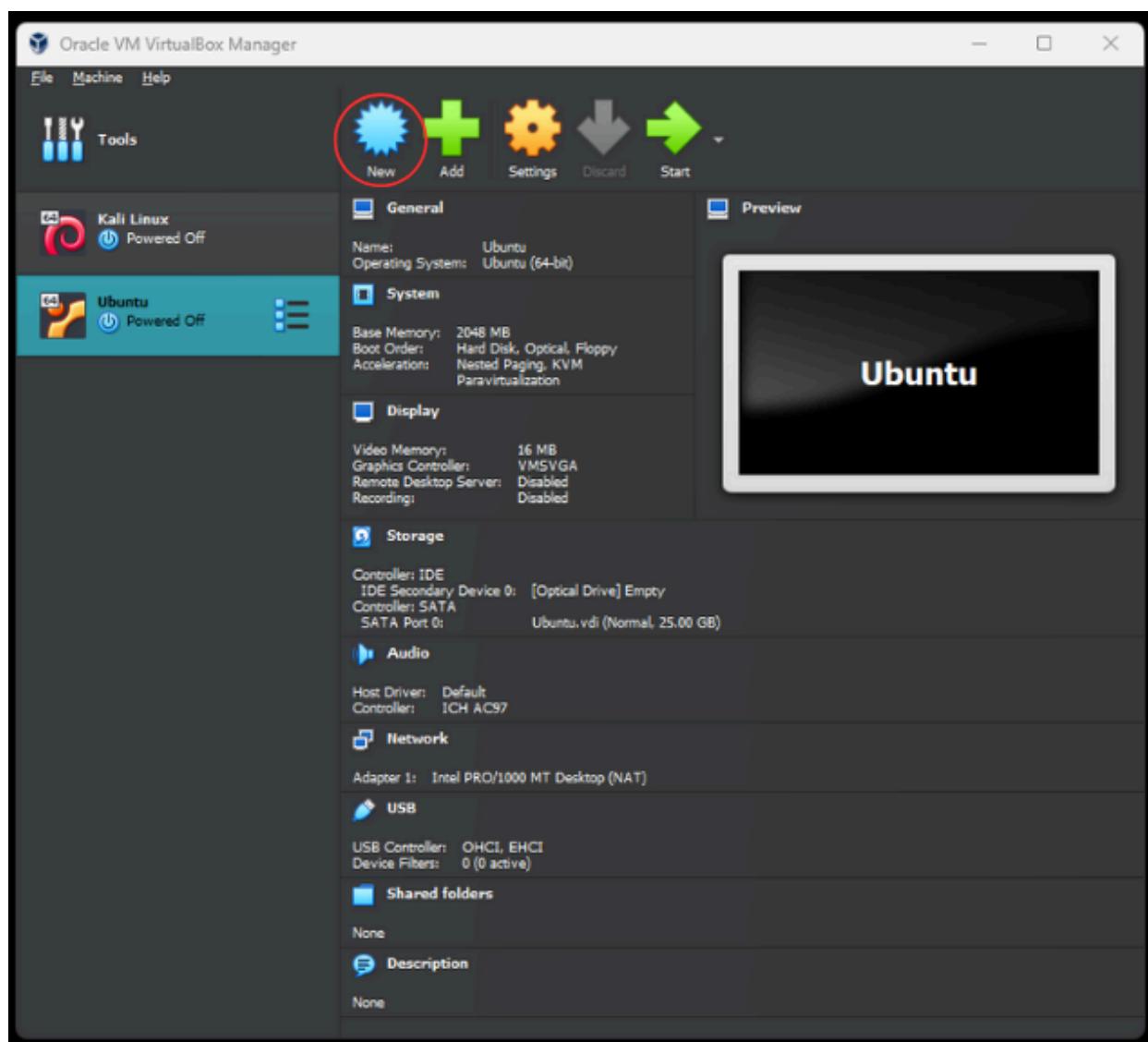
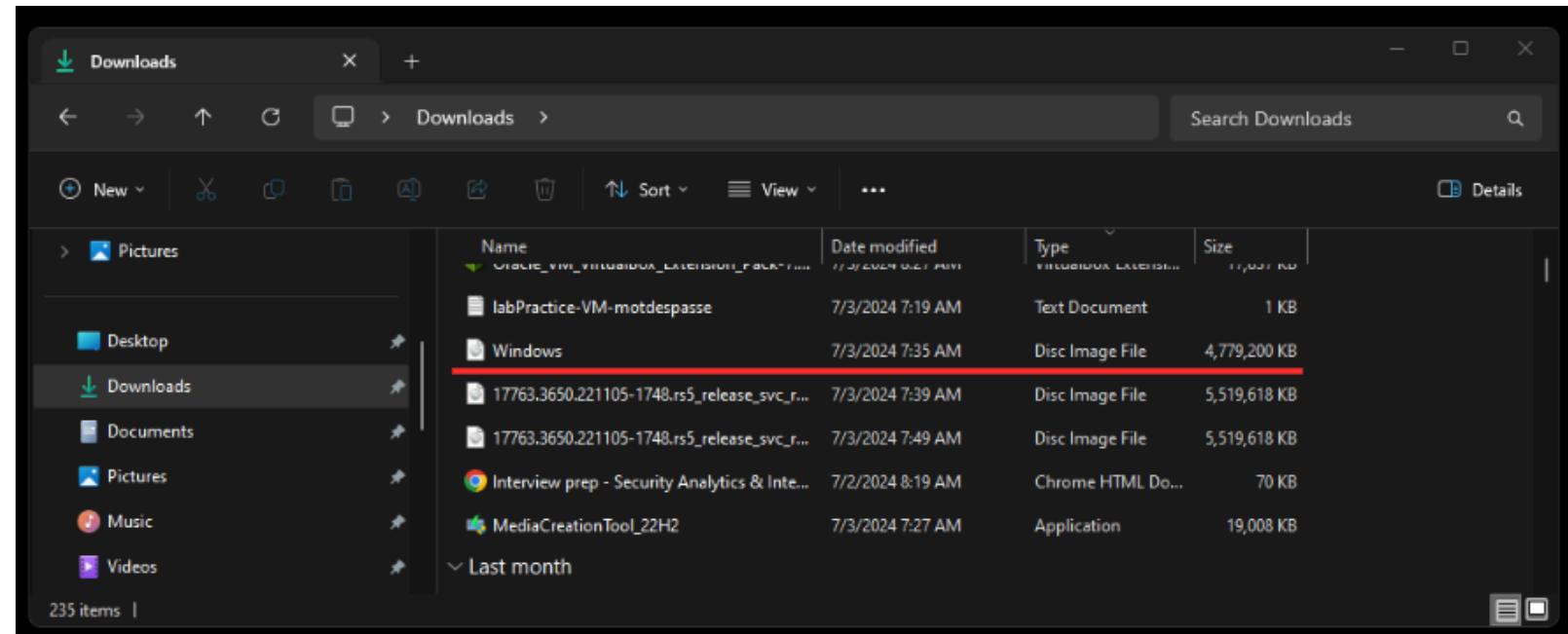
Name	Date modified	Type	Size
labPractice-VM-motdespasse	7/3/2024 7:19 AM	Text Document	1 KB
Windows	7/3/2024 7:35 AM	Disc Image File	4,779,200 KB
17763.3650.221105-1748.rs5_release_svc_r...	7/3/2024 7:39 AM	Disc Image File	5,519,618 KB
17763.3650.221105-1748.rs5_release_svc_r...	7/3/2024 7:49 AM	Disc Image File	5,519,618 KB
Interview prep - Security Analytics & Inte...	7/2/2024 8:19 AM	Chrome HTML Do...	70 KB
MediaCreationTool_22H2	7/3/2024 7:27 AM	Application	19,008 KB

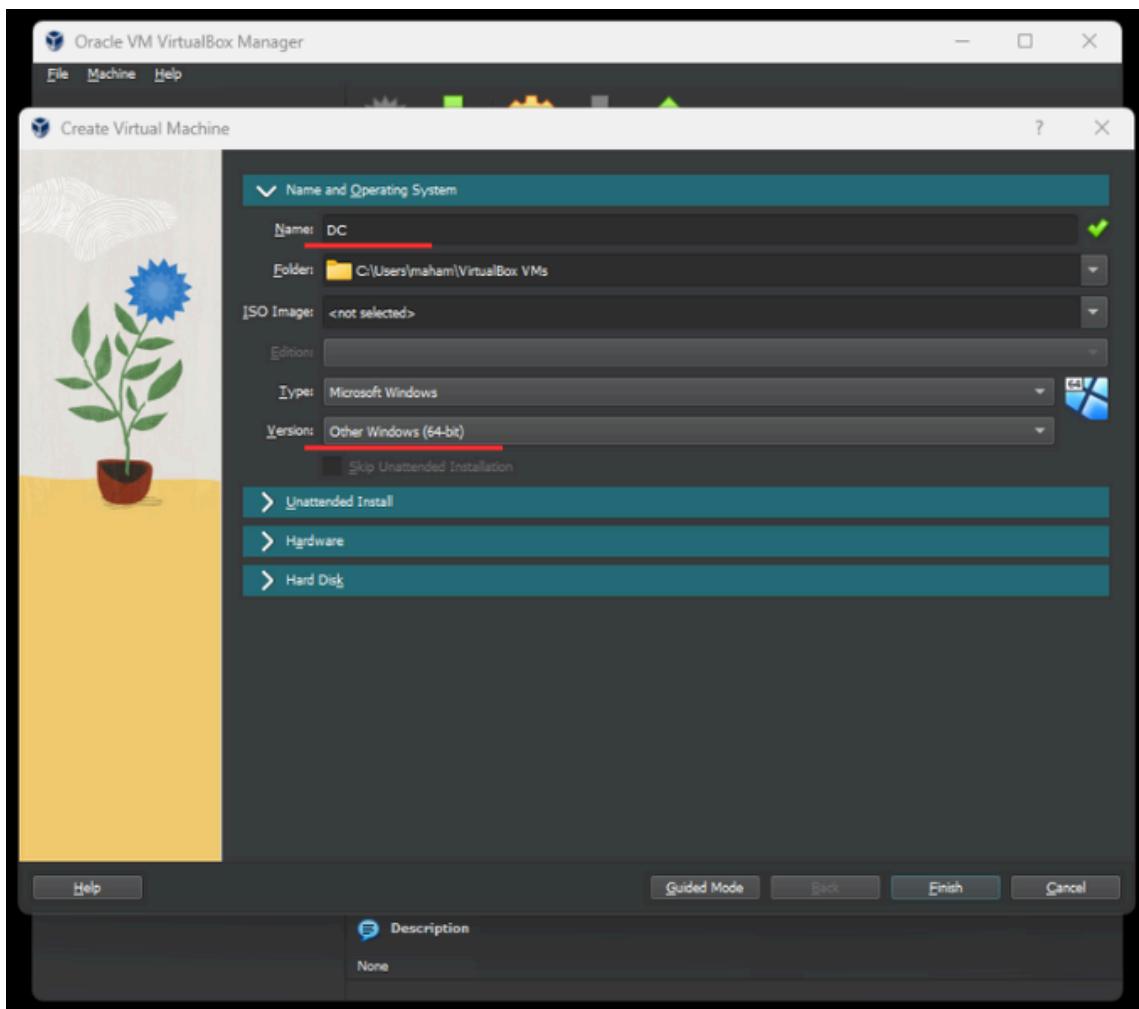




ISO file

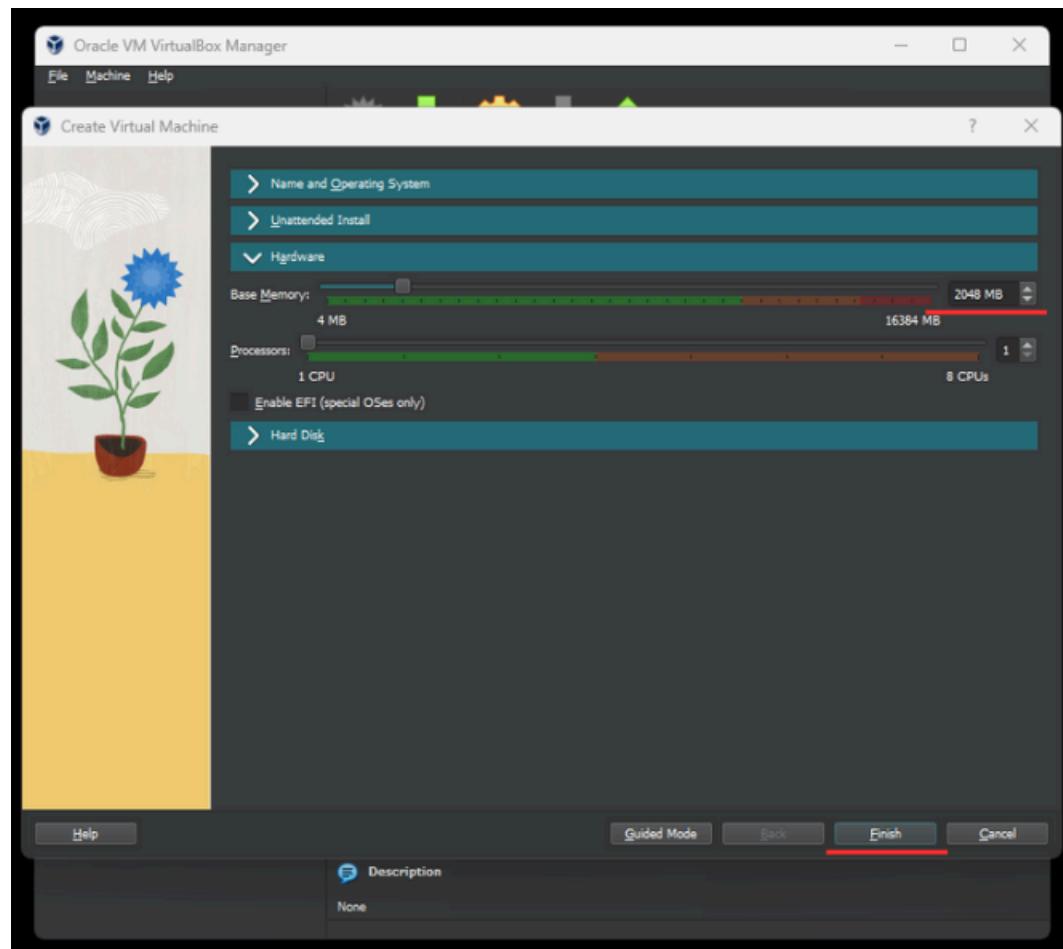
Save it to the location on where you can easily find through file explorer
Voila, there goes your ISO file you will use later to create the windows 10 OS on your VM.



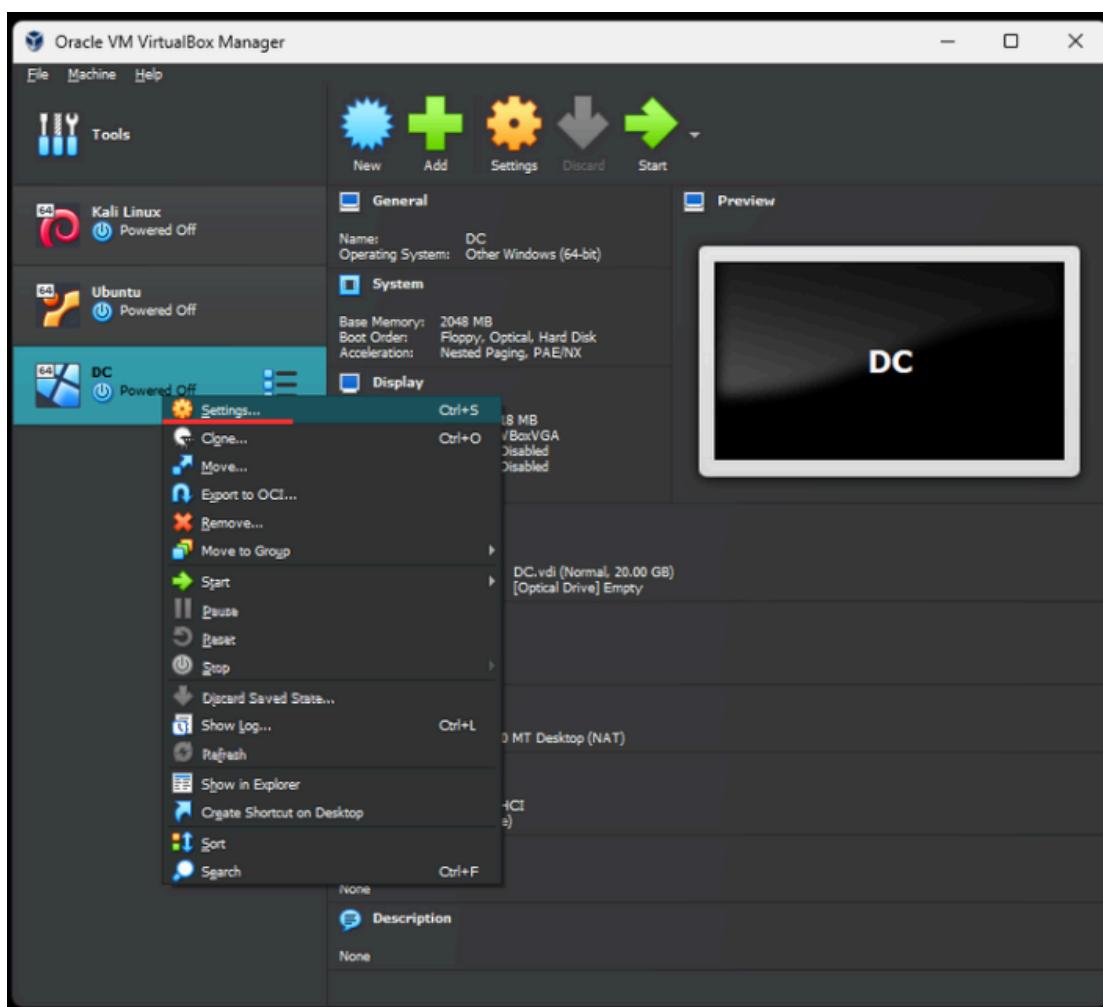
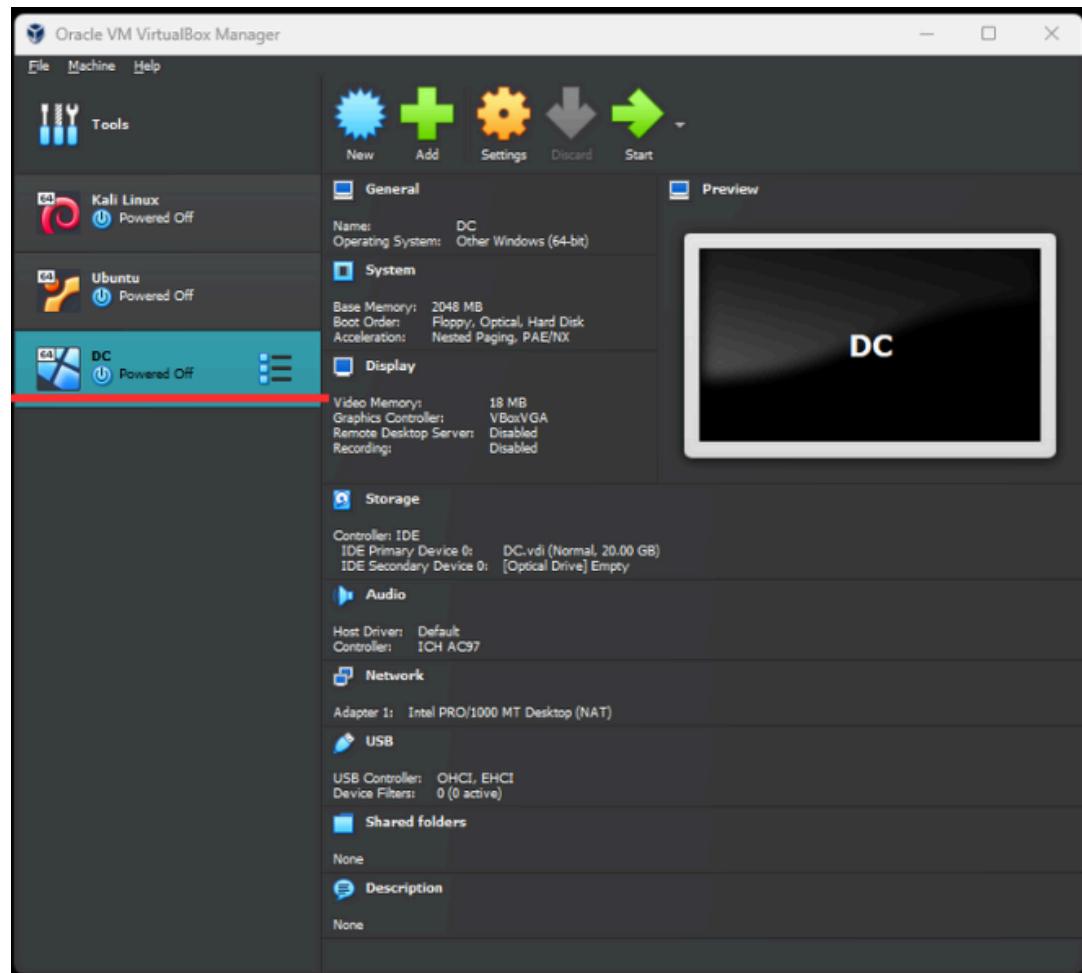


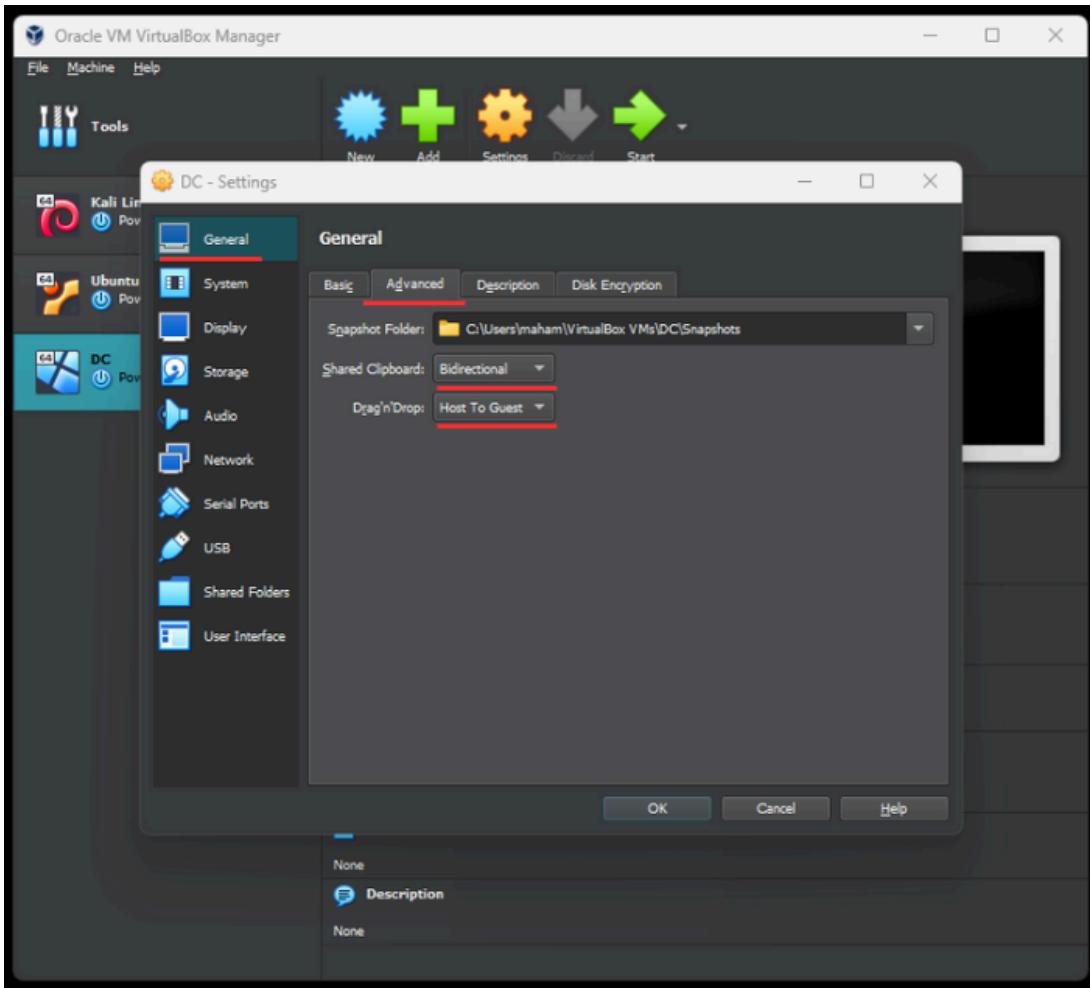
Name: DC (Domain Controller)

Version: Other Windows (64-bit)



Base Memory: 2048 MB





Shared Clipboard: Bidirectional

Drag'n Drop: Host To Guest

[Here is a security lesson for those who choose the convenience of bidirectional drag and drop:](#)

Security Concerns of Bidirectional Drag and Drop in a Virtual Machine

Enabling bidirectional drag and drop between your host machine and a virtual machine (VM) can be convenient, but it also poses several security risks:

1. Malware Transmission:

- Files transferred between the host and VM can carry malware, potentially infecting both systems.

2. Data Leakage:

- Sensitive data from the host could be unintentionally moved to the VM, compromising security.

3. Isolation Breach:

- This feature can break the isolation between the host and VM, exposing both to risks.

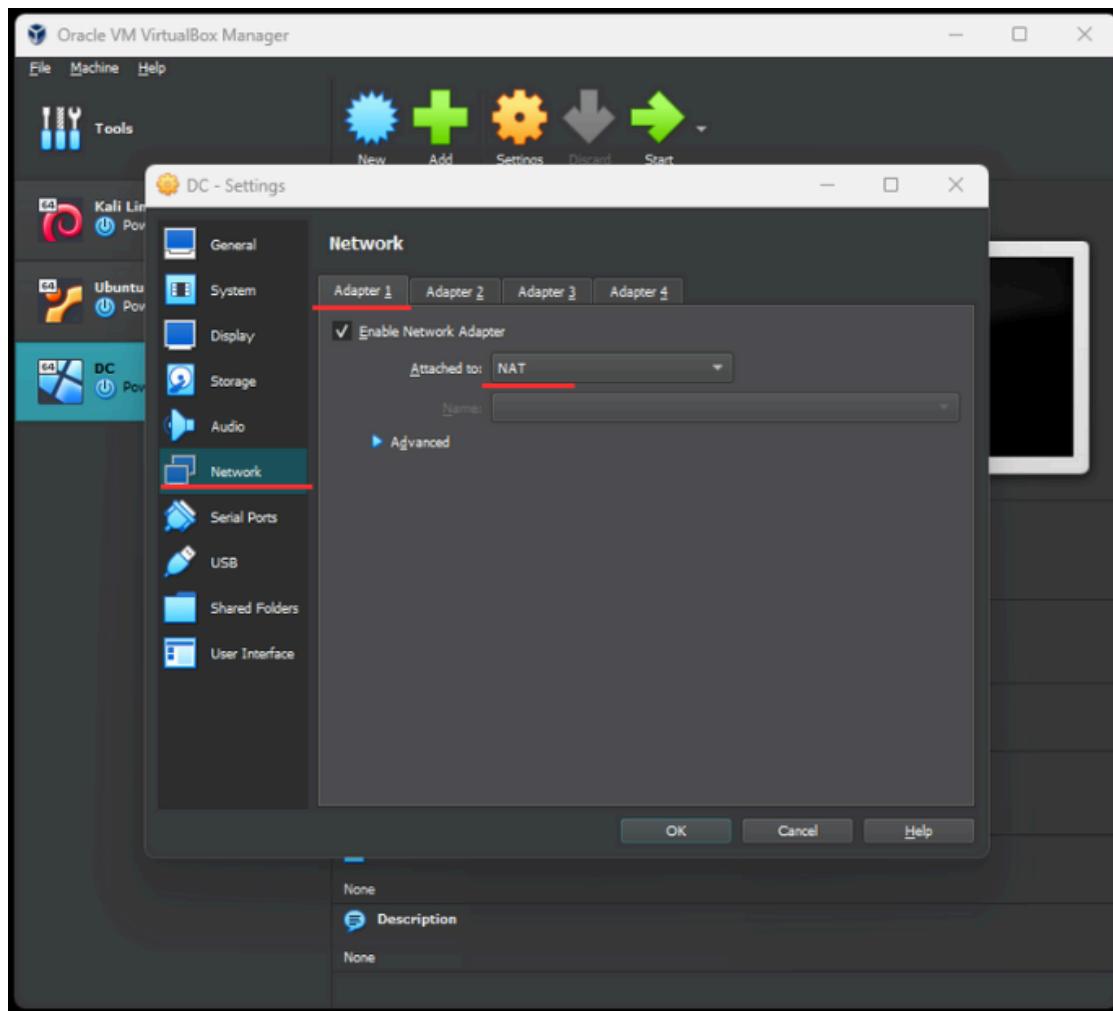
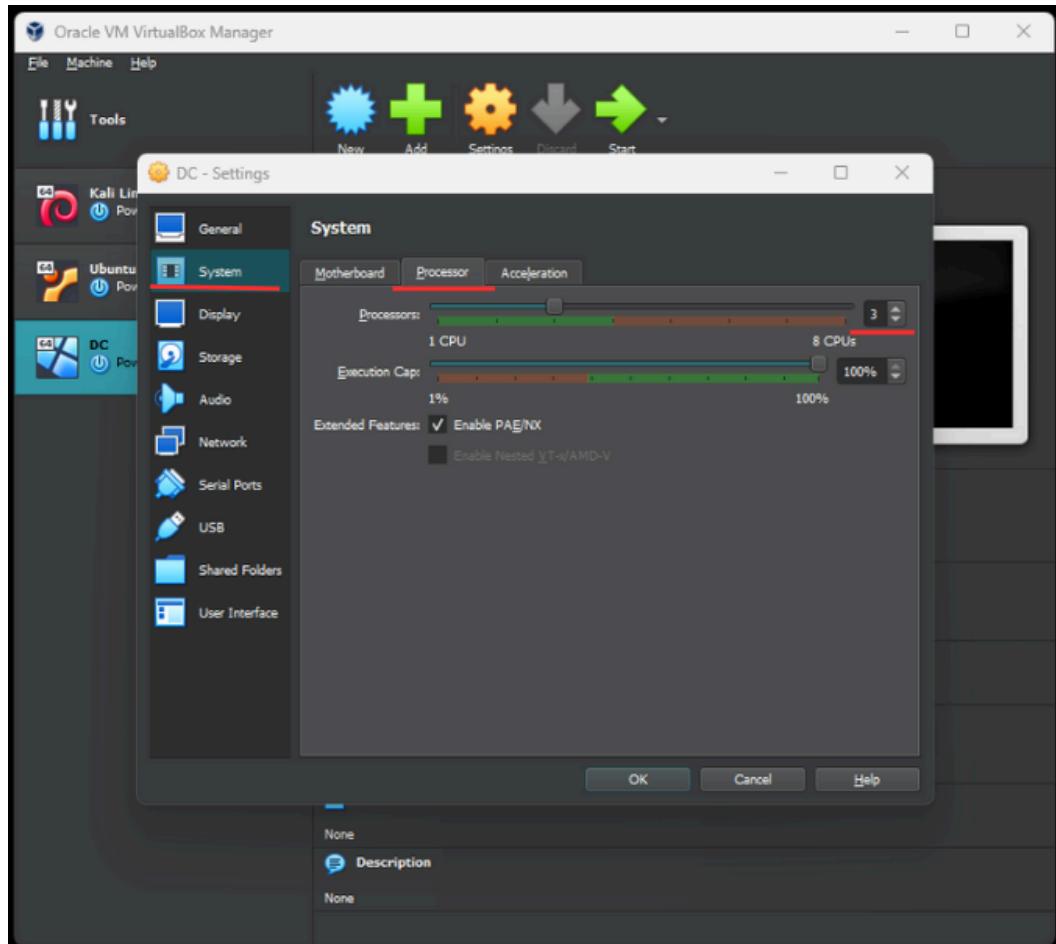
4. Unauthorized Access:

- A compromised VM could be used to exfiltrate data from the host machine.

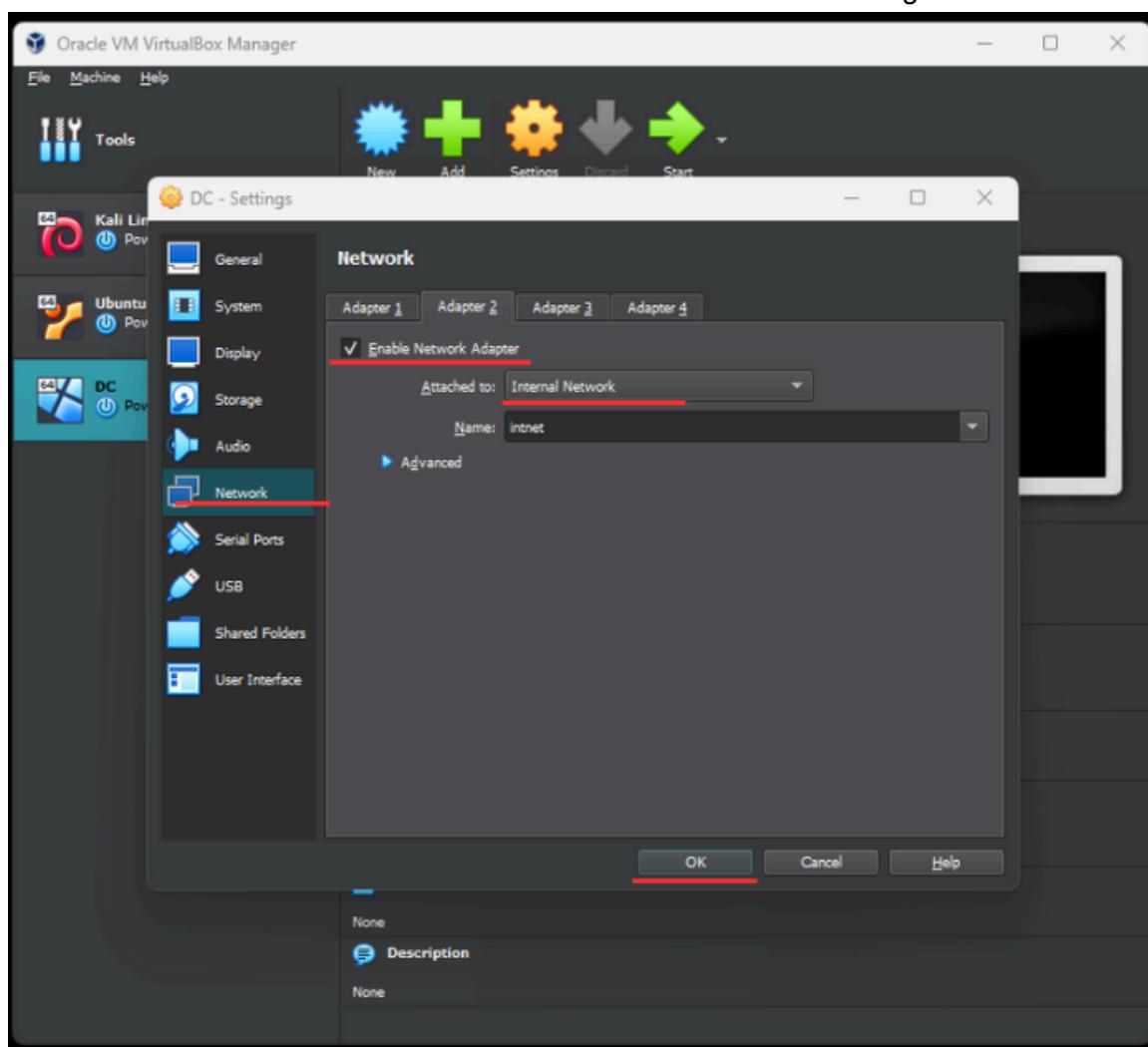
Mitigation Strategies:

- **Disable bidirectional drag and drop unless necessary.**
- **Use one-way transfer** (host to VM or VM to host) to reduce risk.
- **Regularly scan** both host and VM for malware.
- **Limit file transfers** to only essential files.

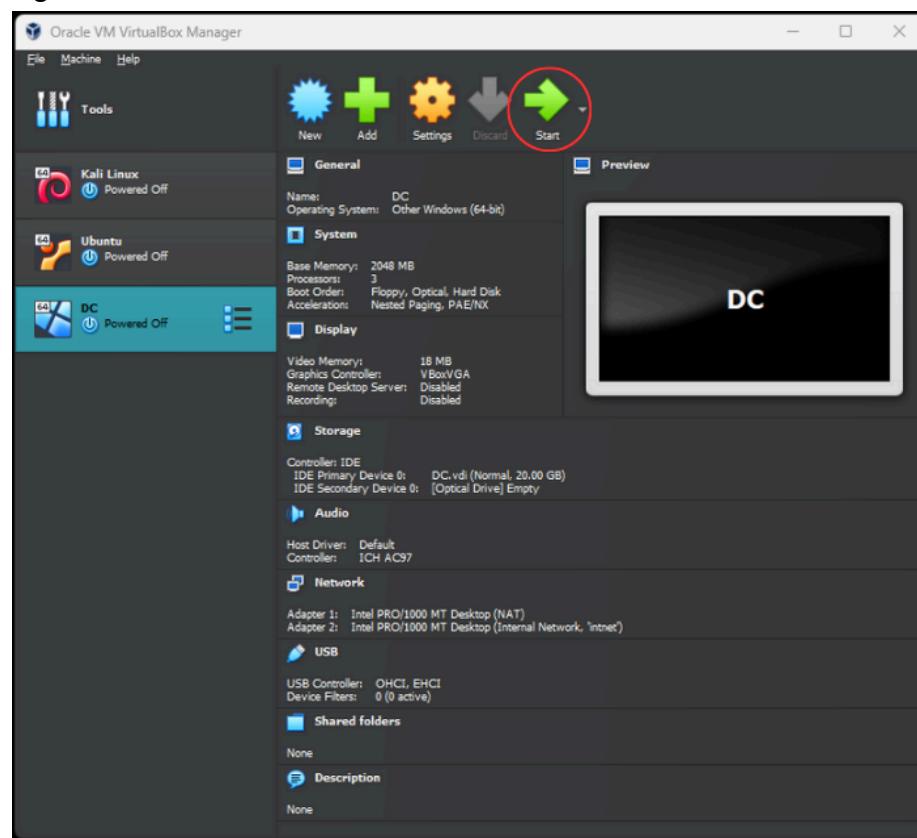
By taking these precautions, you can maintain a secure and effective home lab environment.

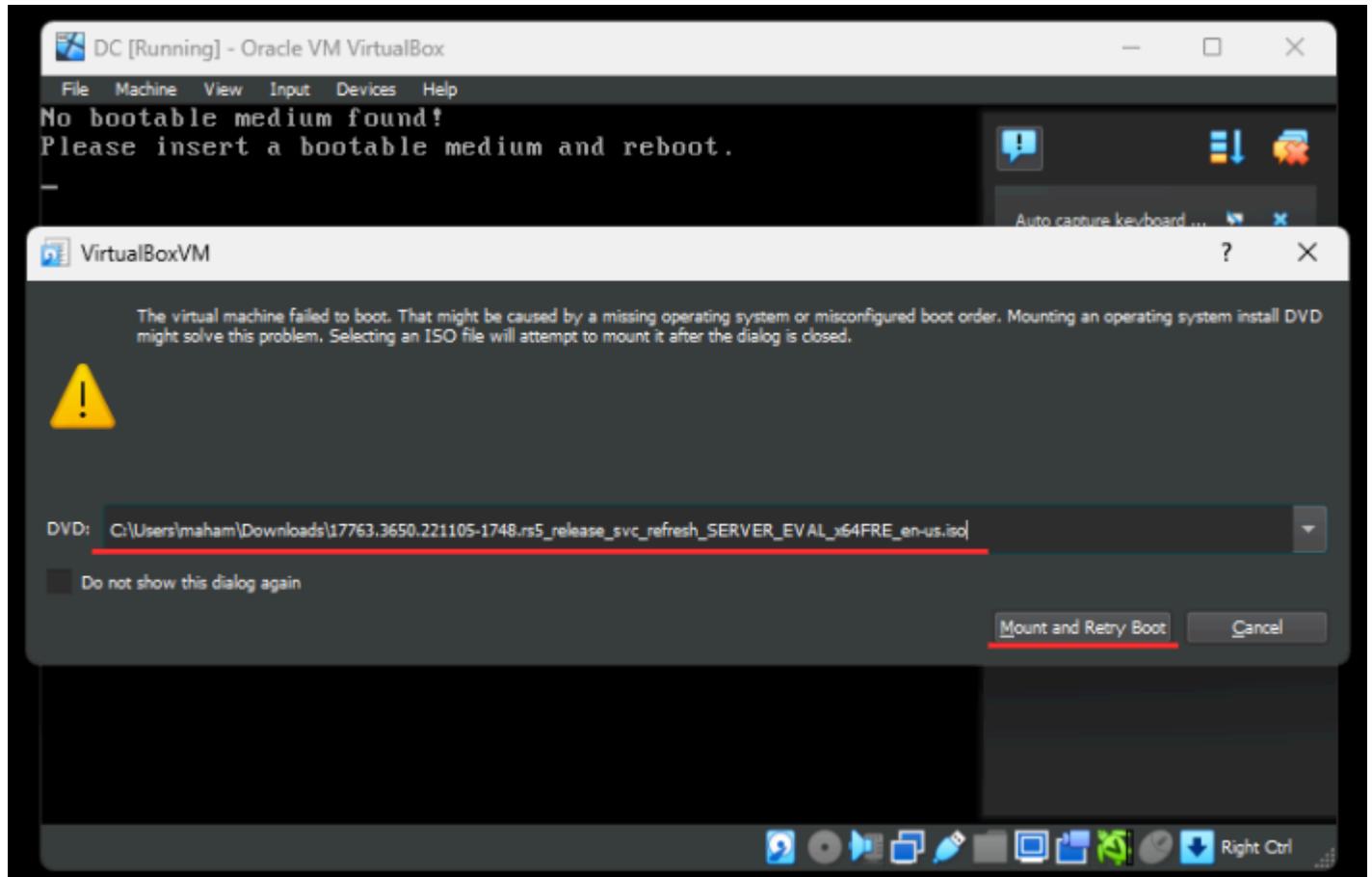


Using NAT so the domain controller can communicate/ connect to the internet through ISP

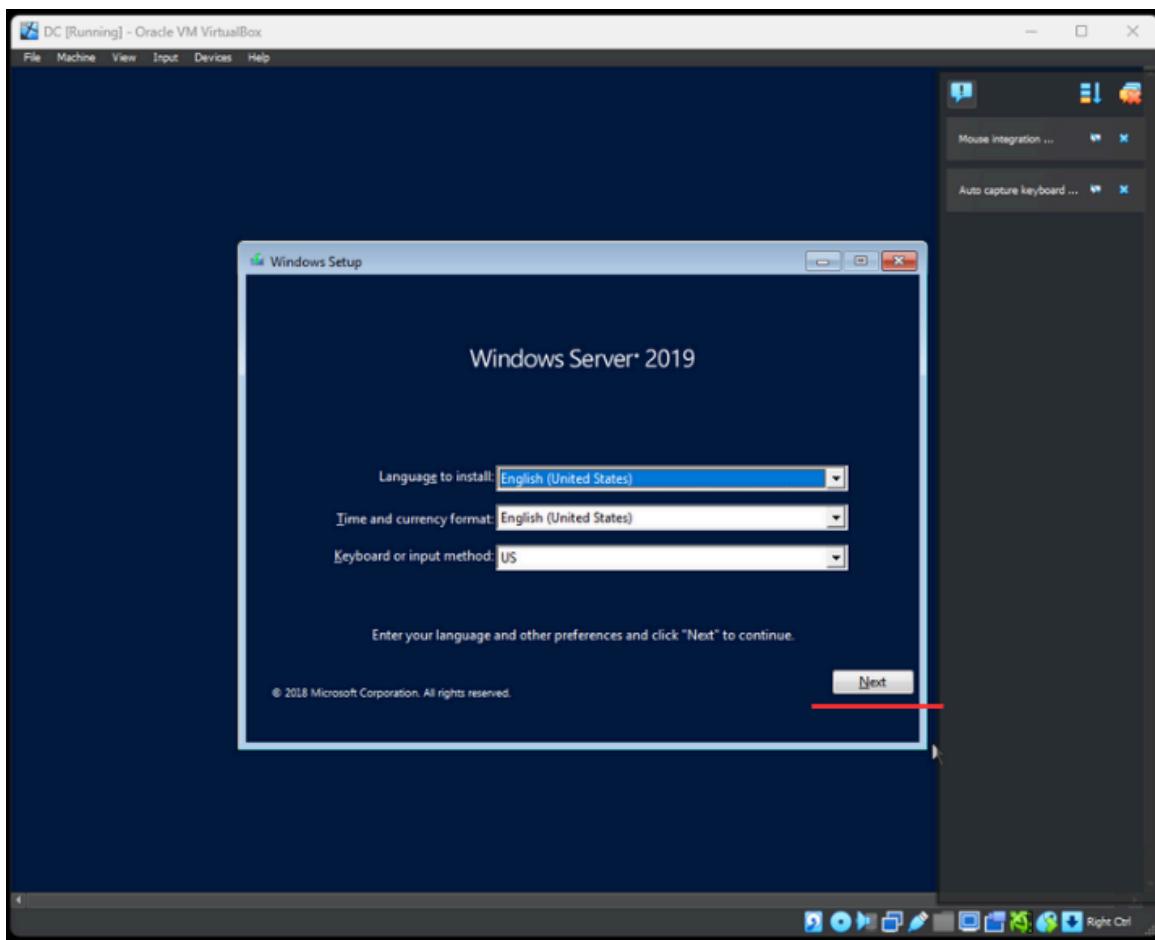


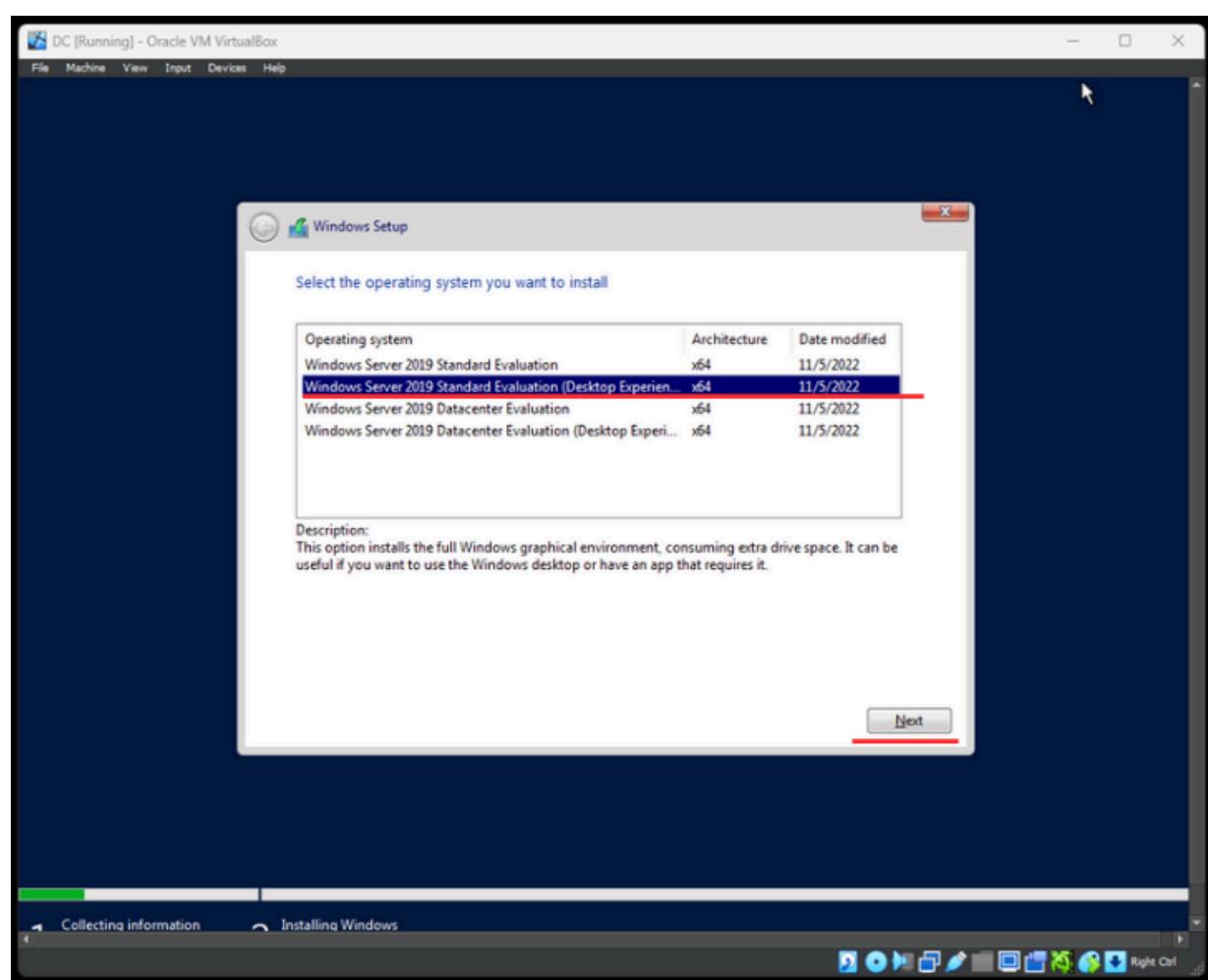
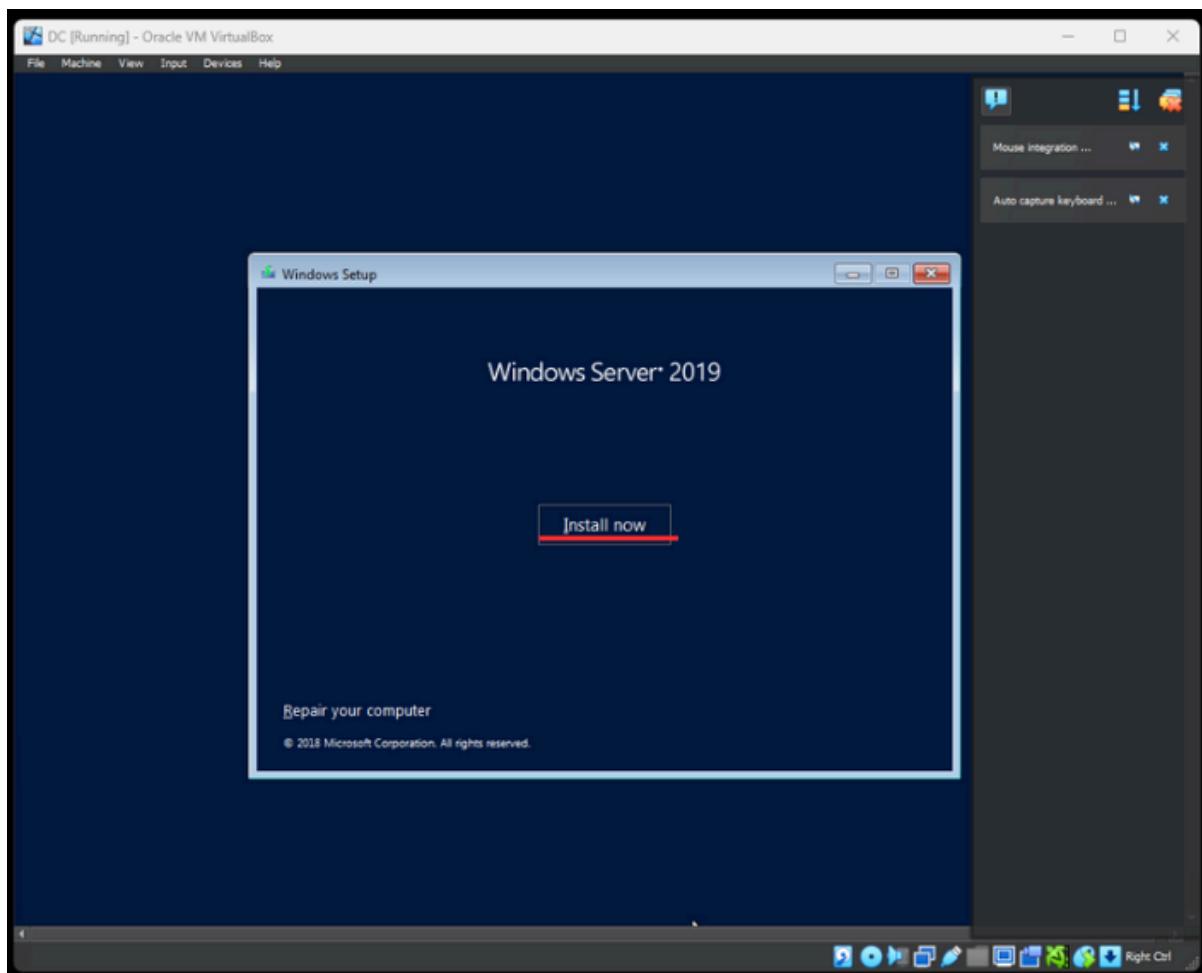
Adapter 1 will enable the VM to communicate with the router using NAT. The internal adapter will connect to the internal network, allowing the Domain Controller to communicate with other internal VMs.

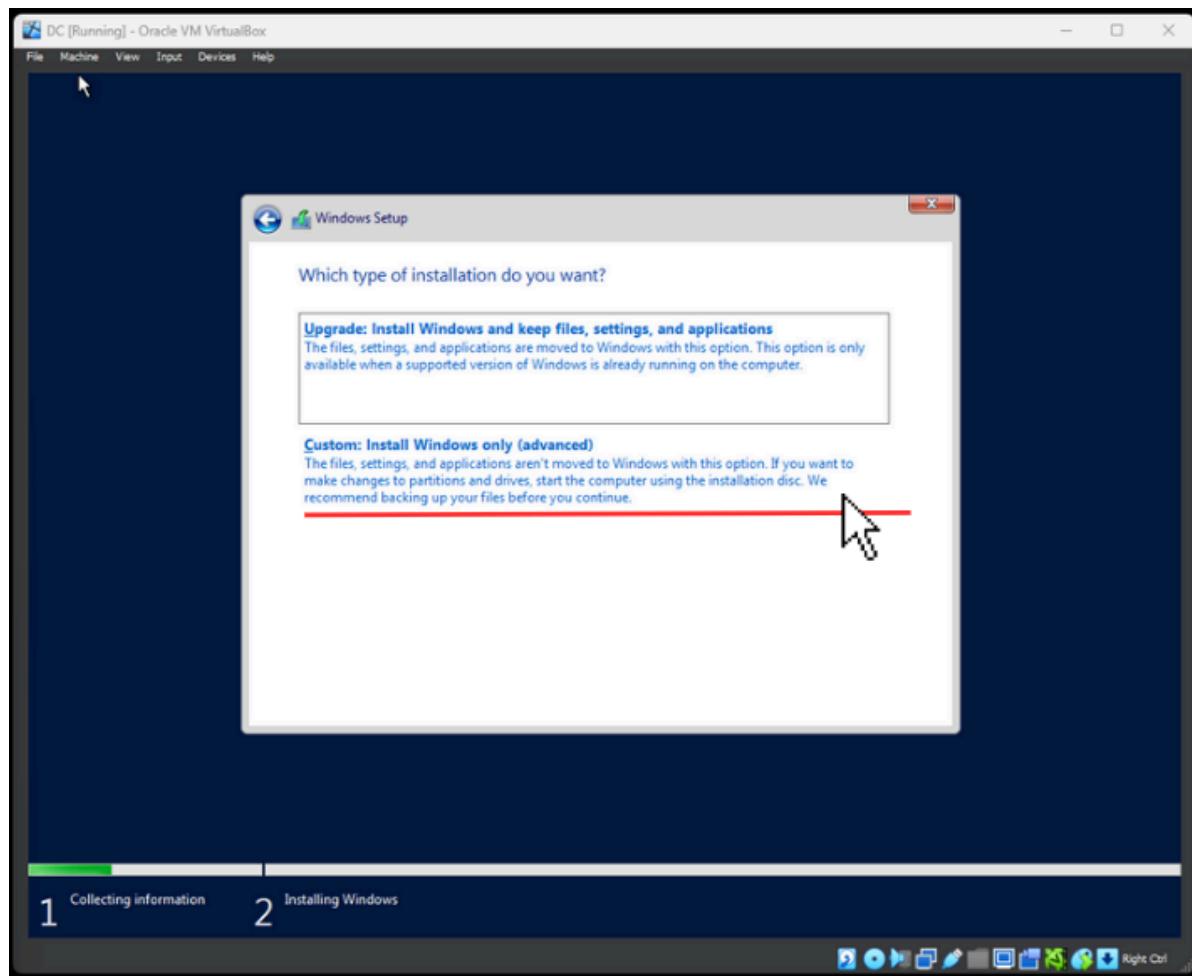
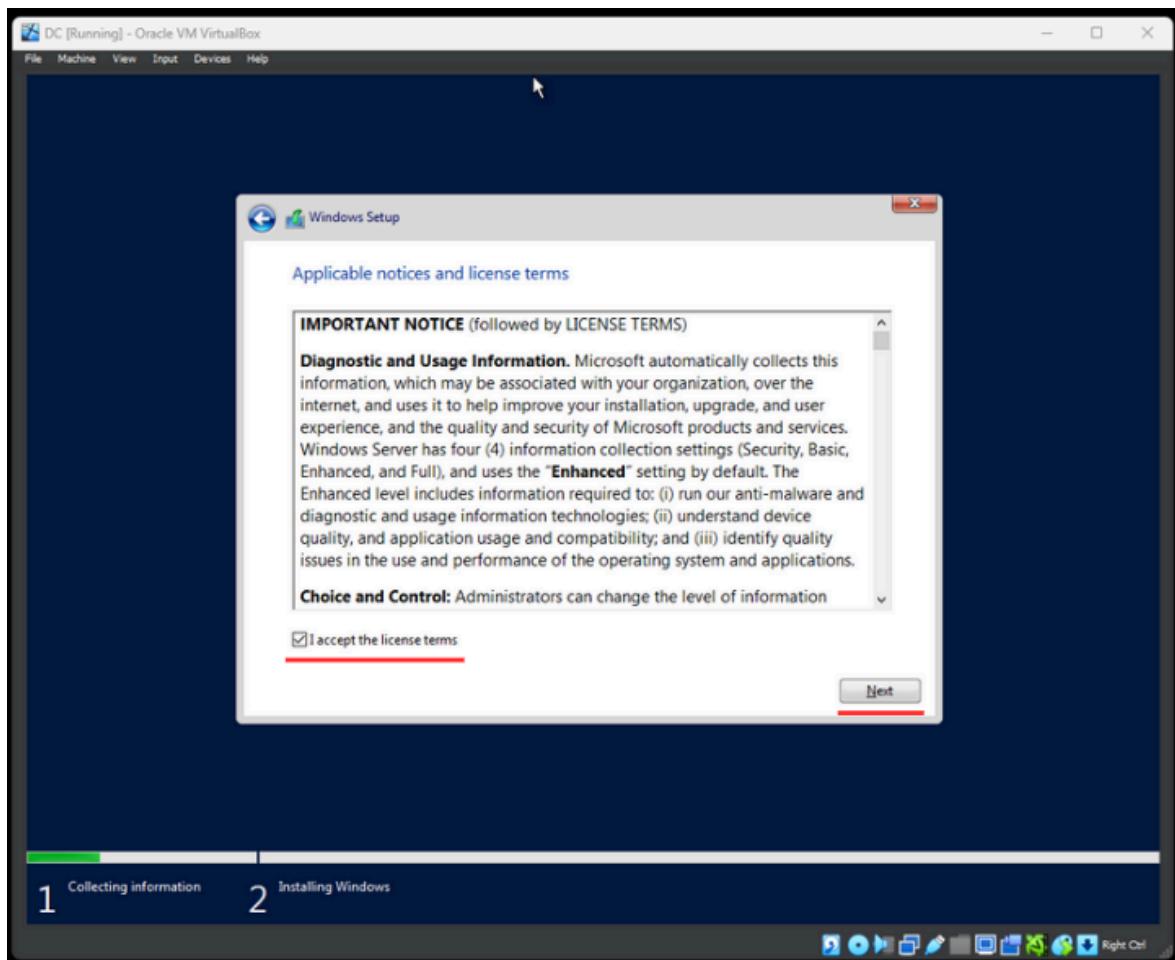


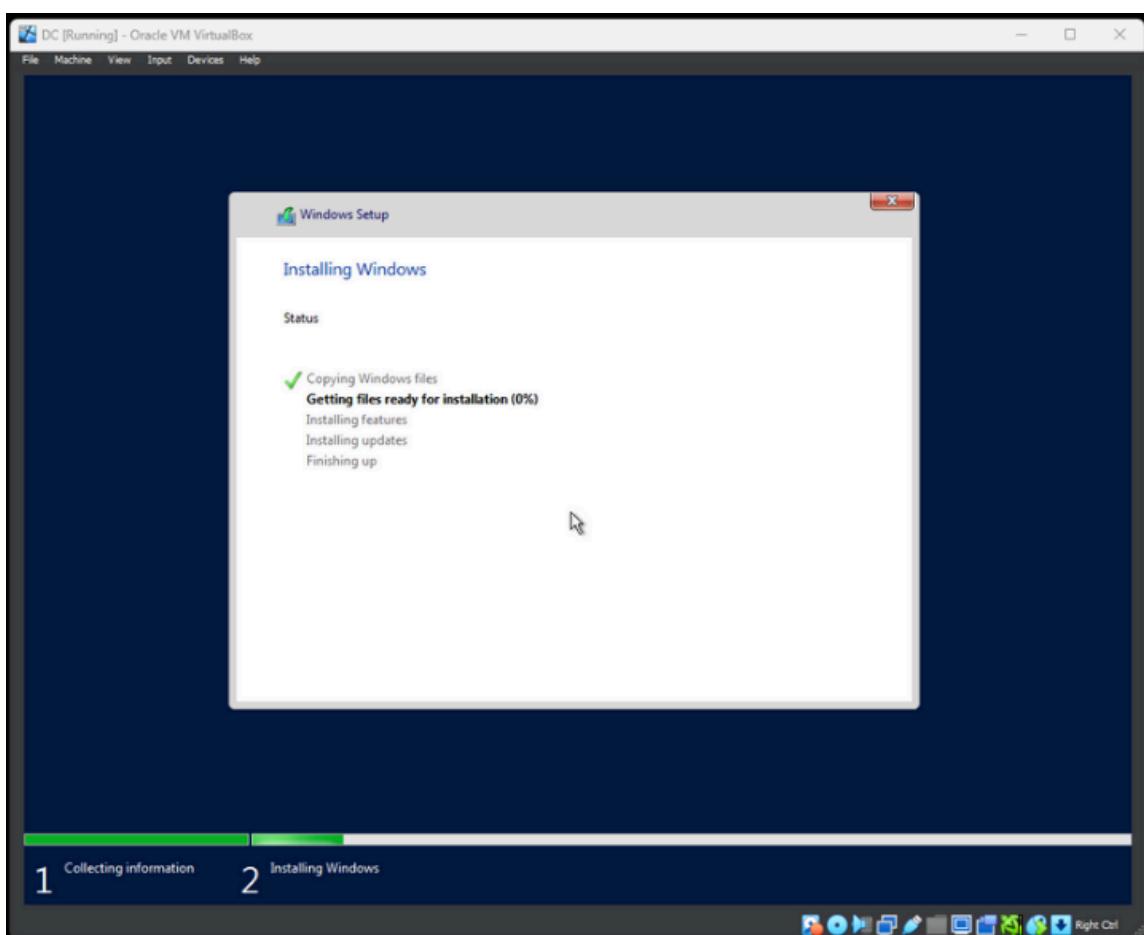
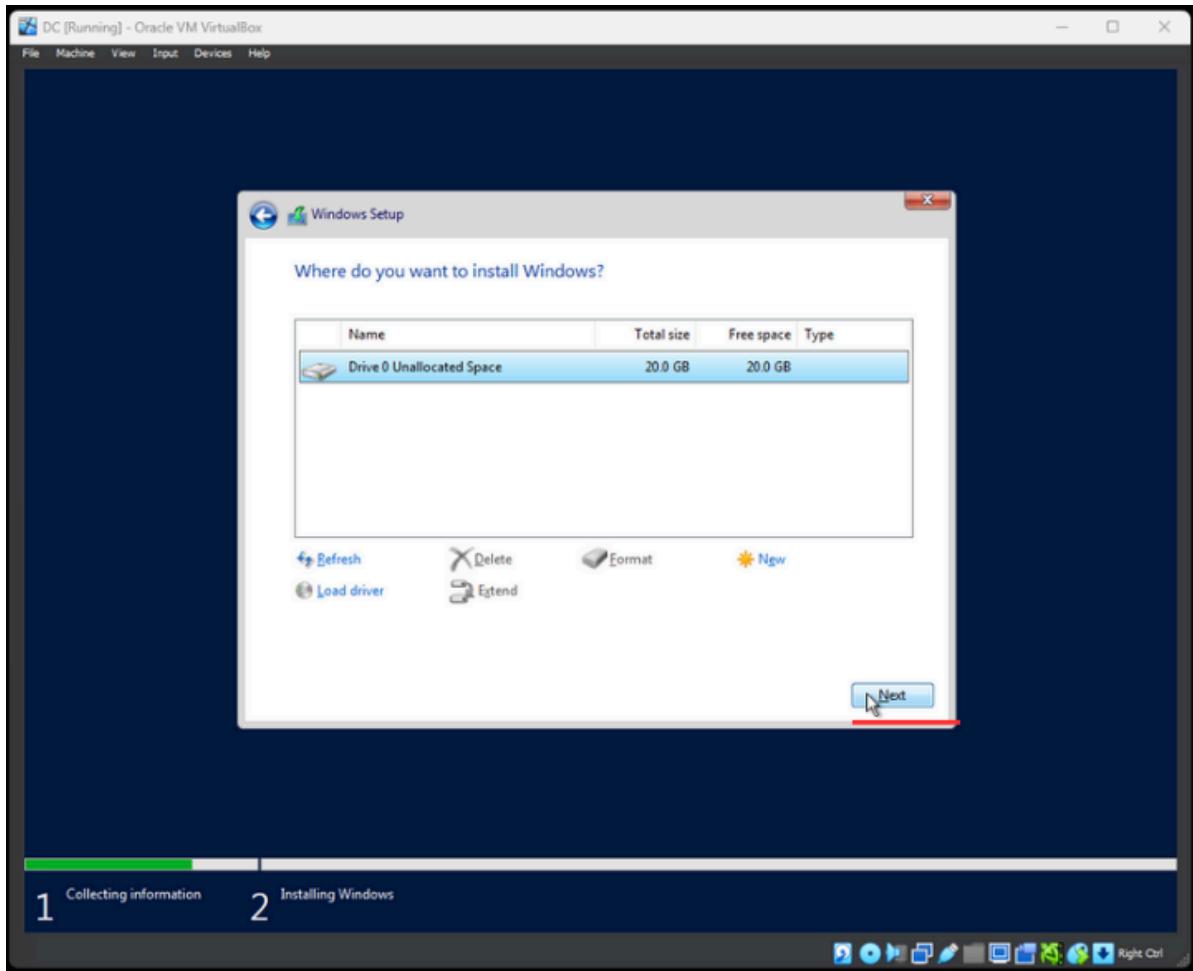


This is from the link provided when downloading the Server 2019

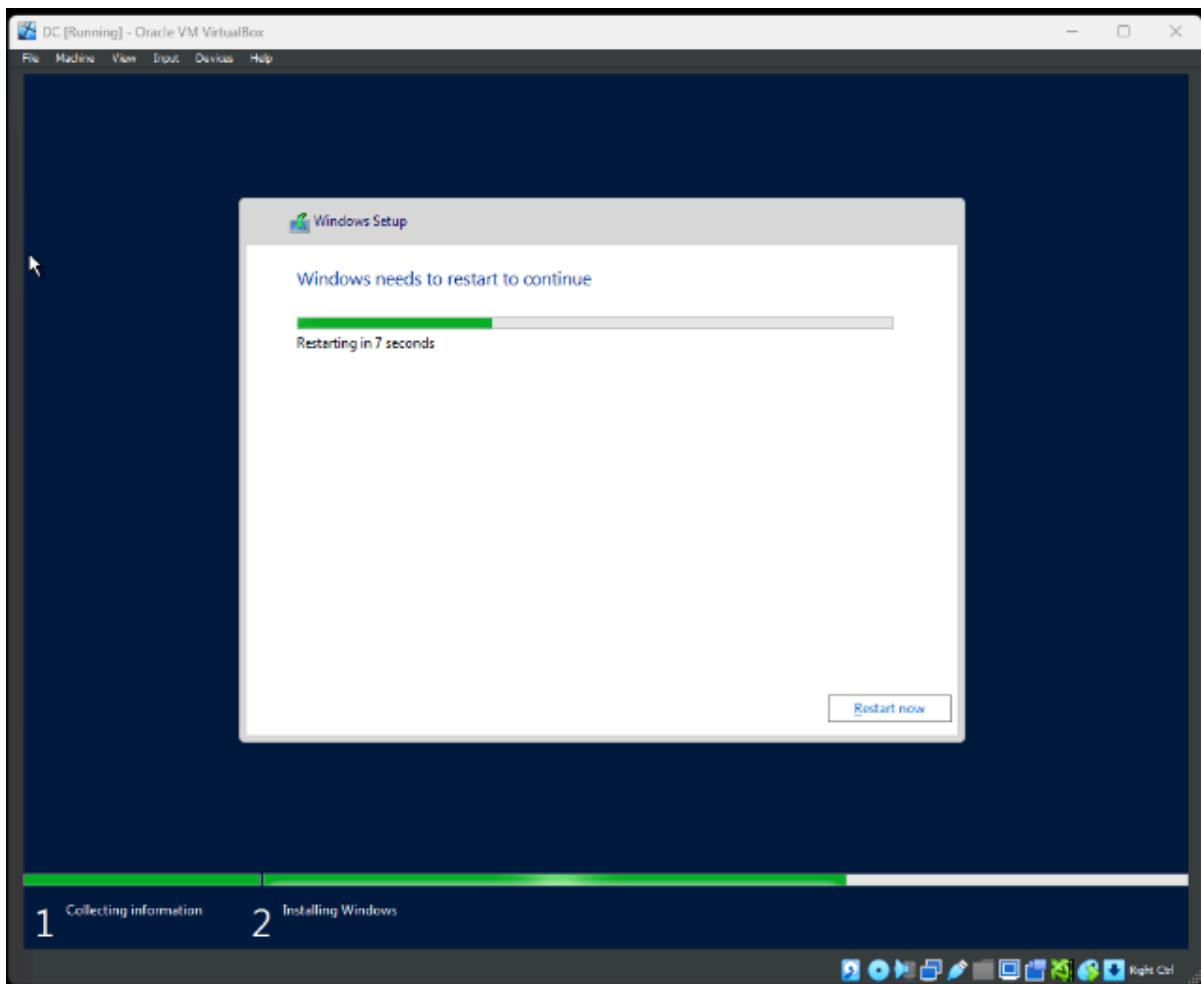




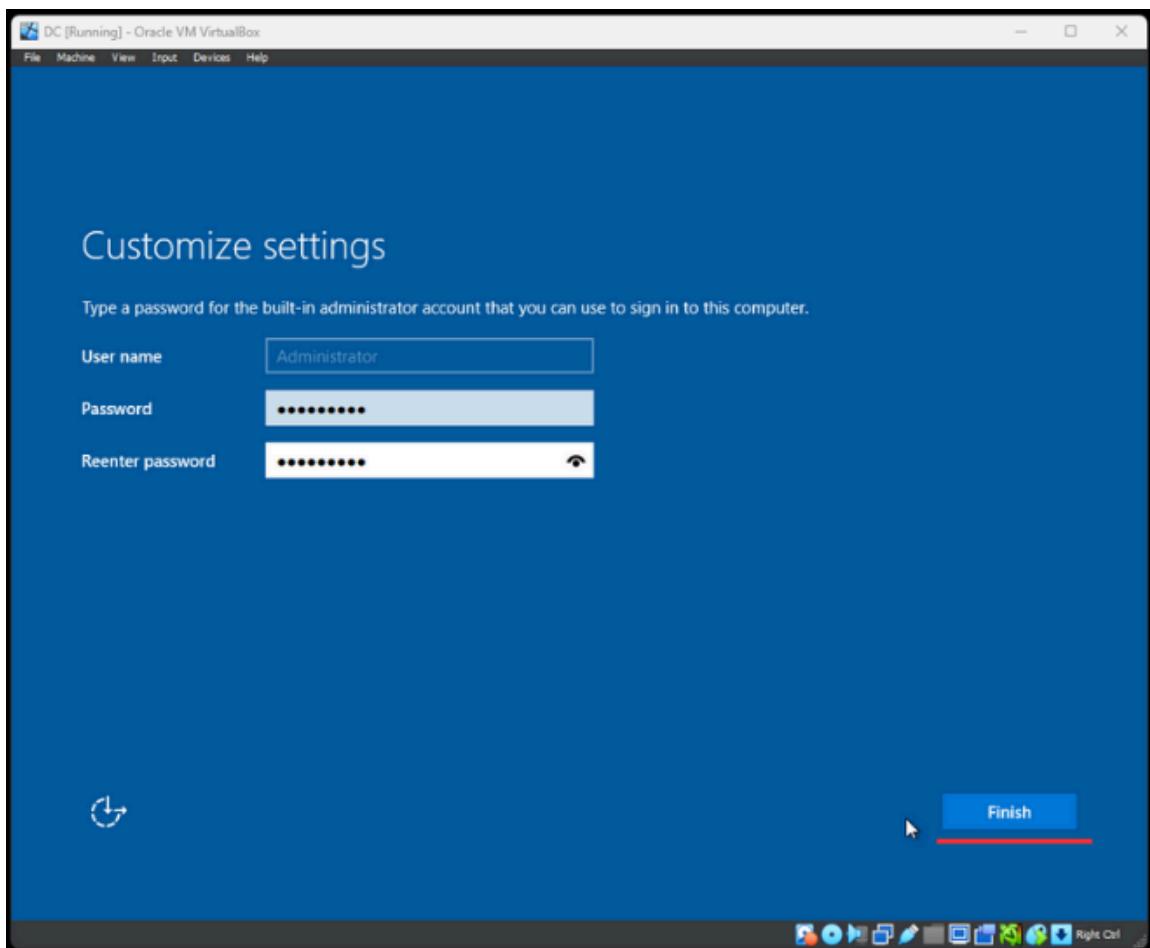




This may take a while, it is normal



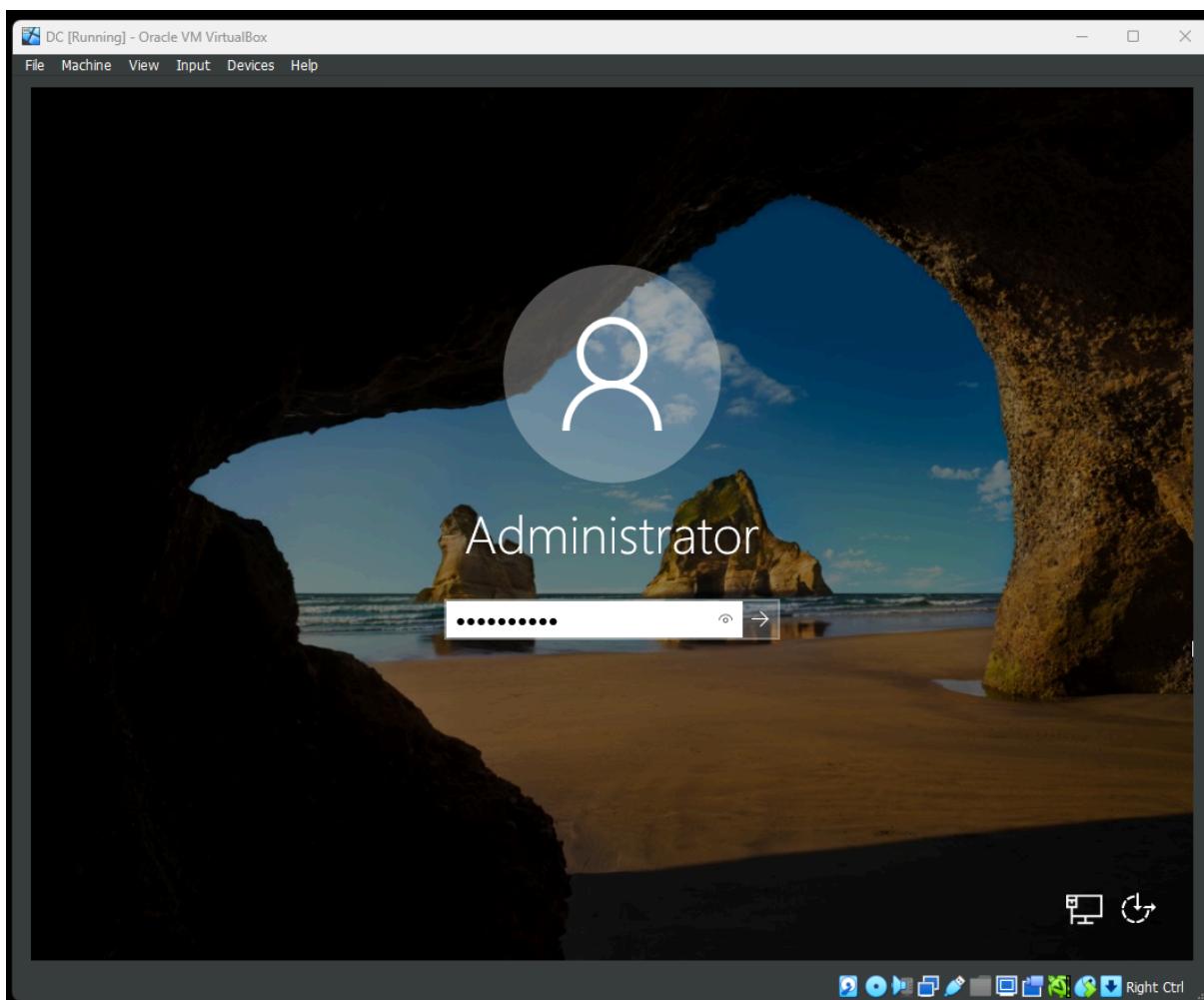
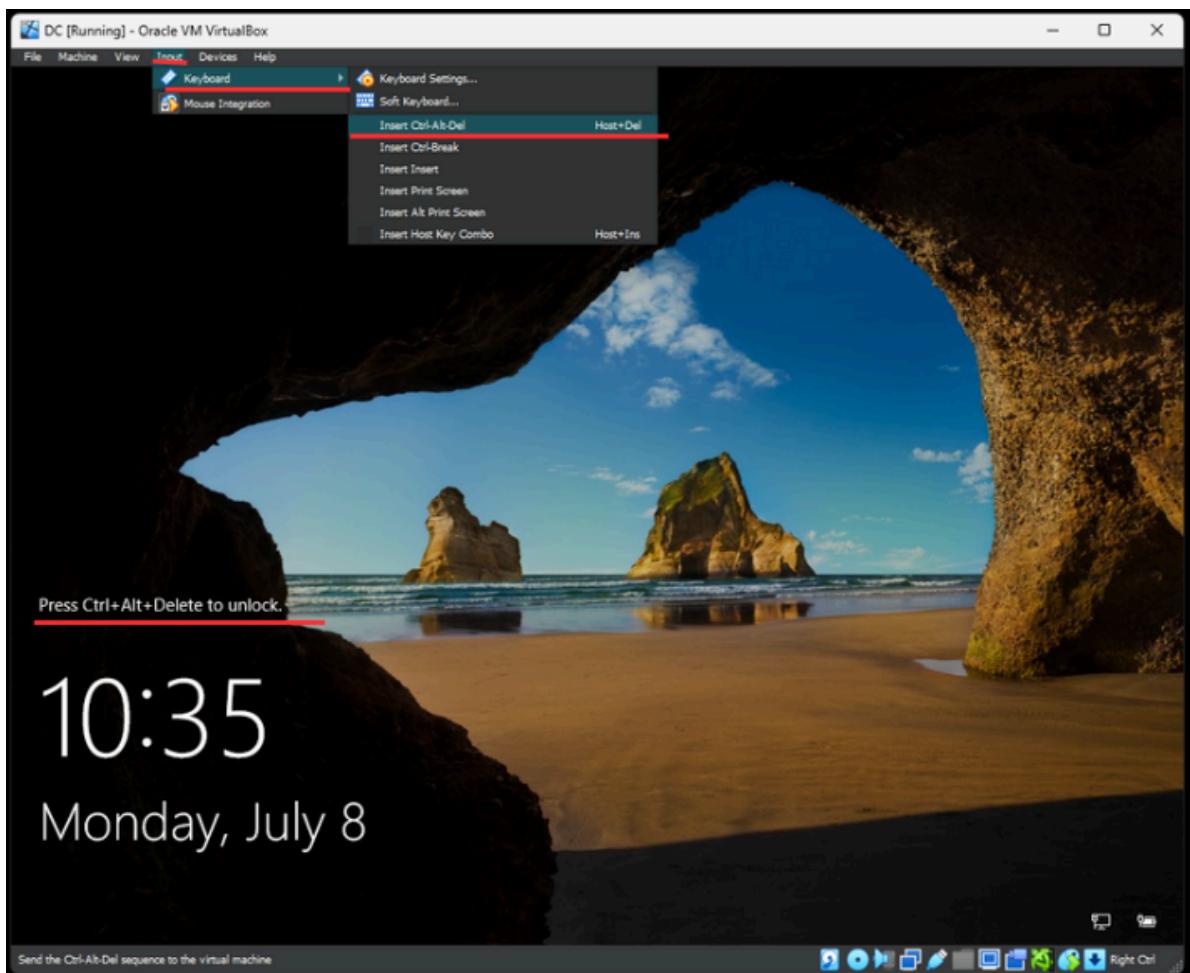
It will restart by itself

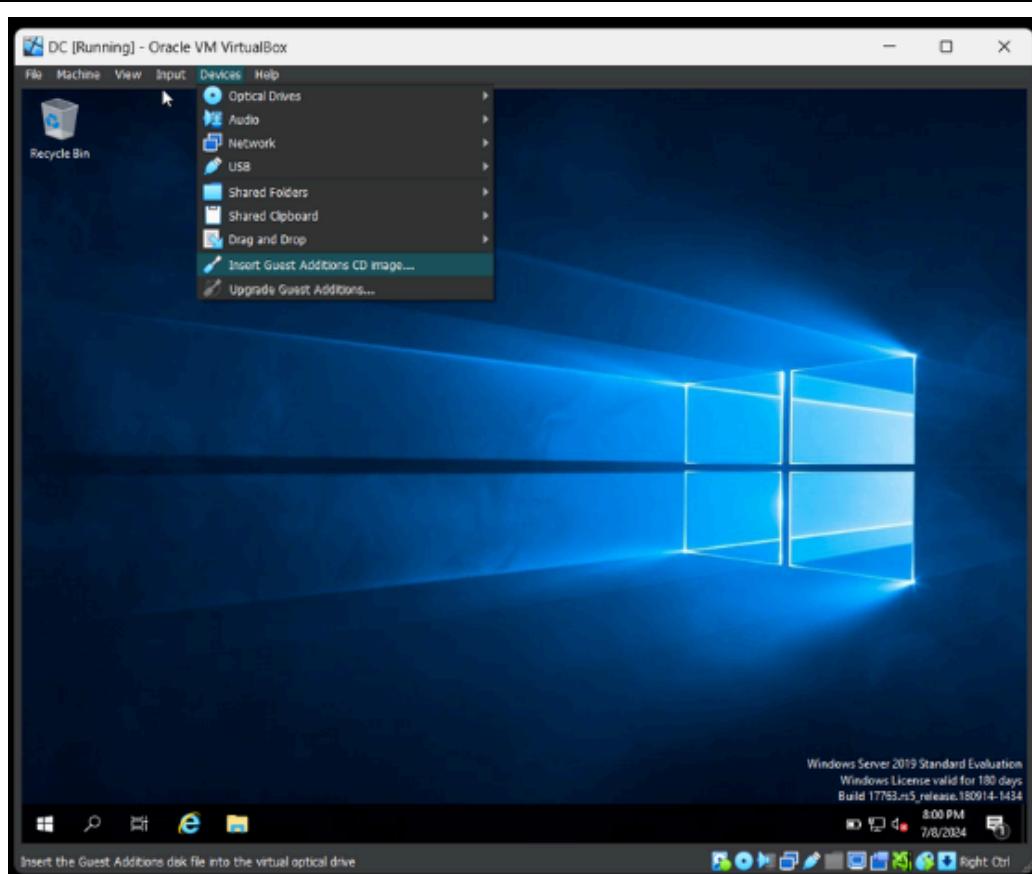
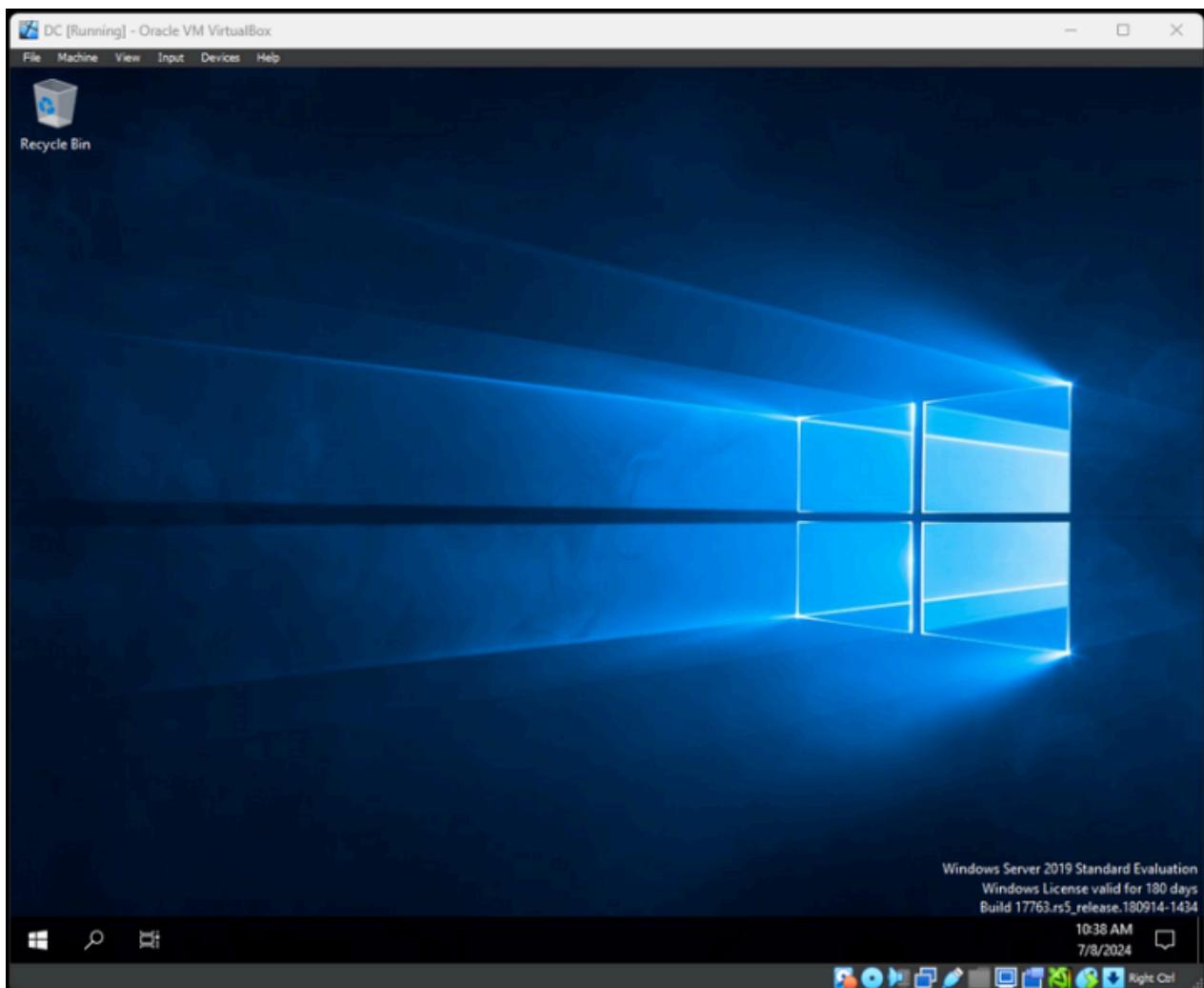


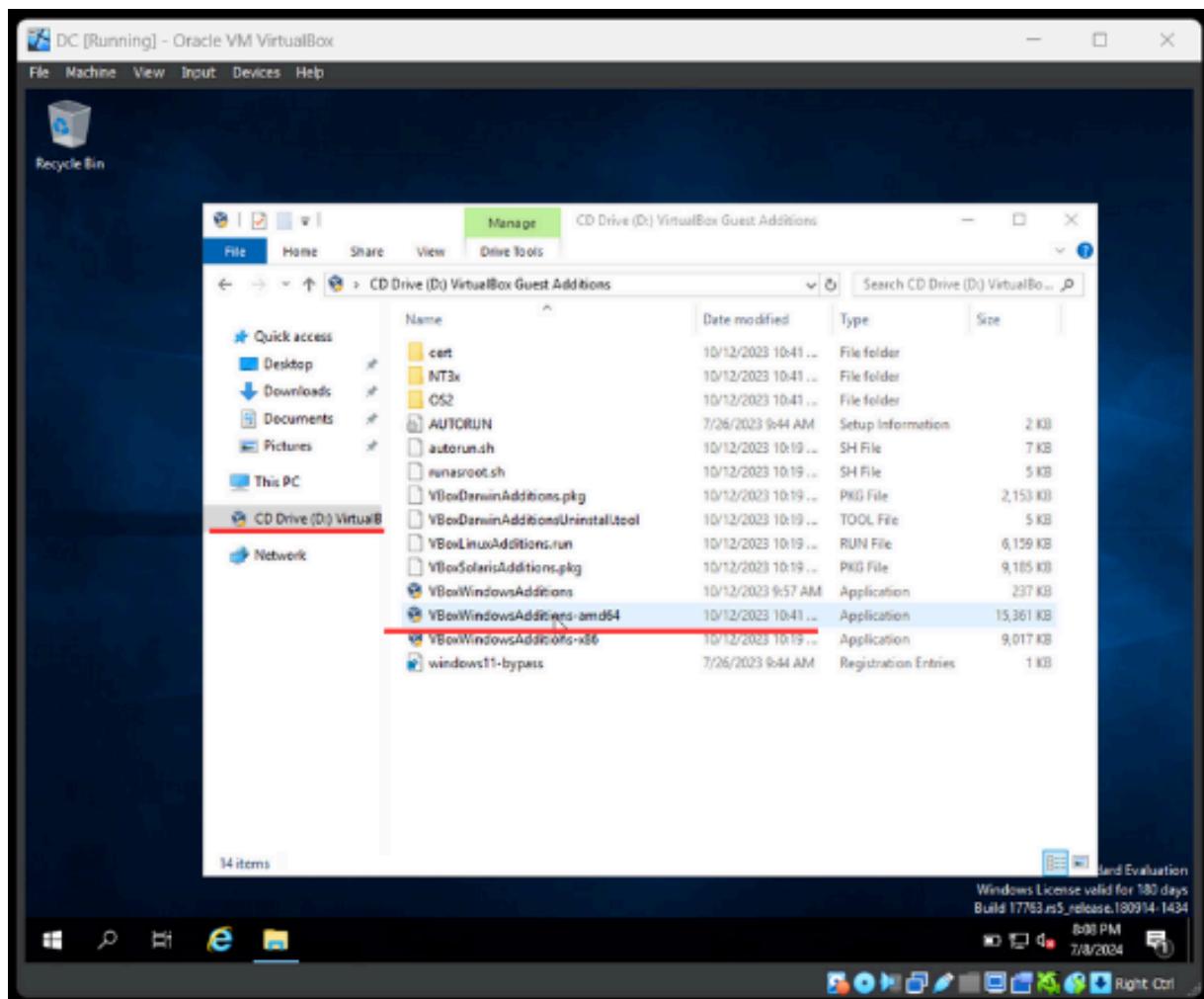
To minimize the burden of memorizing multiple passwords, all passwords will be standardized as "Password1."

Only do this on labs, never on an production or personal environment

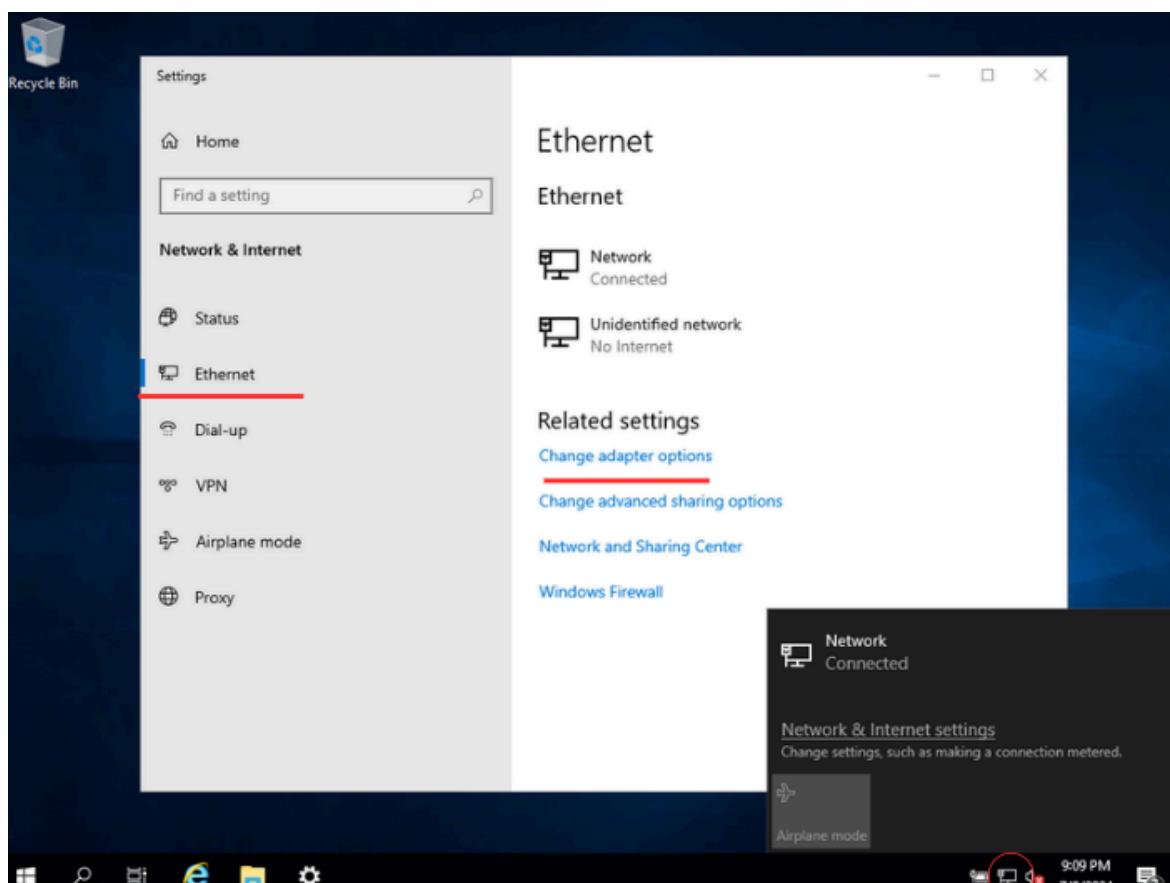


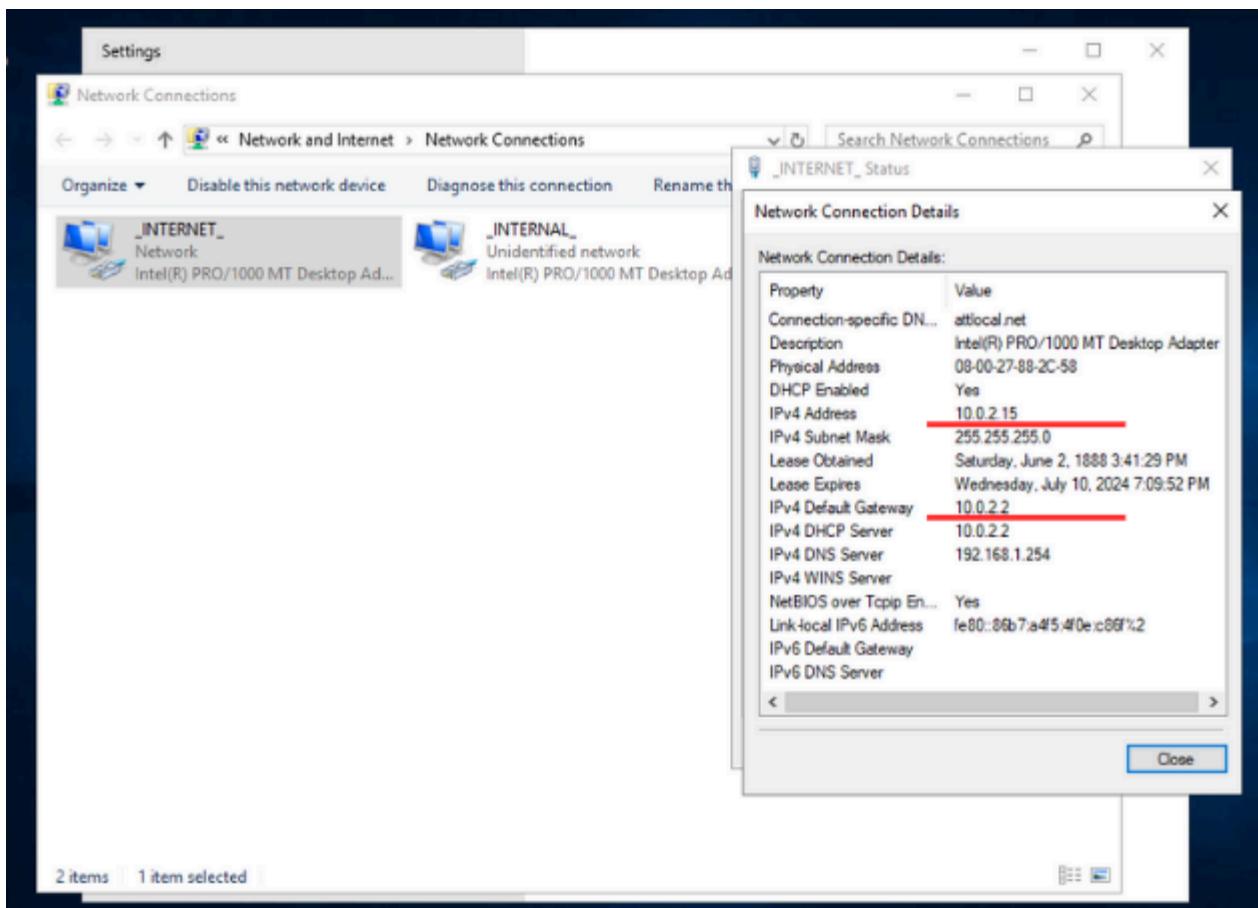






Run the installation by selecting "Next," "Continue," and "Install" as prompted until you complete the process. Select the option to restart, sometimes a reboot as necessary. This allows you to resize and manage everything more efficiently.



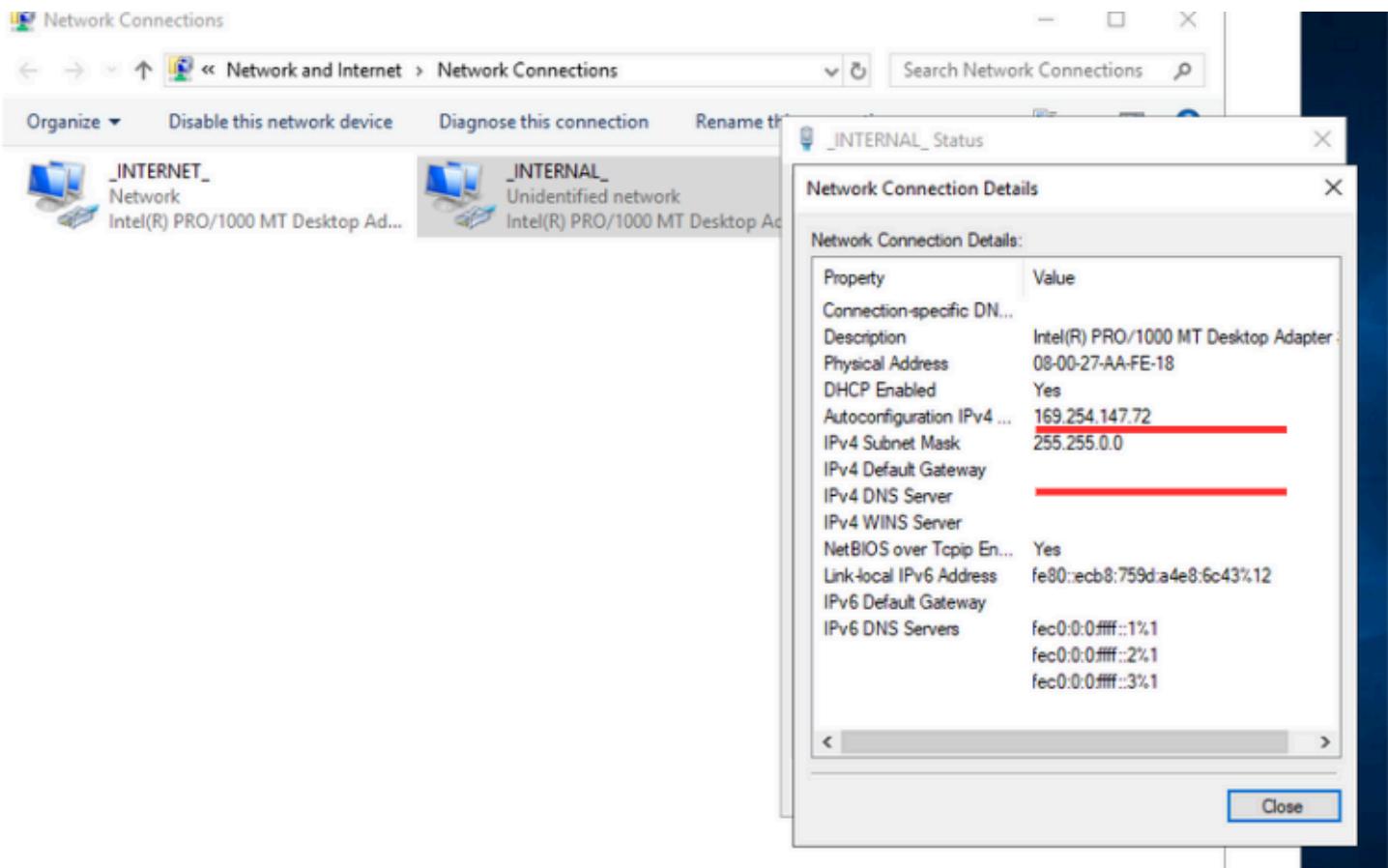


Here we are working with the network interface of the domain controller. Identify the internal NIC and the external NIC and rename them.

How NAT works in Oracle VirtualBox

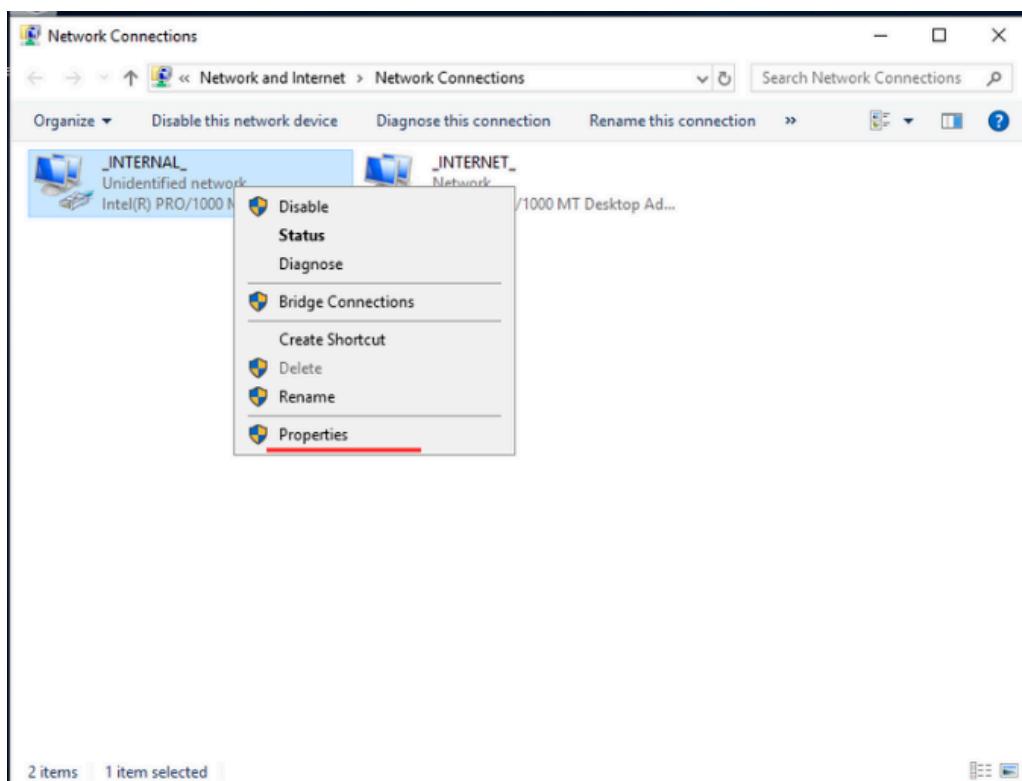
In Oracle VirtualBox, the NAT (Network Address Translation) network type typically uses a default gateway IP address of `10.0.2.2`. This IP address is used as the default gateway for VMs connected via NAT to communicate with the host machine and other networks.

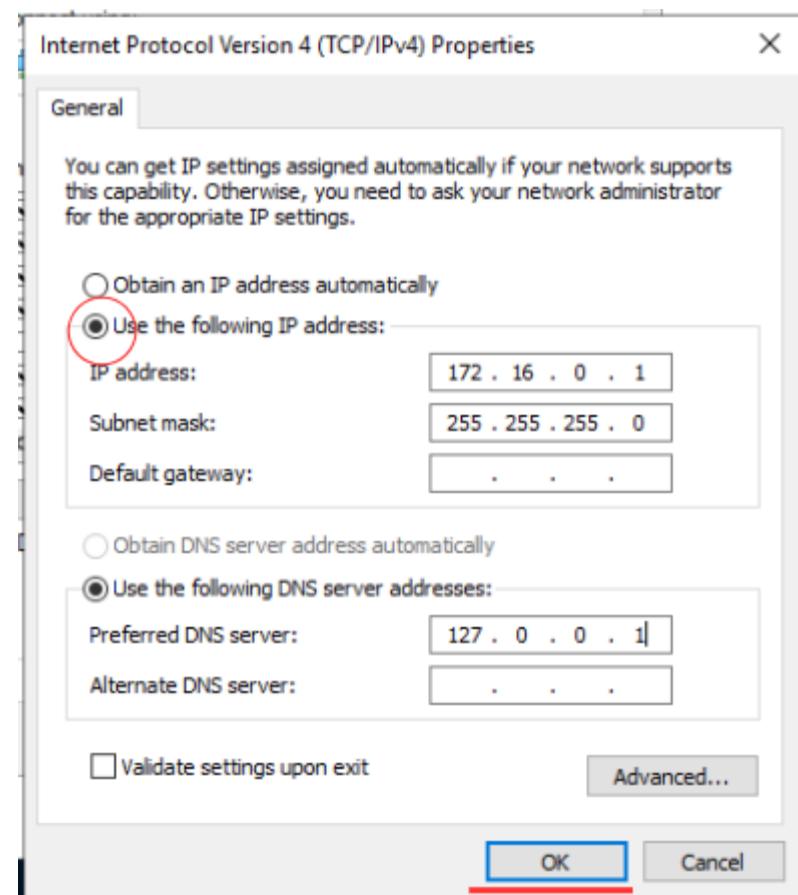
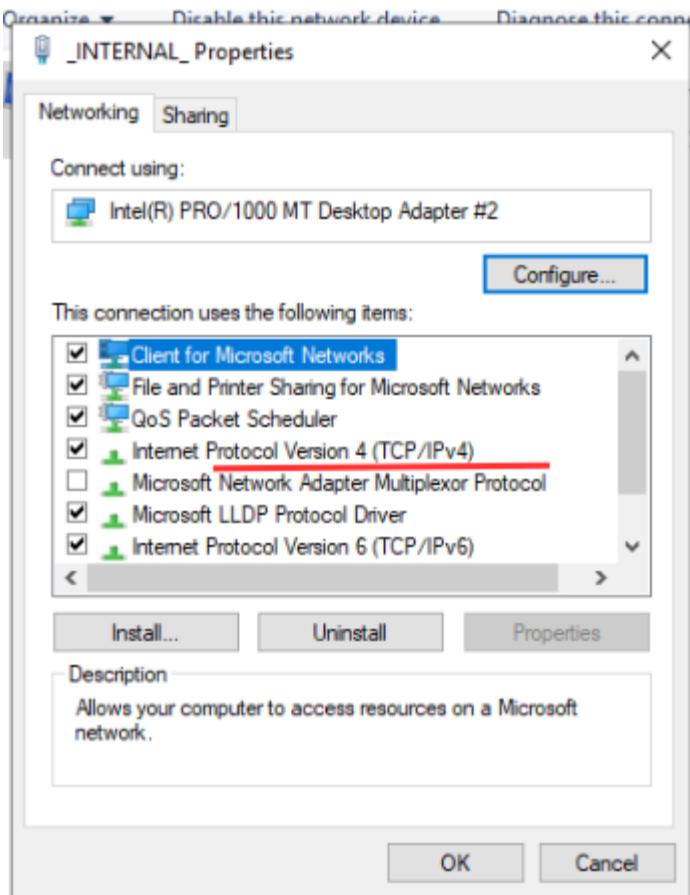
When you configure a VM in Oracle VirtualBox to use NAT for its network connection, the internal DHCP server provided by VirtualBox will automatically assign an IP address to the VM. The NAT networking mode in VirtualBox provides a way for VMs to communicate with external networks using the host machine's network connection. The IP addresses assigned to VMs using NAT are managed by VirtualBox's internal DHCP server.



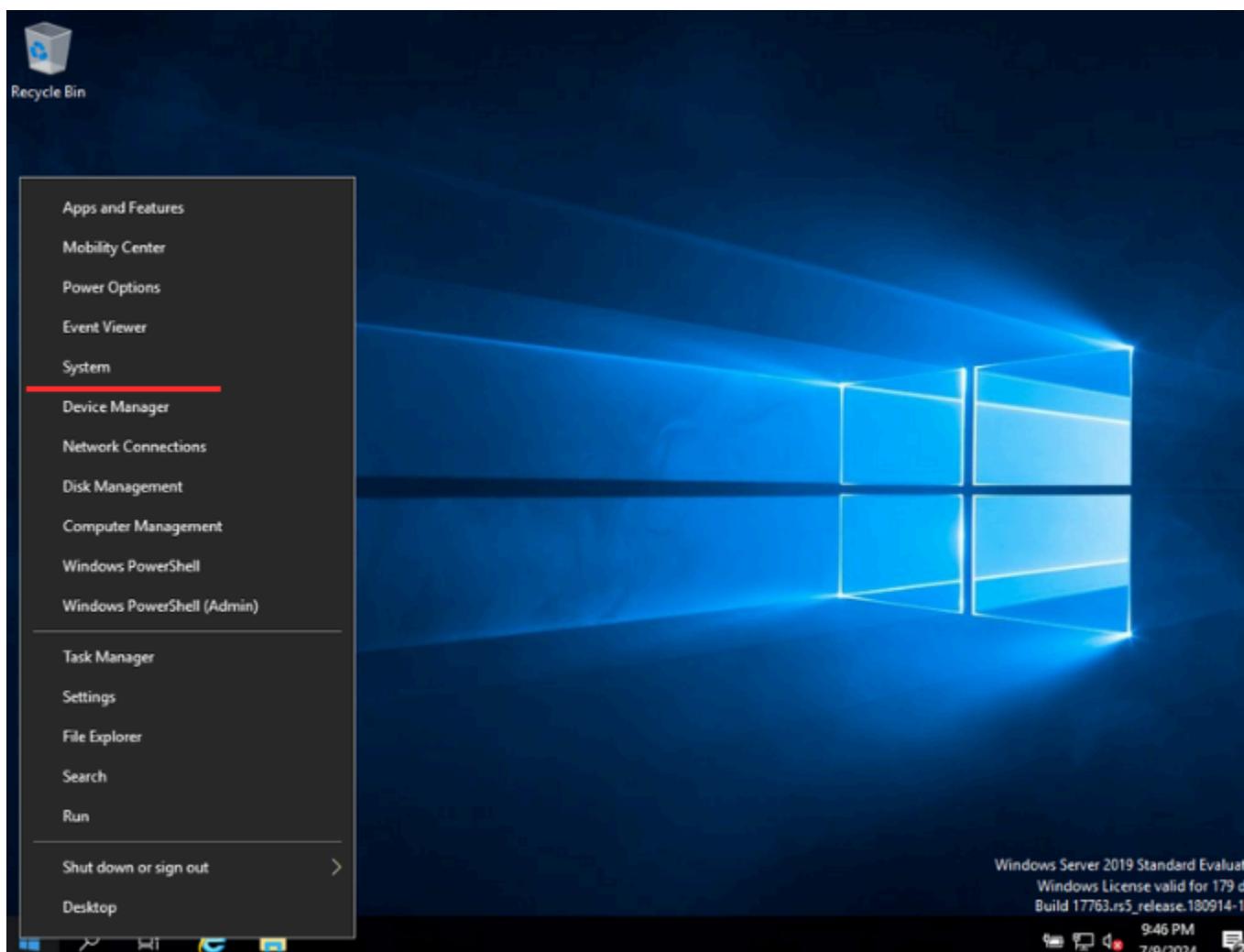
The INTERNAL network adapter has an Autoconfiguration IPv4 Address of 169.254.147.72, which indicates that it did not receive an IP address from a DHCP server. Instead, it has assigned itself an Automatic Private IP Addressing (APIPA) address. APIPA addresses are in the range of 169.254.x.x and are used when a device cannot obtain an IP address from a DHCP server.

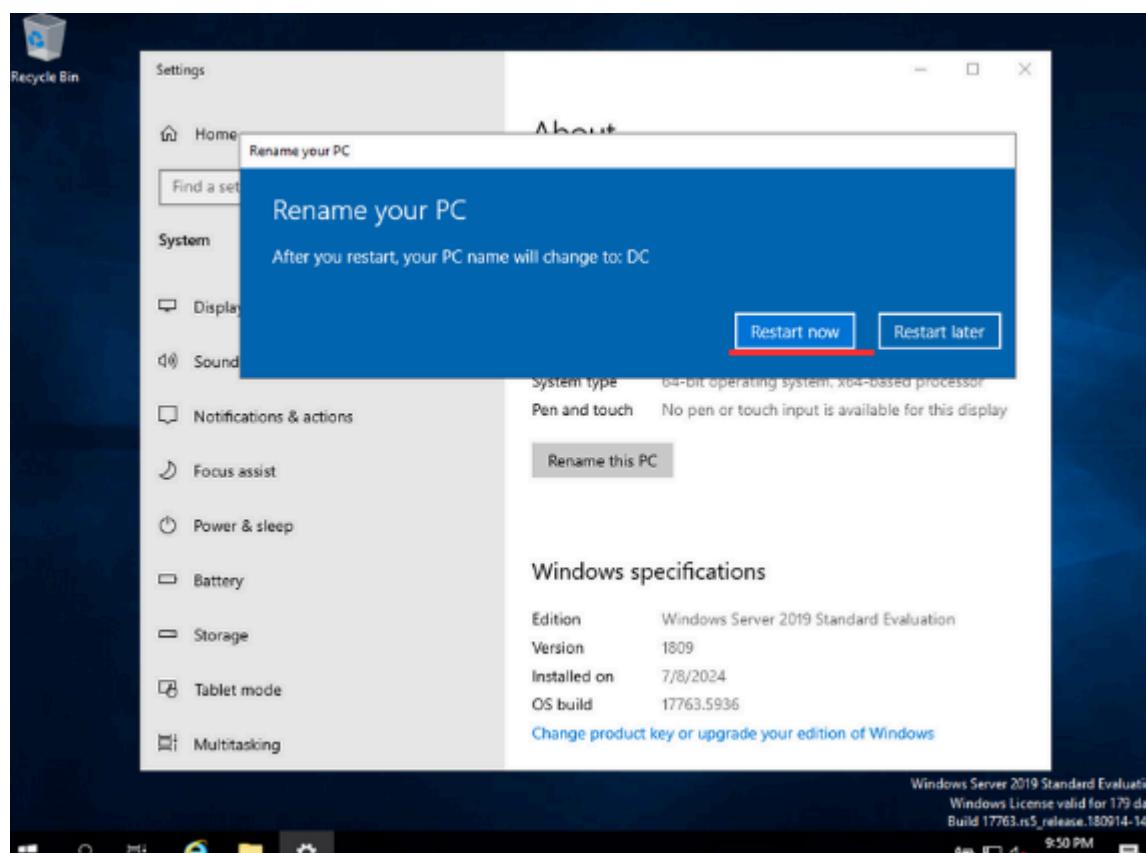
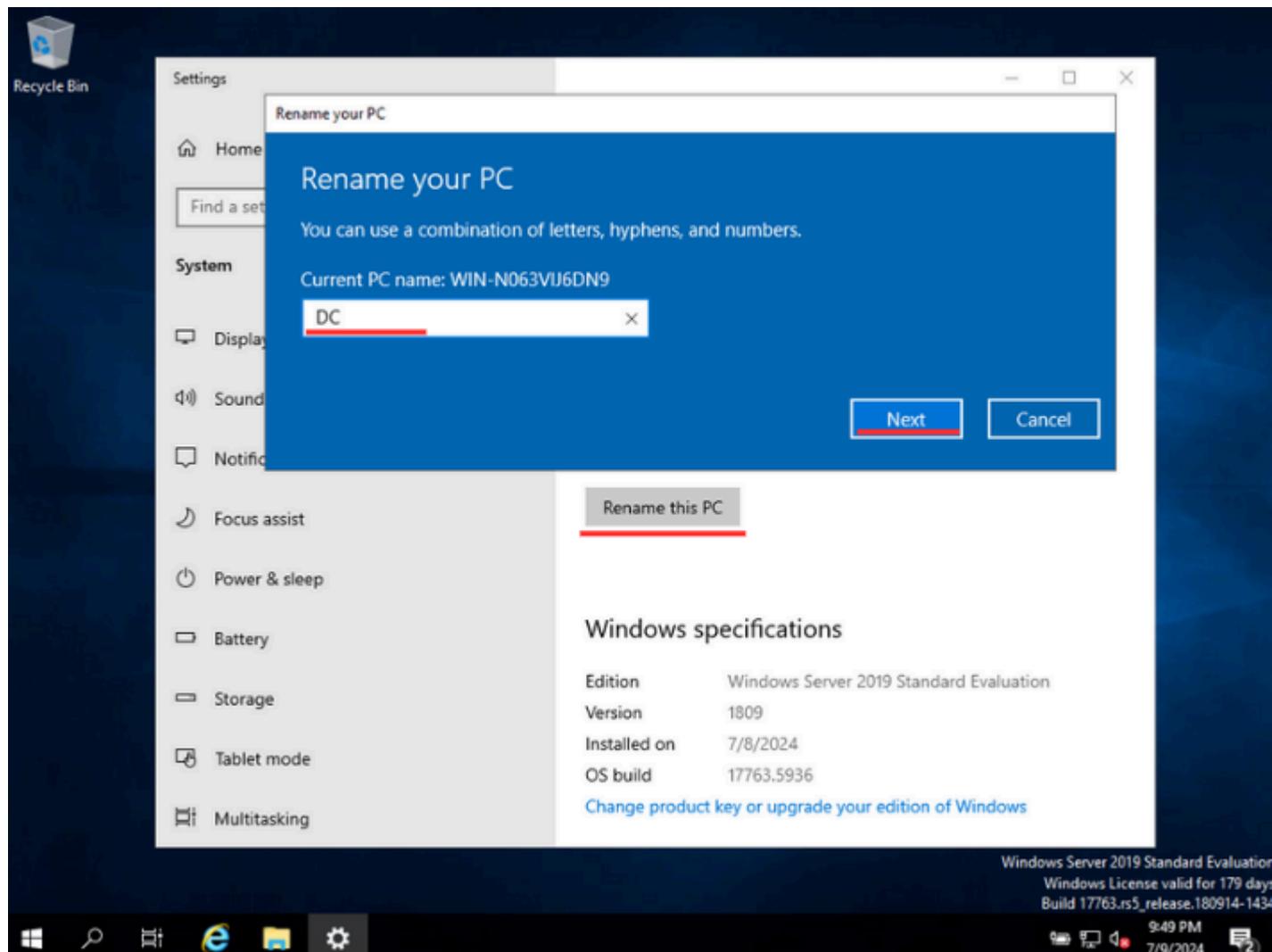
Now we will be creating the IP address for the internal network based on the topology.



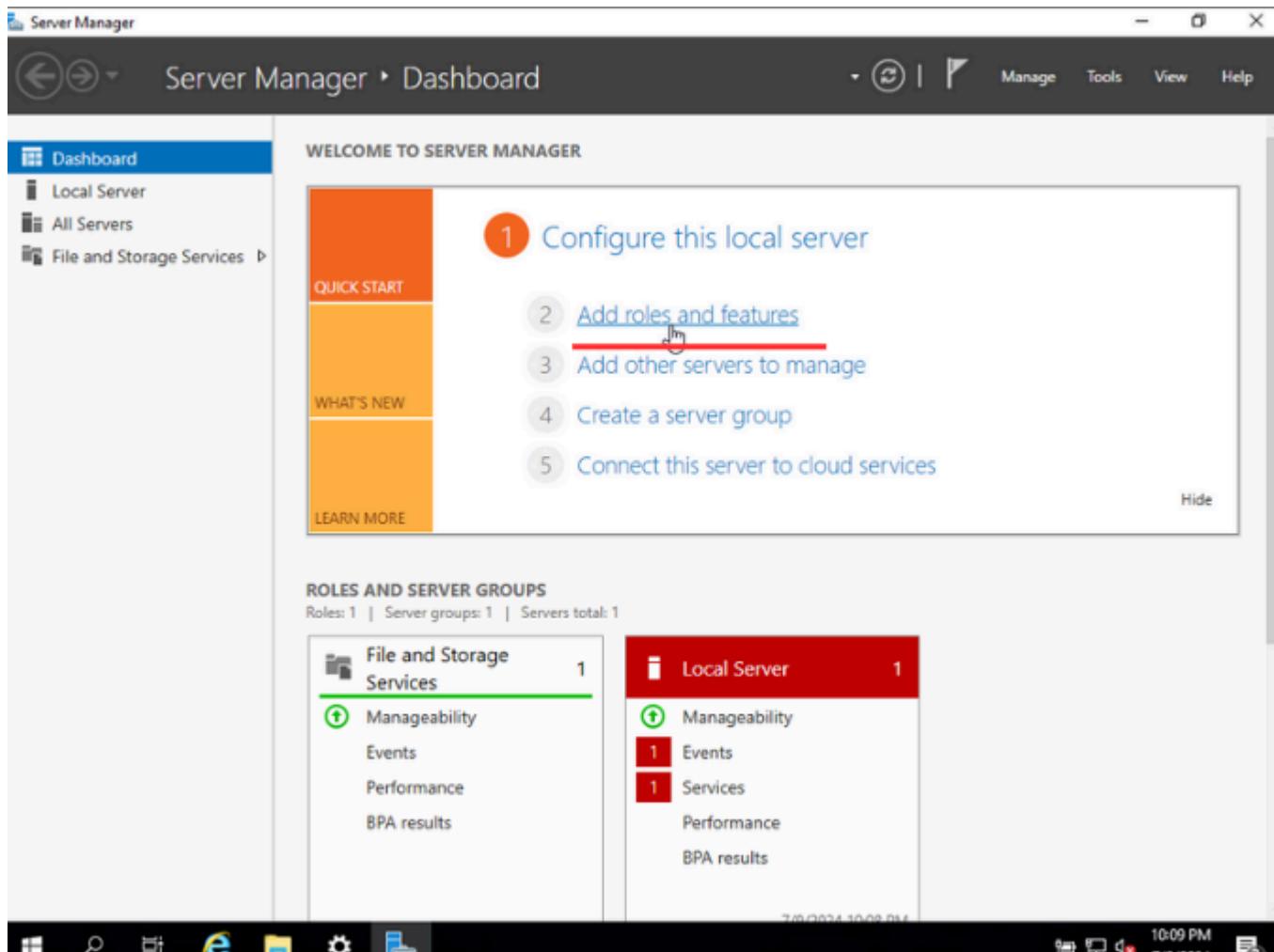


Establishing the dns server for internal NIC





Now installing active directory domains services, to create a domain



The screenshot shows two windows of the 'Add Roles and Features Wizard'.
The left window is the 'Before you begin' page, which provides instructions for using the wizard to install roles, role services, or features. It lists prerequisites such as a strong password and network settings, and links to the 'Remove Roles and Features Wizard'. A checkbox for skipping the page by default is available.
The right window is the 'Select installation type' page, which allows choosing between 'Role-based or feature-based installation' (selected) and 'Remote Desktop Services installation'. It explains that the former installs required role services for VDI, while the latter creates a virtual machine-based deployment.
Both windows have a standard Windows interface with back/next buttons, an install button, and a cancel button.

When you install the Active Directory Domain Services (AD DS) role on Windows Server 2019 using Server Manager, the DNS server role is installed automatically if it's not already present. This is essential because DNS is a critical component for AD DS functionality.

DESTINATION SERVER
DC

Select destination server

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Select a server or a virtual hard disk on which to install roles and features.

- Select a server from the server pool
- Select a virtual hard disk

Server Pool

Filter:

Name	IP Address	Operating System
DC	10.0.2.15,172.1...	Microsoft Windows Server 2019 Standard Evaluation

1 Computer(s) found

This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.

< Previous

Next >

Install

Cancel

DESTINATION SERVER

Select server roles

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
- Active Directory Federation Services
- Active Directory Lightweight Direct
- Active Directory Rights Managemen
- Device Health Attestation
- DHCP Server
- DNS Server
- Fax Server
- File and Storage Services (1 of 12 in
- Host Guardian Service
- Hyper-V
- Network Policy and Access Services
- Print and Document Services
- Remote Access
- Remote Desktop Services
- Volume Activation Services
- Web Server (IIS)
- Windows Deployment Services
- Windows Server Update Services

Add Roles and Features Wizard

Add features that are required for Active Directory Domain Services?

You cannot install Active Directory Domain Services unless the following role services or features are also installed.

[Tools] Group Policy Management

▪ Remote Server Administration Tools

▪ Role Administration Tools

Active Directory module for Windows PowerShell

▪ AD DS Tools

[Tools] Active Directory Administrative Center

[Tools] AD DS Snap-Ins and Command-Line Tools

 Include management tools (if applicable)

Add Features

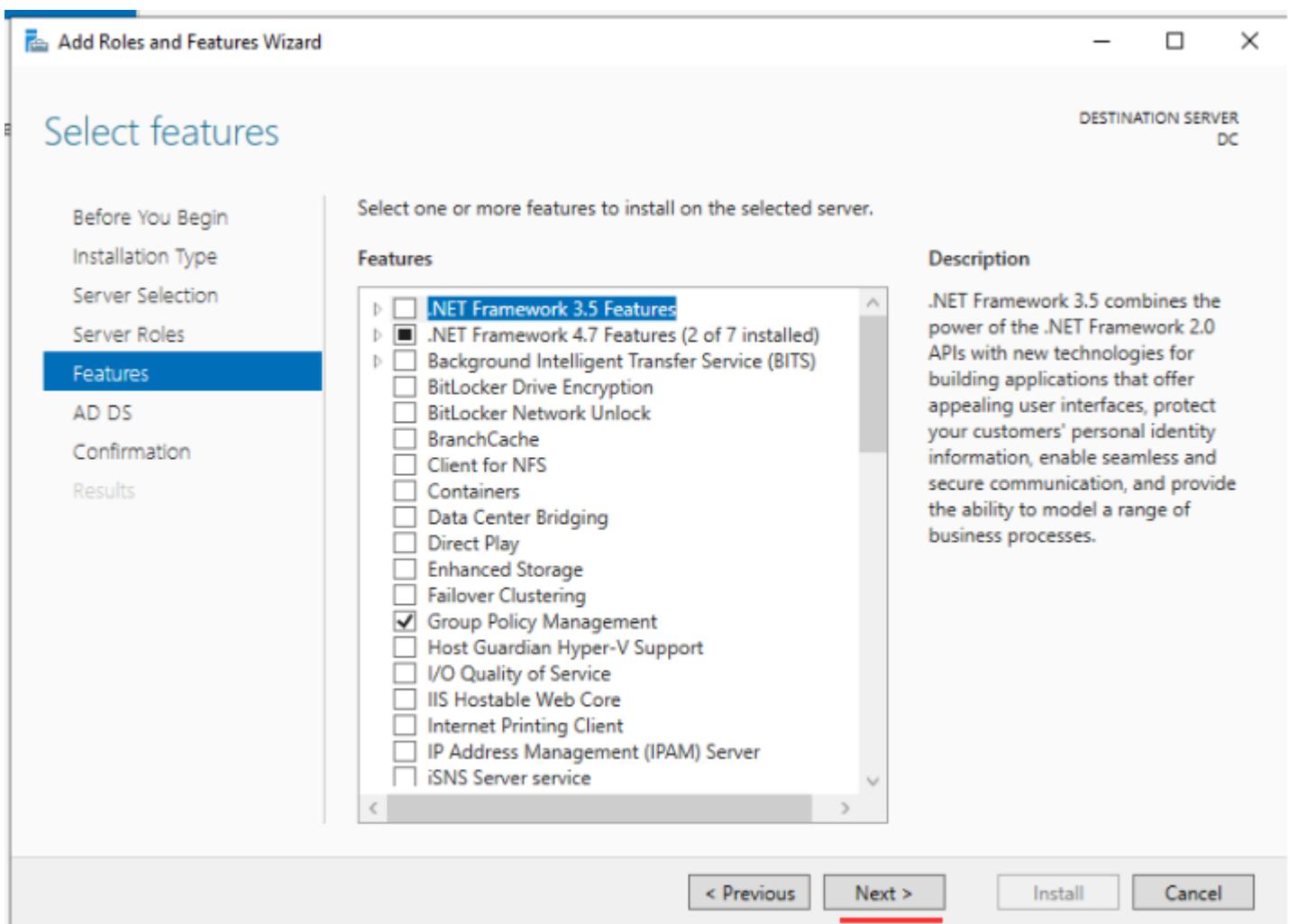
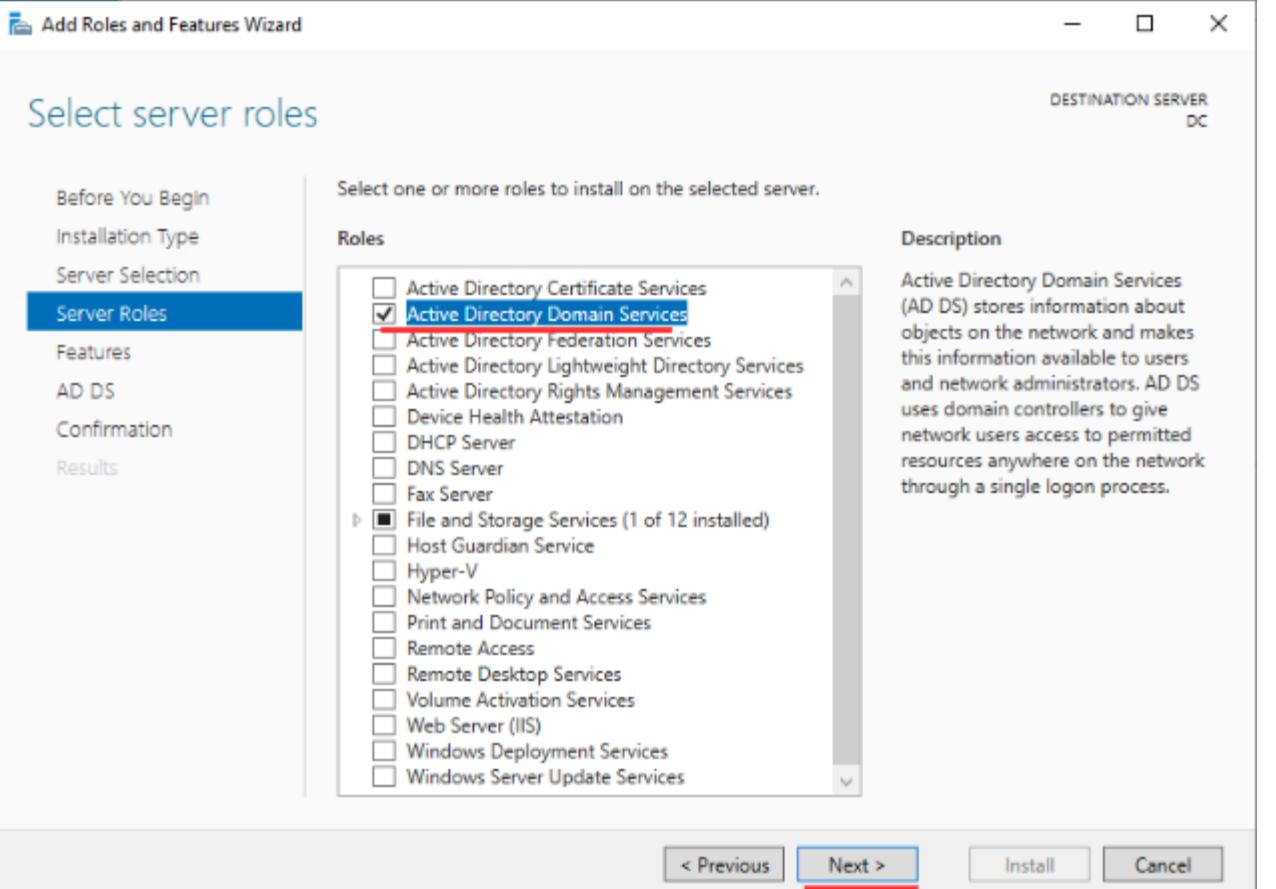
Cancel

< Previous

Next >

Install

Cancel



Add Roles and Features Wizard

Active Directory Domain Services

DESTINATION SERVER
DC

Before You Begin
Installation Type
Server Selection
Server Roles
Features
AD DS
Confirmation
Results

Active Directory Domain Services (AD DS) stores information about users, computers, and other devices on the network. AD DS helps administrators securely manage this information and facilitates resource sharing and collaboration between users.

Things to note:

- To help ensure that users can still log on to the network in the case of a server outage, install a minimum of two domain controllers for a domain.
- AD DS requires a DNS server to be installed on the network. If you do not have a DNS server installed, you will be prompted to install the DNS Server role on this machine.

 Azure Active Directory, a separate online service, can provide simplified identity and access management, security reporting, single sign-on to cloud and on-premises web apps.
[Learn more about Azure Active Directory](#)
[Configure Office 365 with Azure Active Directory Connect](#)

< Previous **Next >** Install Cancel

Add Roles and Features Wizard

Confirm installation selections

DESTINATION SERVER
DC

Before You Begin
Installation Type
Server Selection
Server Roles
Features
AD DS
Confirmation
Results

To install the following roles, role services, or features on selected server, click Install.

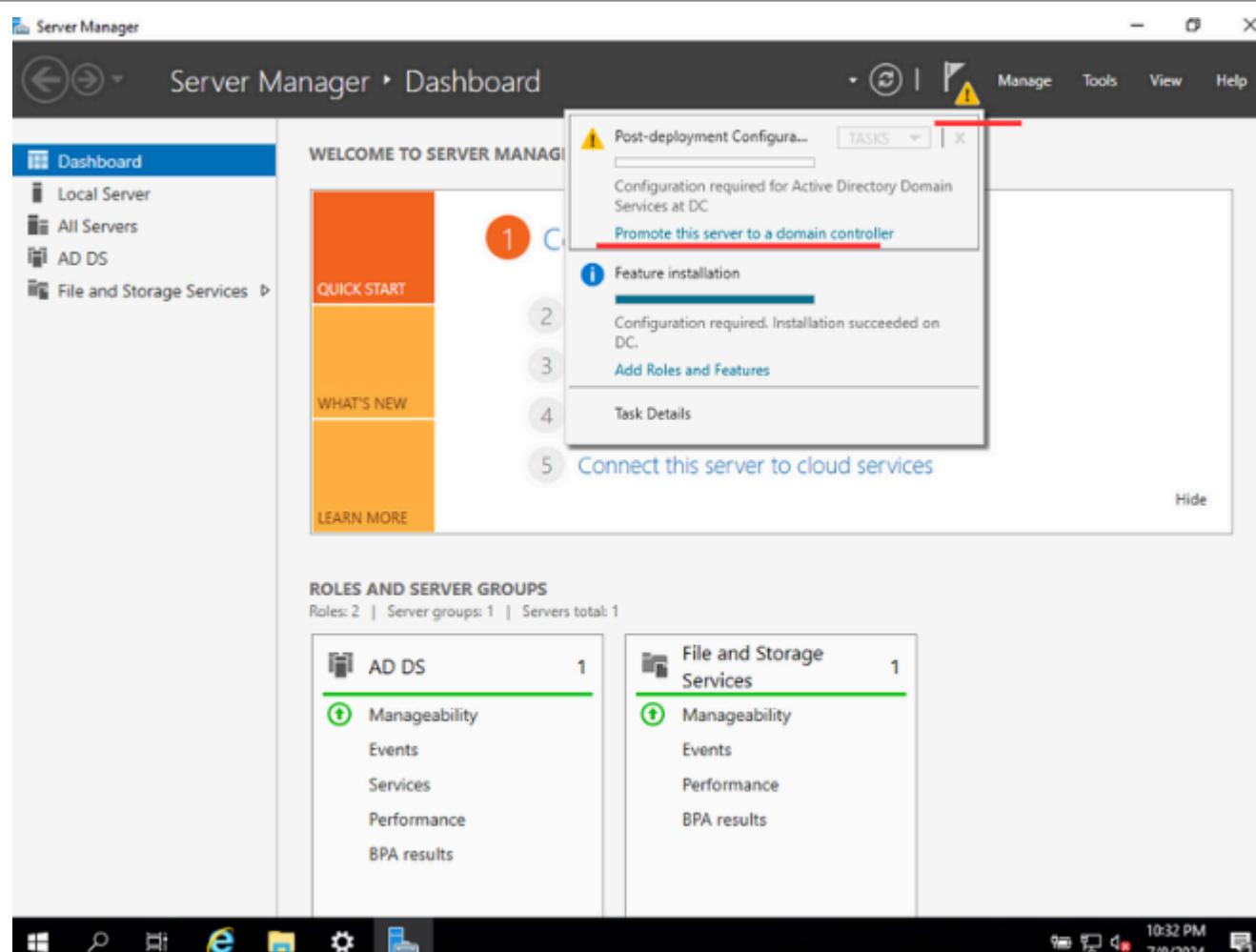
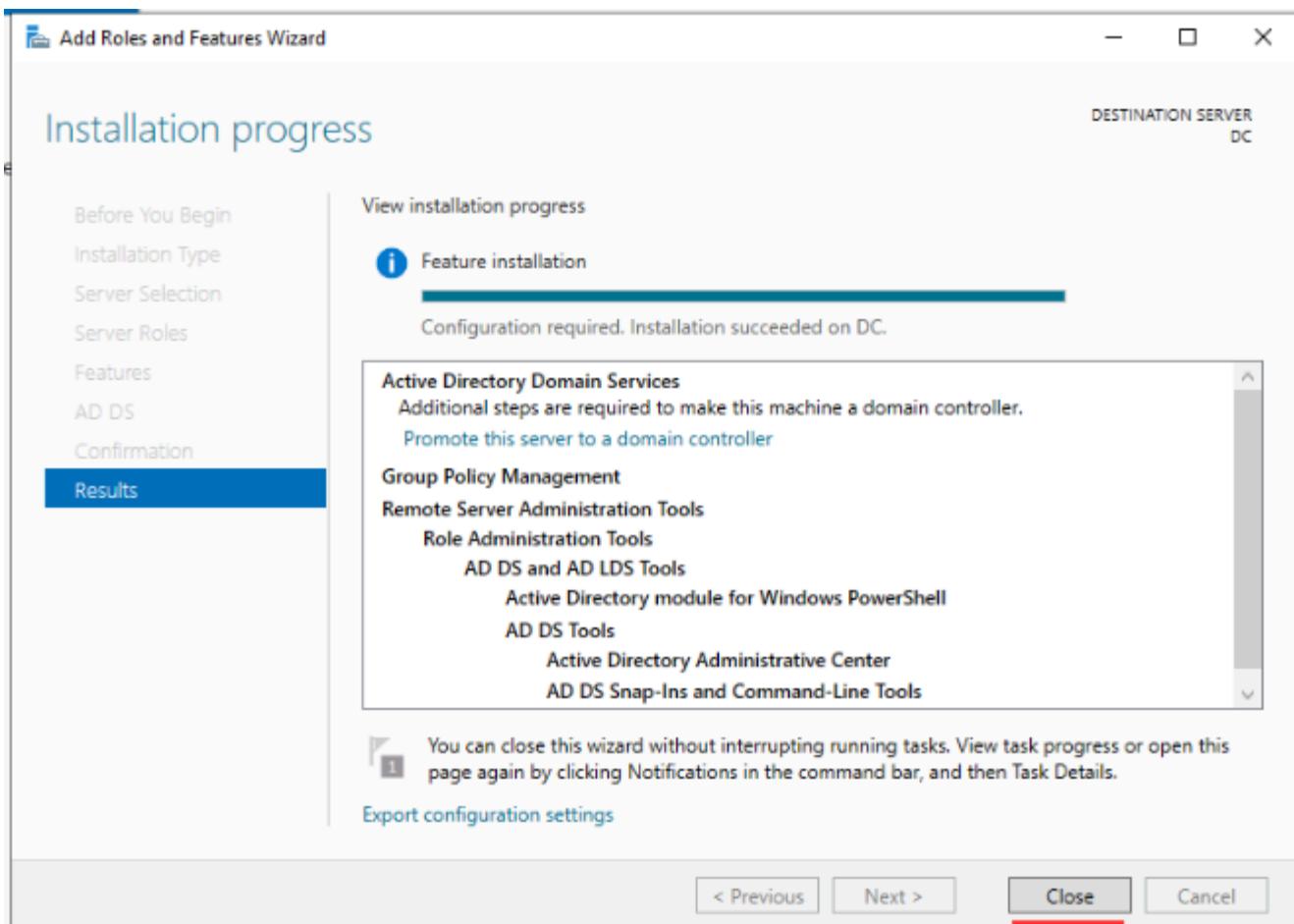
Restart the destination server automatically if required

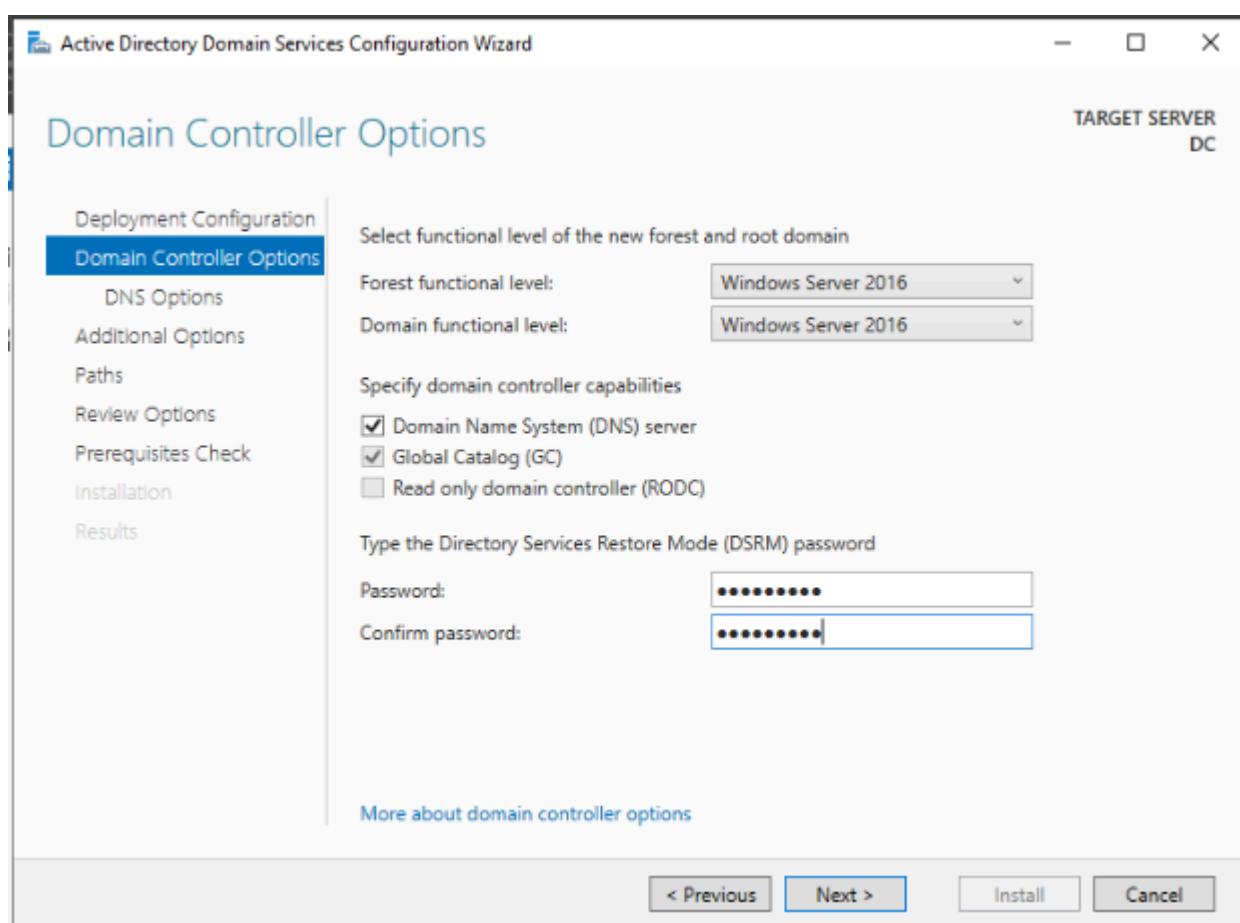
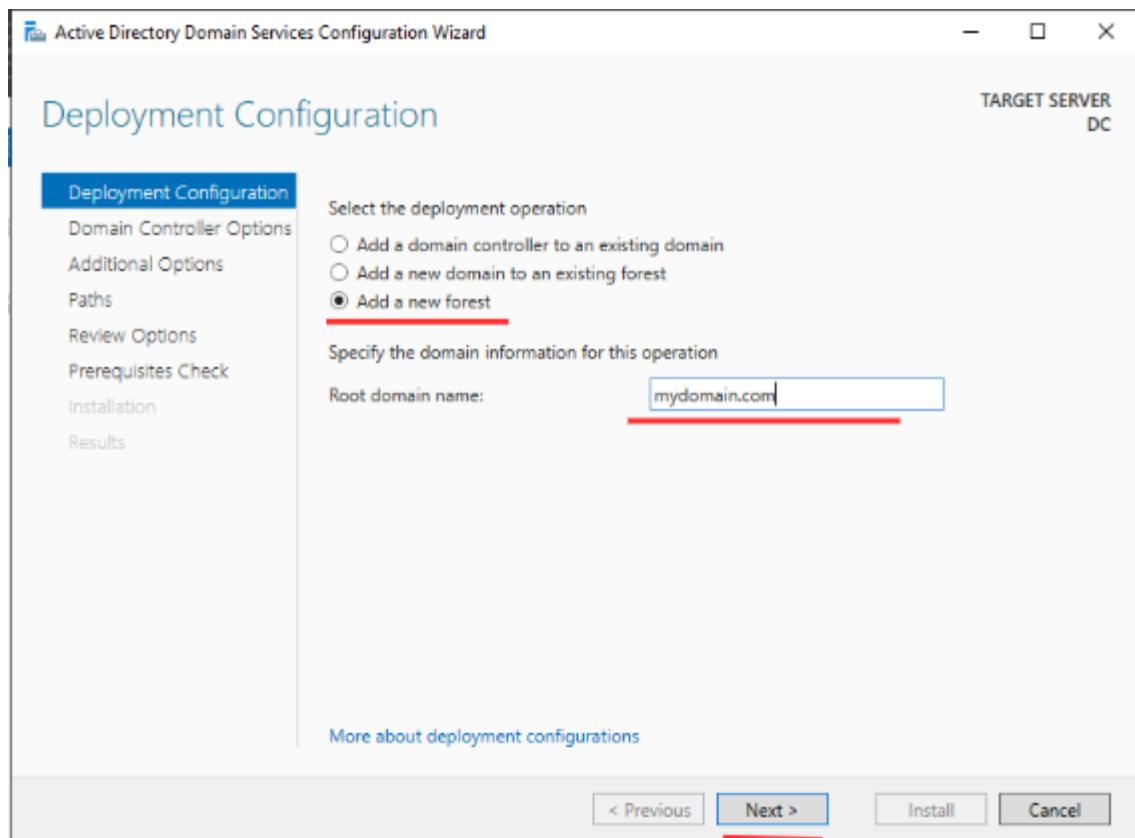
Optional features (such as administration tools) might be displayed on this page because they have been selected automatically. If you do not want to install these optional features, click Previous to clear their check boxes.

Active Directory Domain Services
Group Policy Management
Remote Server Administration Tools
Role Administration Tools
 AD DS and AD LDS Tools
 Active Directory module for Windows PowerShell
 AD DS Tools
 Active Directory Administrative Center
 AD DS Snap-Ins and Command-Line Tools

Export configuration settings
Specify an alternate source path

< Previous **Next >** **Install** Cancel





"Password1"

TARGET SERVER
DC

DNS Options

A delegation for this DNS server cannot be created because the authoritative parent zone cannot be found... [Show more](#) [X](#)

Deployment Configuration

Domain Controller Options

DNS Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results

Specify DNS delegation options

 Create DNS delegation[More about DNS delegation](#)

< Previous

Next >

Install

Cancel

TARGET SERVER
DC

Additional Options

Deployment Configuration

Domain Controller Options

DNS Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results

Verify the NetBIOS name assigned to the domain and change it if necessary

The NetBIOS domain name:

MYDOMAIN

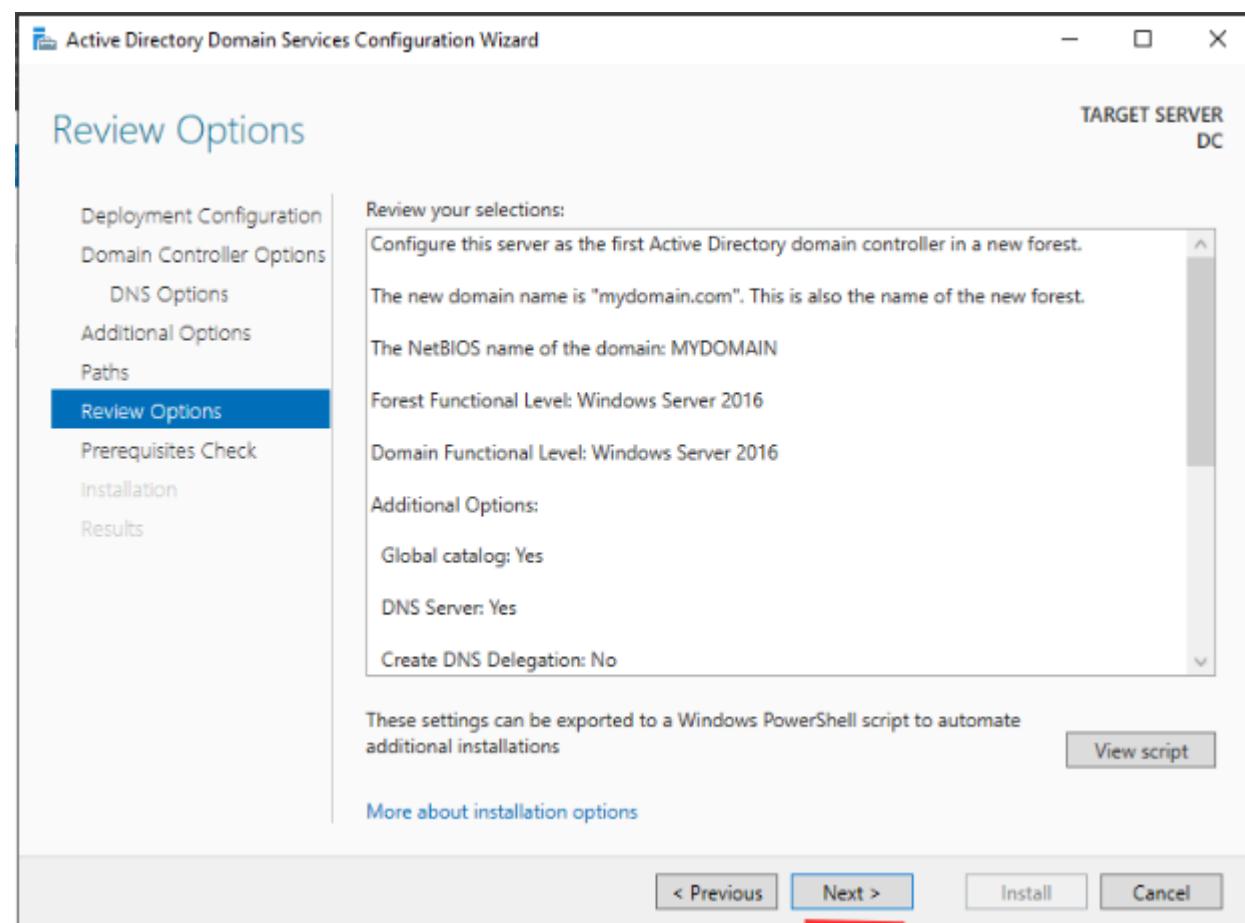
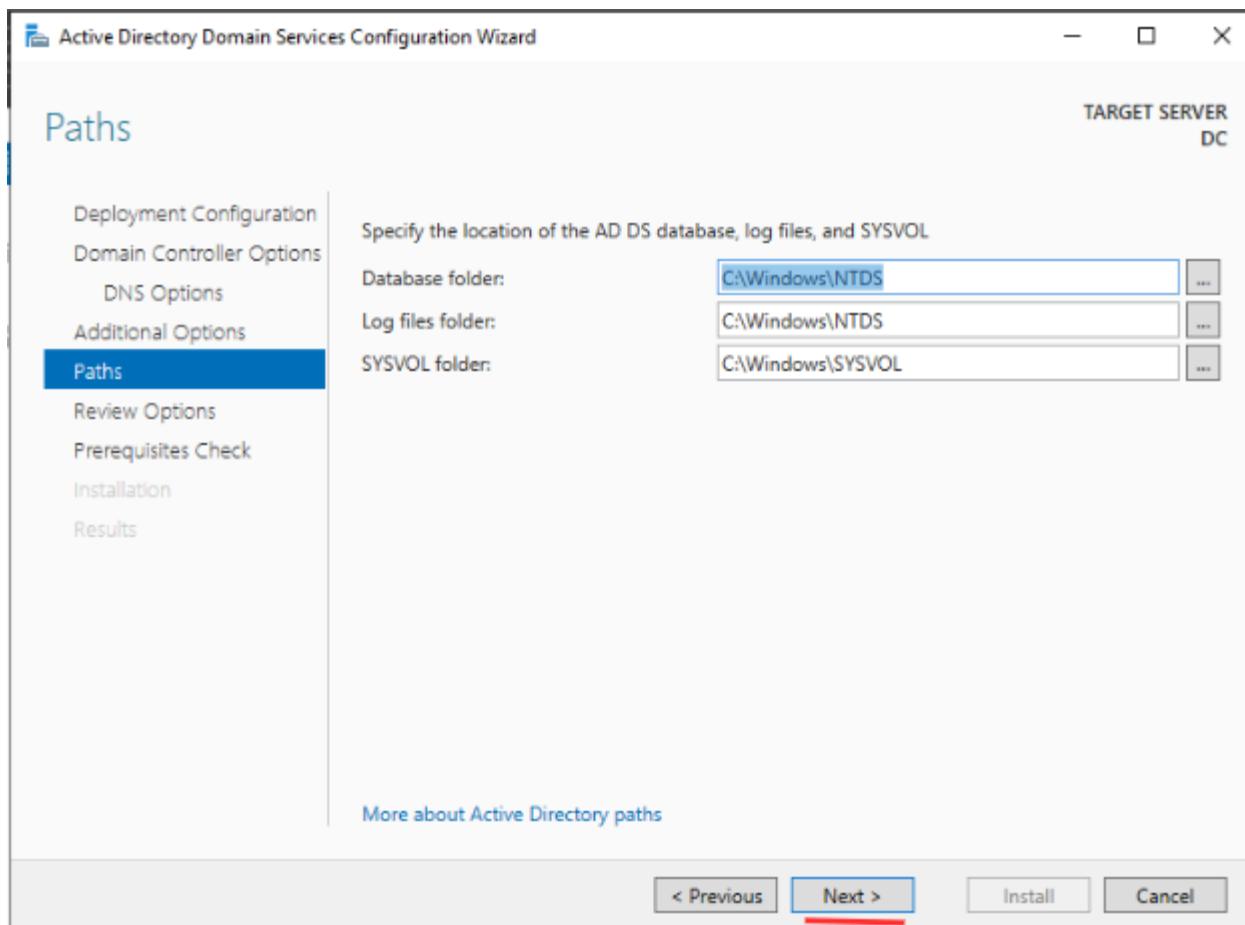
[More about additional options](#)

< Previous

Next >

Install

Cancel



Active Directory Domain Services Configuration Wizard

Prerequisites Check

TARGET SERVER
DC

All prerequisite checks passed successfully. Click 'Install' to begin installation.

Deployment Configuration
Domain Controller Options
DNS Options
Additional Options
Paths
Review Options
Prerequisites Check
Installation
Results

Prerequisites need to be validated before Active Directory Domain Services is installed on this computer

Rerun prerequisites check

View results

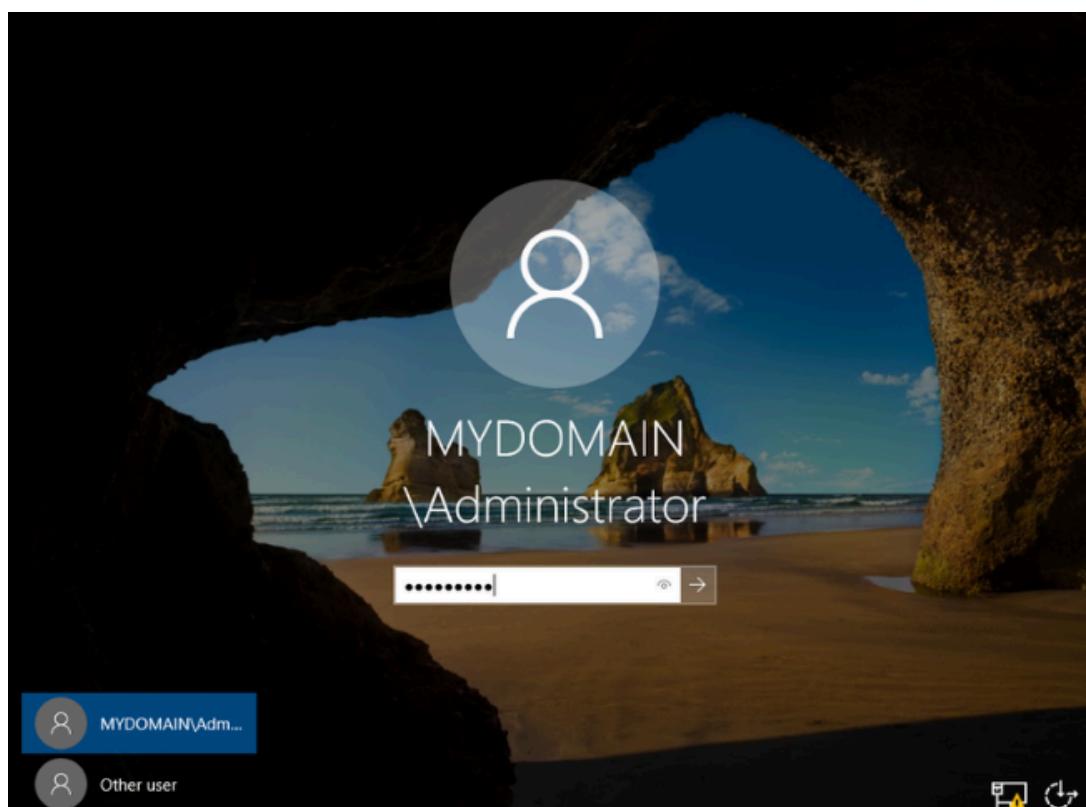
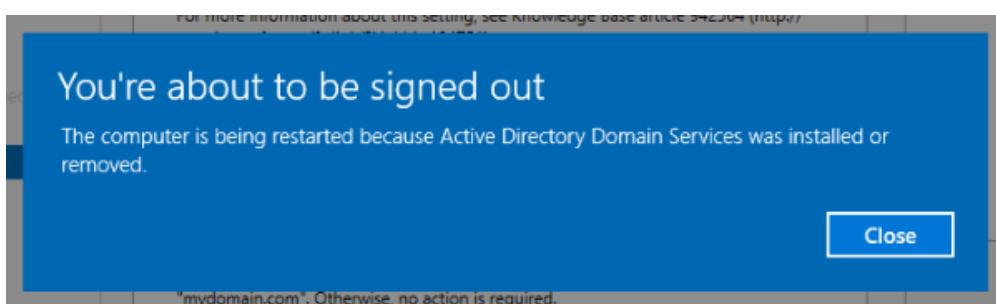
⚠ Windows Server 2019 domain controllers have a default for the security setting named "Allow cryptography algorithms compatible with Windows NT 4.0" that prevents weaker cryptography algorithms when establishing security channel sessions.
For more information about this setting, see Knowledge Base article 942564 (<http://go.microsoft.com/fwlink/?LinkId=104751>).

⚠ This computer has at least one physical network adapter that does not have static IP address(es) assigned to its IP Properties. If both IPv4 and IPv6 are enabled for a network adapter, both IPv4 and IPv6 static IP addresses should be assigned to both IPv4 and IPv6 Properties of the physical network adapter. Such static IP address(es) assignment should be done to all the physical network adapters for reliable Domain Name System.

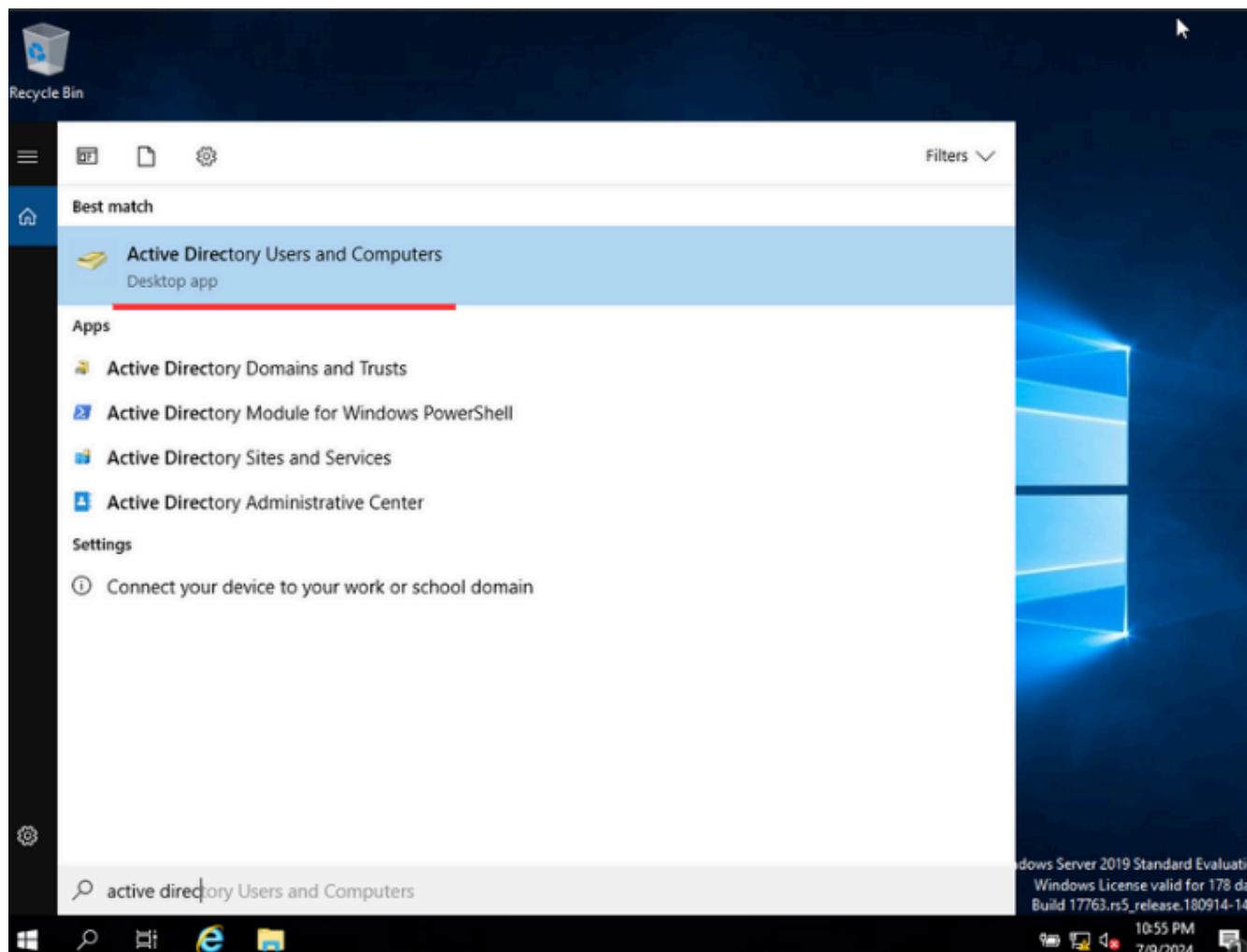
⚠ If you click Install, the server automatically reboots at the end of the promotion operation.

More about prerequisites

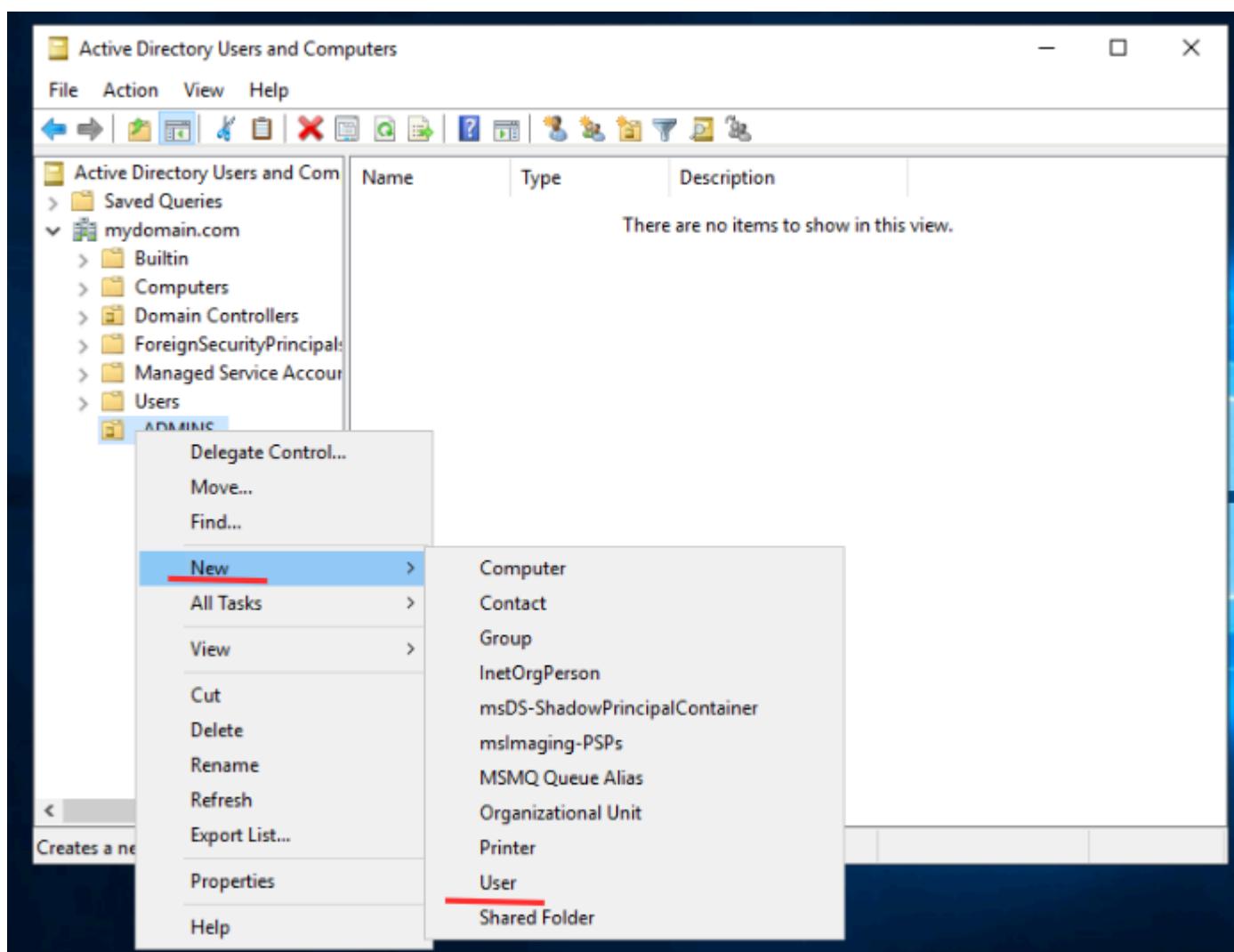
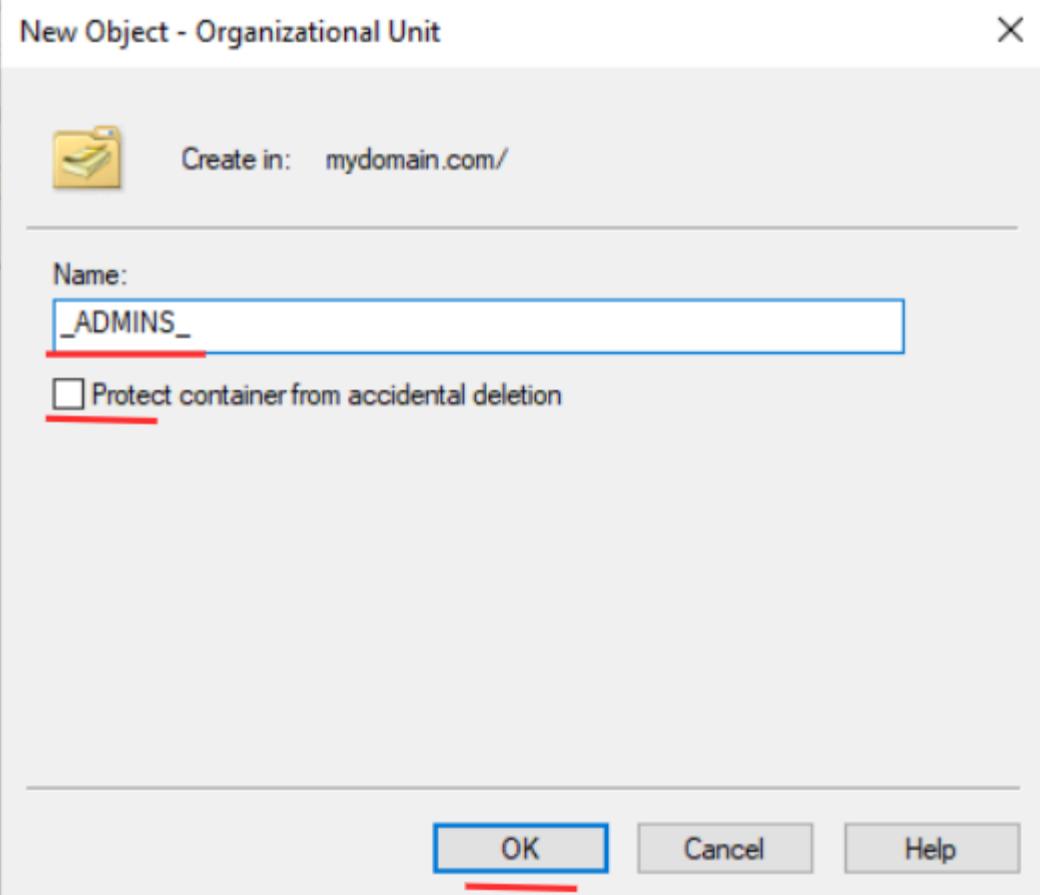
< Previous Next > **Install** Cancel



Now we will be creating a dedicated admin account instead of using the built in administrator



The screenshot shows the "Active Directory Users and Computers" console window. A context menu is open over a folder named "mydomain.com". The menu includes options like "Delegate Control...", "Find...", "Change Domain...", "Change Domain Controller...", "Raise domain functional level...", and "Operations Masters...". The "New" option is highlighted with a red underline. A secondary context menu is displayed, listing items such as Computer, Contact, Group, InetOrgPerson, msDS-ShadowPrincipalContainer, msImaging-PSPs, MSMQ Queue Alias, Organizational Unit, Printer, User, and Shared Folder. The status bar at the bottom right indicates "Windows Server 2019 Standard Evaluation" and "Build 17763.rs5_release.180914-143".



New Object - User

Create in: mydomain.com/_ADMINS_

First name: Mahamud Initials:

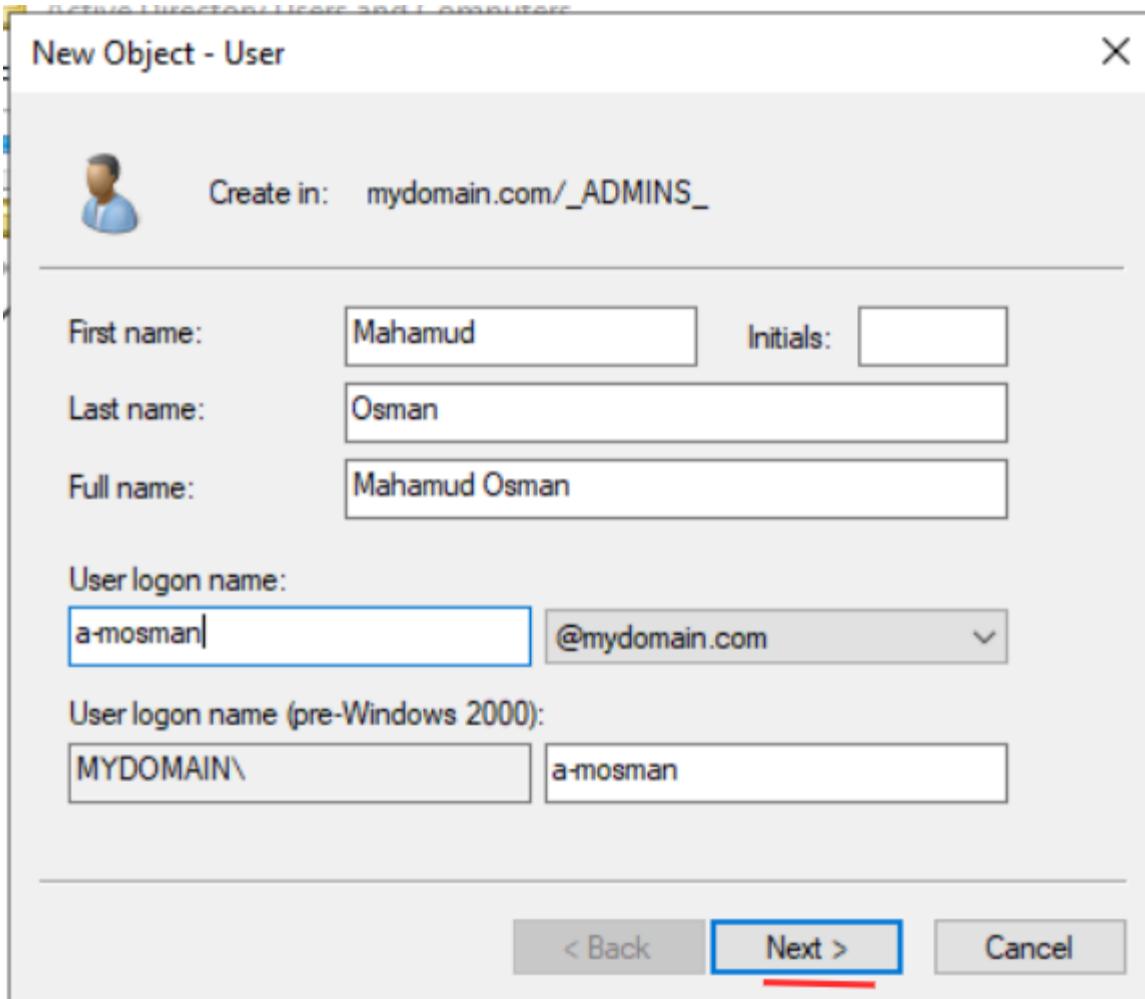
Last name: Osman

Full name: Mahamud Osman

User logon name:
a-mosman @mydomain.com

User logon name (pre-Windows 2000):
MYDOMAIN\ a-mosman

< Back Next > Cancel



The “User logon name” can be whatever, create name based on your preferred naming convention

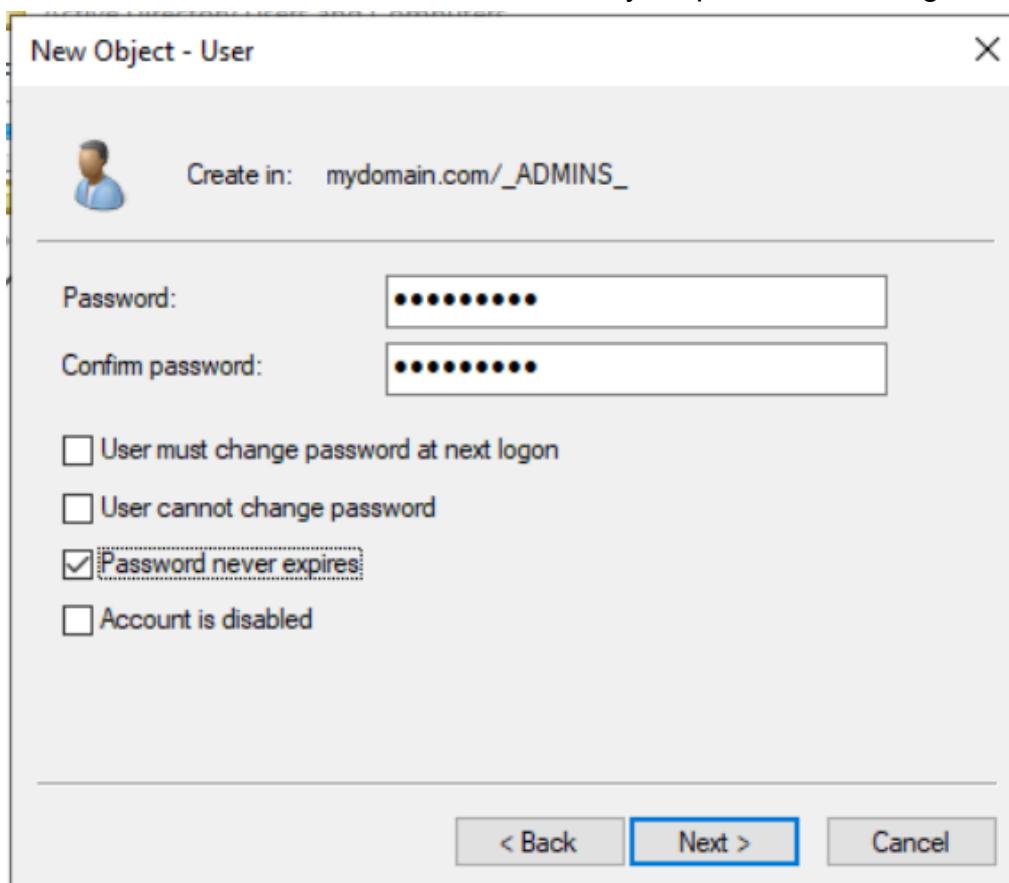
New Object - User

Create in: mydomain.com/_ADMINS_

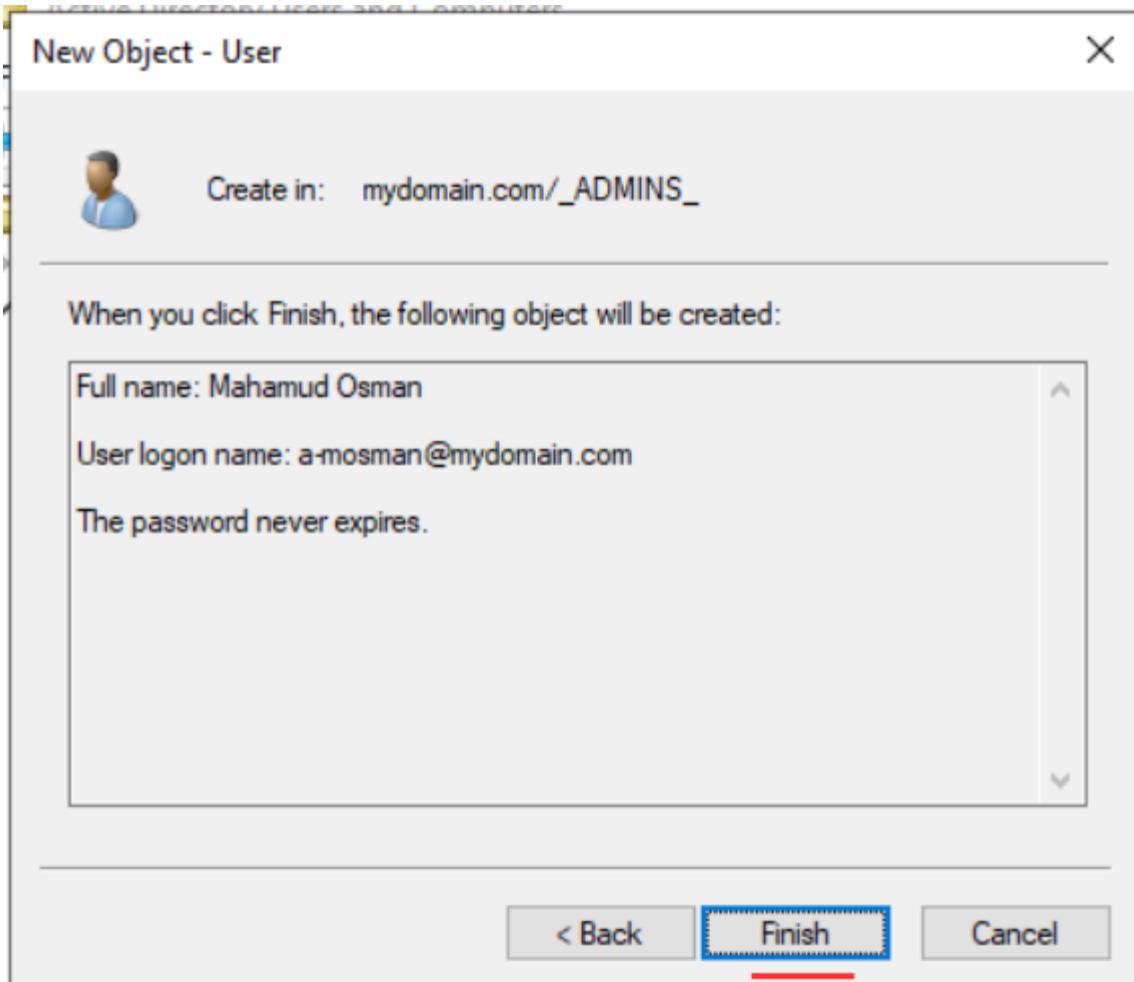
Password: Confirm password:

User must change password at next logon
 User cannot change password
 Password never expires
 Account is disabled

< Back Next > Cancel



ONLY for lab purposes, I will select a “password never expires”. We can come back later when dealing with password policies



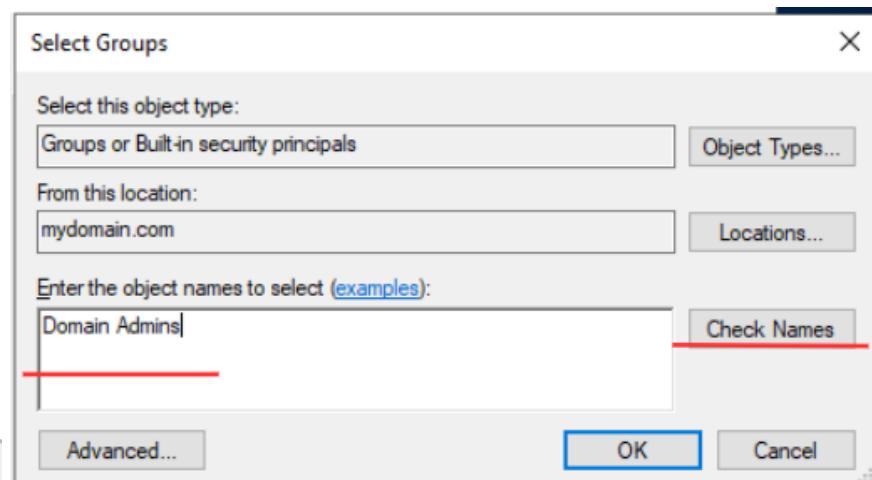
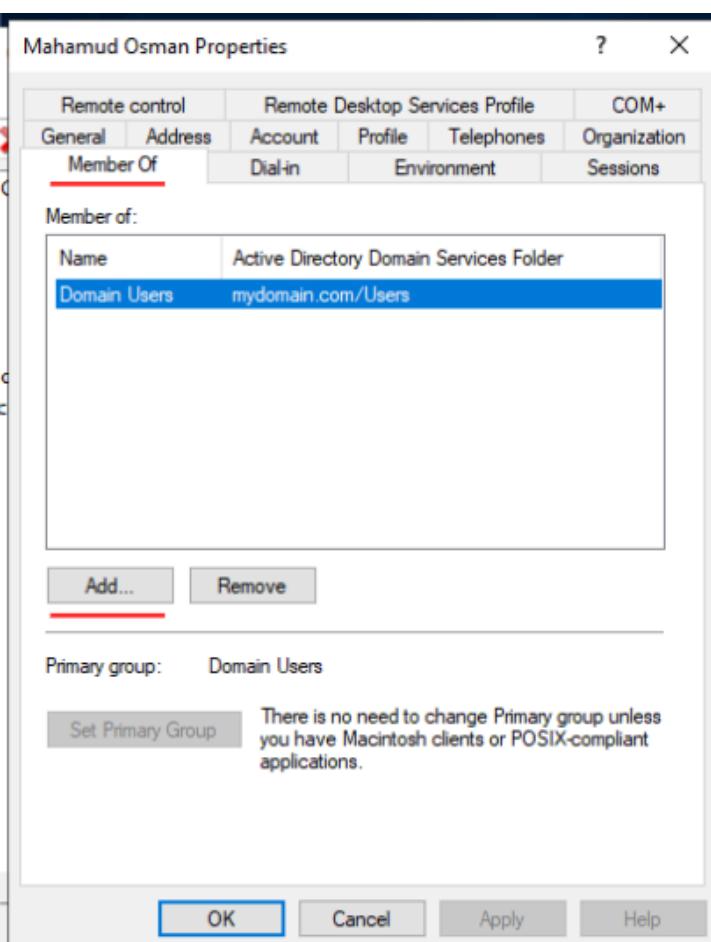
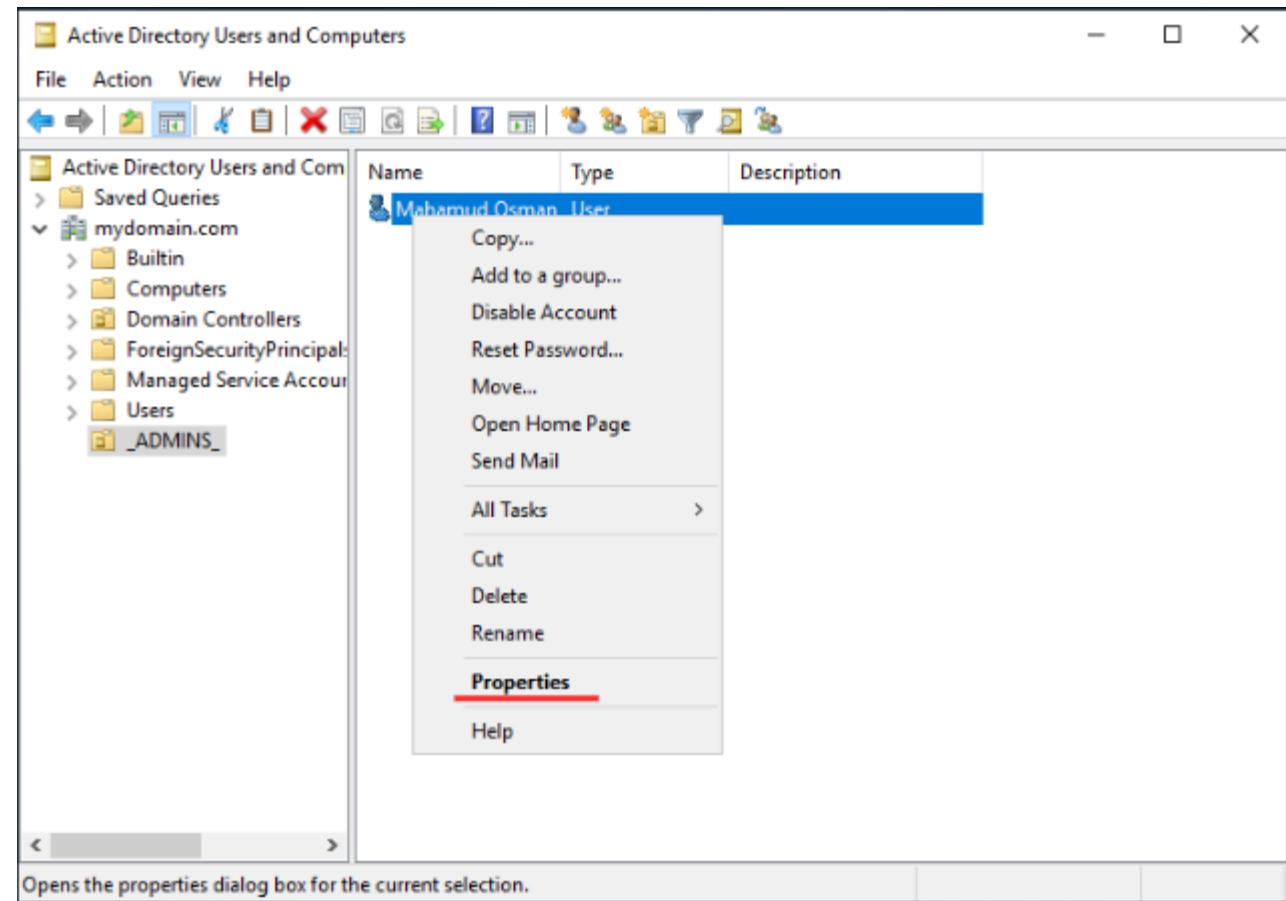
The screenshot shows the 'Active Directory Users and Computers' window. The title bar includes the application name and standard window controls. The menu bar has options: File, Action, View, Help. Below the menu is a toolbar with various icons. The left pane is a navigation tree:

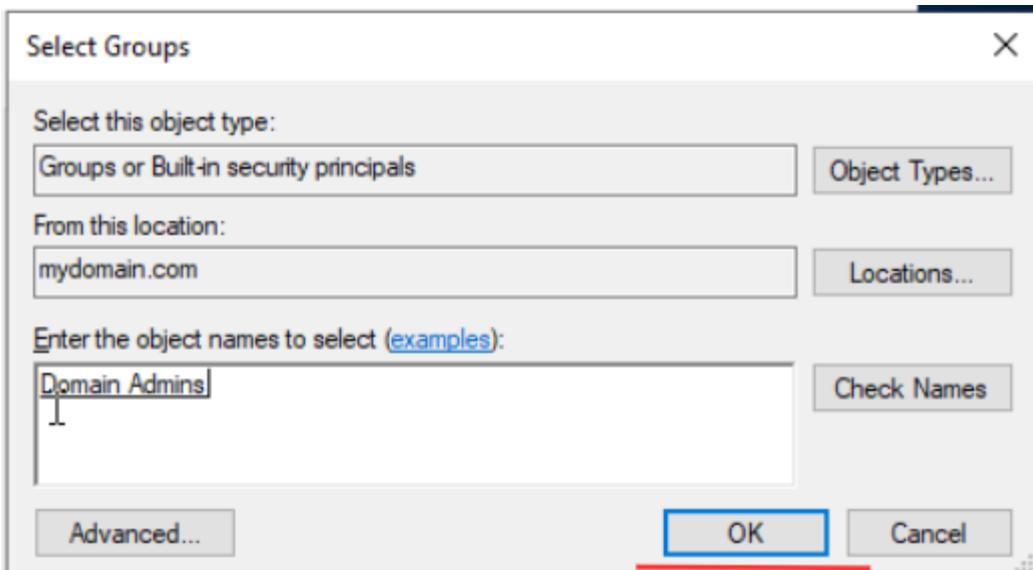
- Active Directory Users and Computers
- Saved Queries
- mydomain.com
 - Builtin
 - Computers
 - Domain Controllers
 - ForeignSecurityPrincipal
 - Managed Service Account
 - Users
 - _ADMINS_

The right pane displays a table of users:

Name	Type	Description
Mahamud Osman	User	

The account was created but it still needs to be turned into an admin account

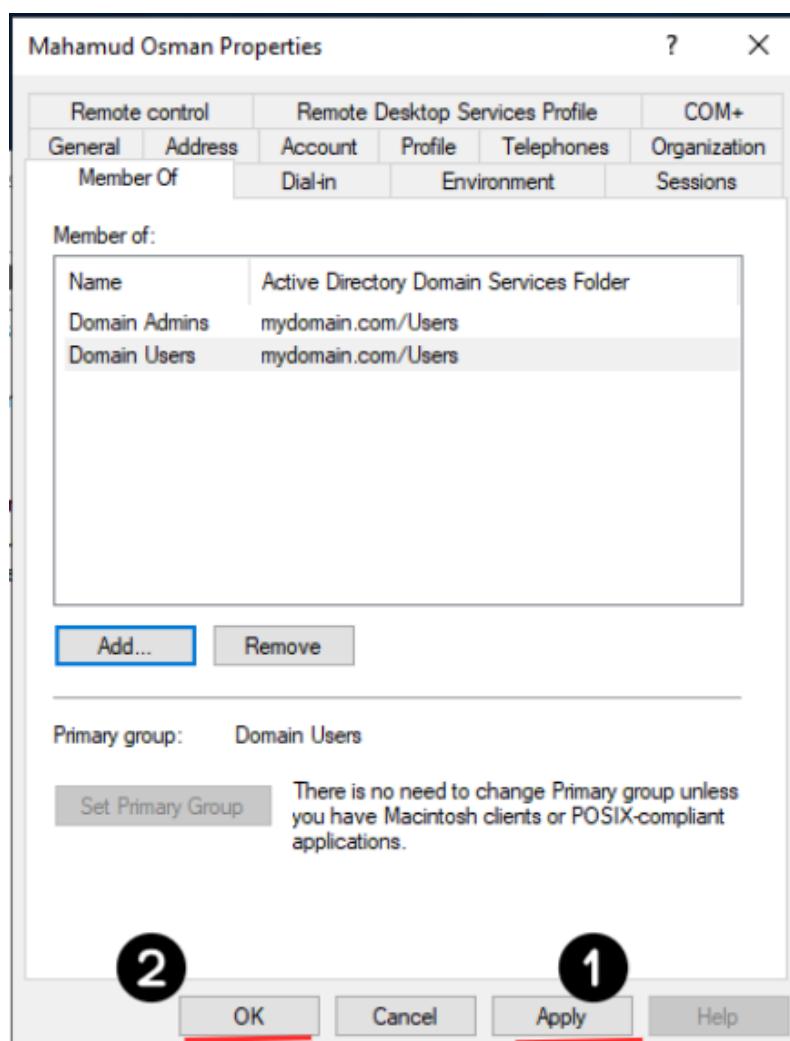




You can see it resolves to domain admin

In Active Directory, there are several built-in administrative groups that are recognized by default across domains. These groups have predefined administrative privileges and are crucial for managing various aspects of the Active Directory environment.

“Domain Admins” - Members of this group have full administrative control over the domain. They can perform all administrative tasks within the domain, including managing domain controllers, creating and managing users and groups, modifying group policies, etc.



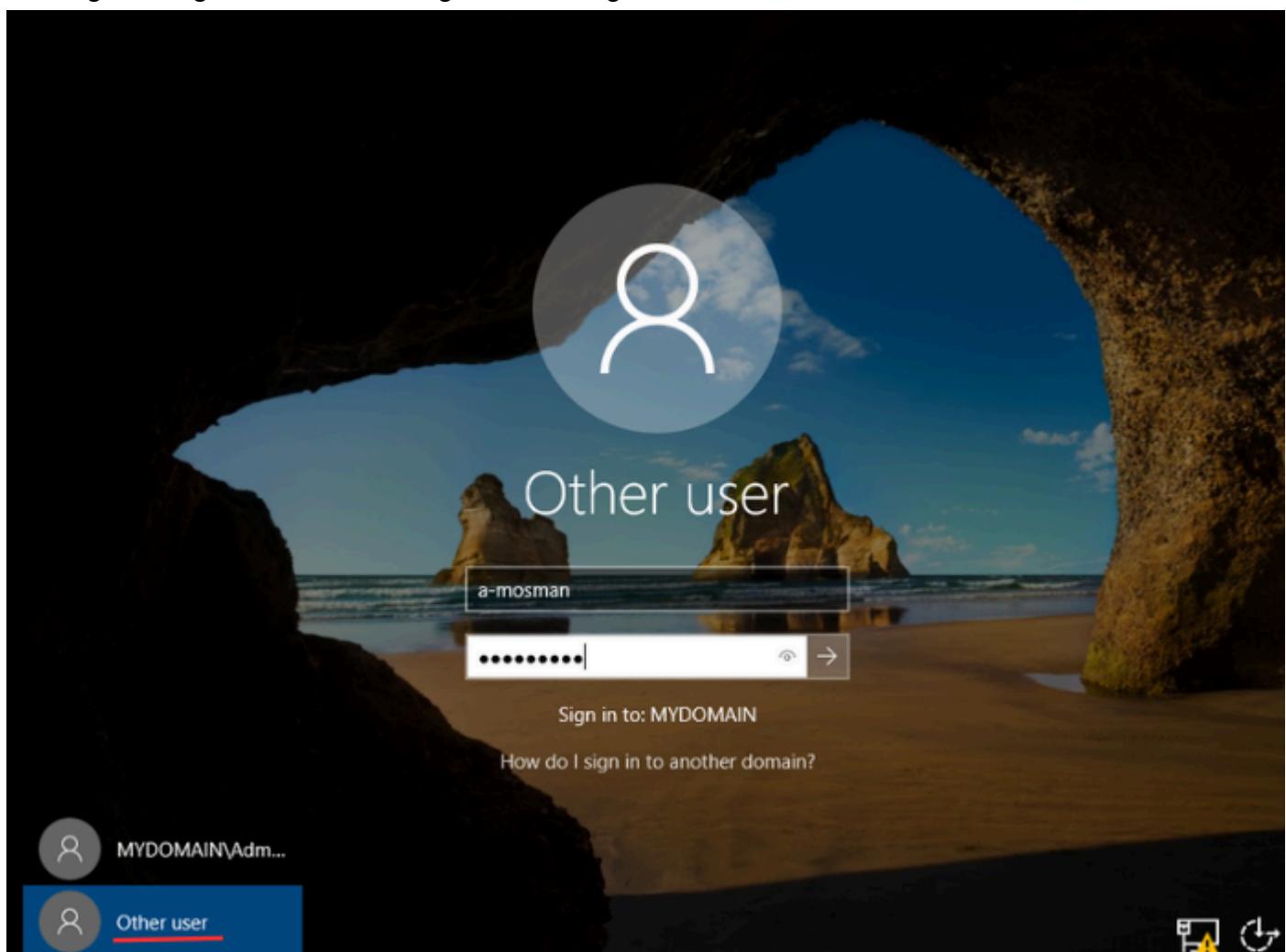
Active Directory Users and Computers

File Action View Help

Active Directory Users and Com
Saved Queries
mydomain.com
Builtin
Computers
Domain Controllers
ForeignSecurityPrincipals
Managed Service Accounts
Users
ADMINS

Name	Type	Description
Mahamud Osman	User	

Now you are good to go. You can now sign out and sign back in



**Dashboard**

- Local Server
- All Servers
- AD DS
- DNS
- File and Storage Services ▾

WELCOME TO SERVER MANAGER

QUICK START

WHAT'S NEW

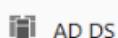
LEARN MORE

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](#)**ROLES AND SERVER GROUPS**

Roles: 3 | Server groups: 1 | Servers total: 1



AD DS

1

[Manageability](#)[Events](#)[Services](#)[Performance](#)[BPA results](#)

DNS

1

[Manageability](#)[Events](#)[Services](#)[Performance](#)[BPA results](#)12:24 AM
7/11/2024

Now installing Network Address Translation for the internal network

Add Roles and Features WizardDESTINATION SERVER
DC.mydomain.com**Before you begin****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](#)

DESTINATION SERVER
DC.mydomain.com

Select installation type

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD).

 Role-based or feature-based installation

Configure a single server by adding roles, role services, and features.

 Remote Desktop Services installation

Install required role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-based or session-based desktop deployment.

< Previous

Next >

Install

Cancel

DESTINATION SERVER
DC.mydomain.com

Select destination server

Before You Begin

Server Selection

Server Roles

Features

Confirmation

Results

Select a server or a virtual hard disk on which to install roles and features.

 Select a server from the server pool **Select a virtual hard disk**

Server Pool

Filter:		
Name	IP Address	Operating System
DC.mydomain.com	10.0.2.15,172.1...	Microsoft Windows Server 2019 Standard Evaluation

1 Computer(s) found

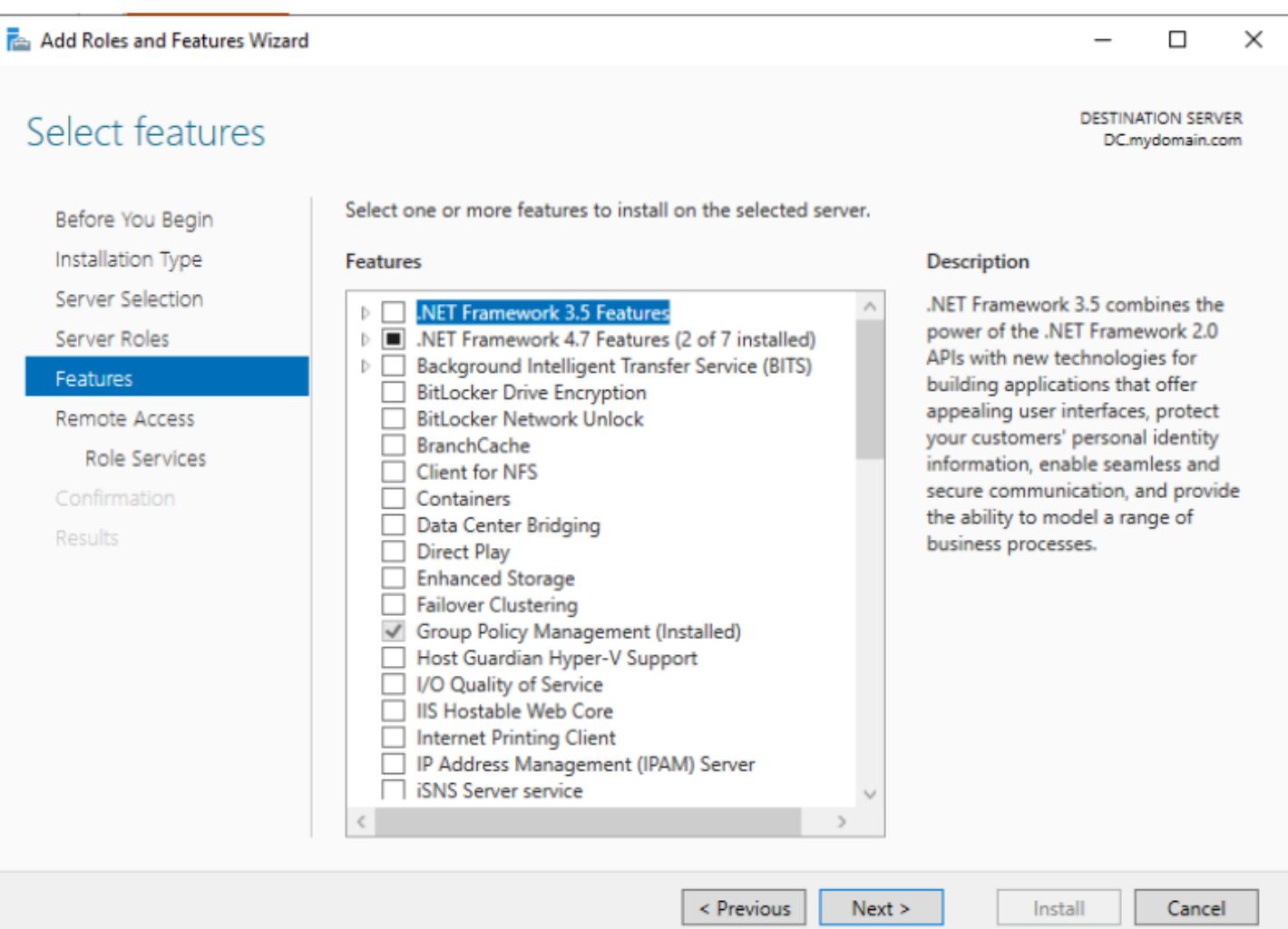
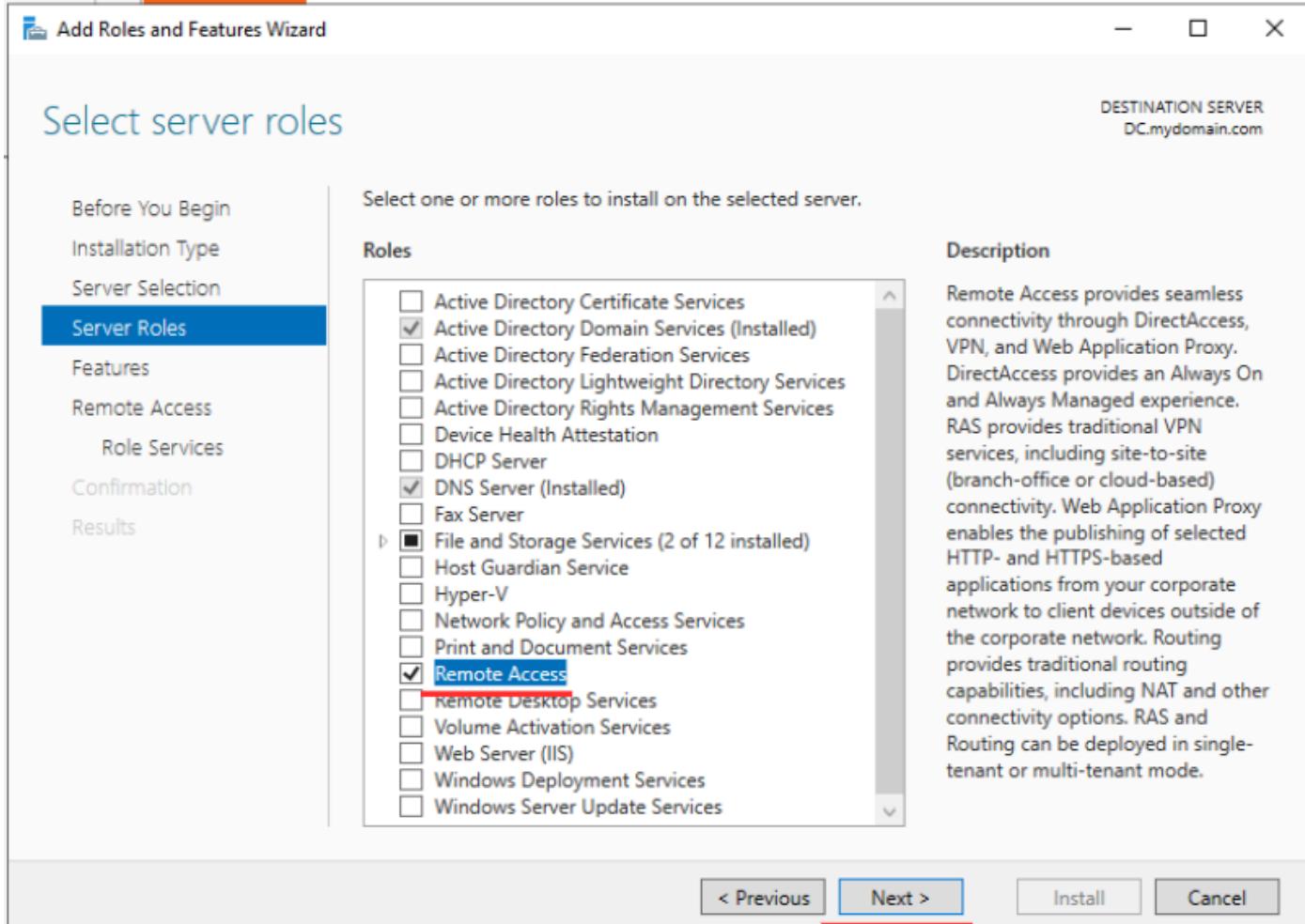
This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.

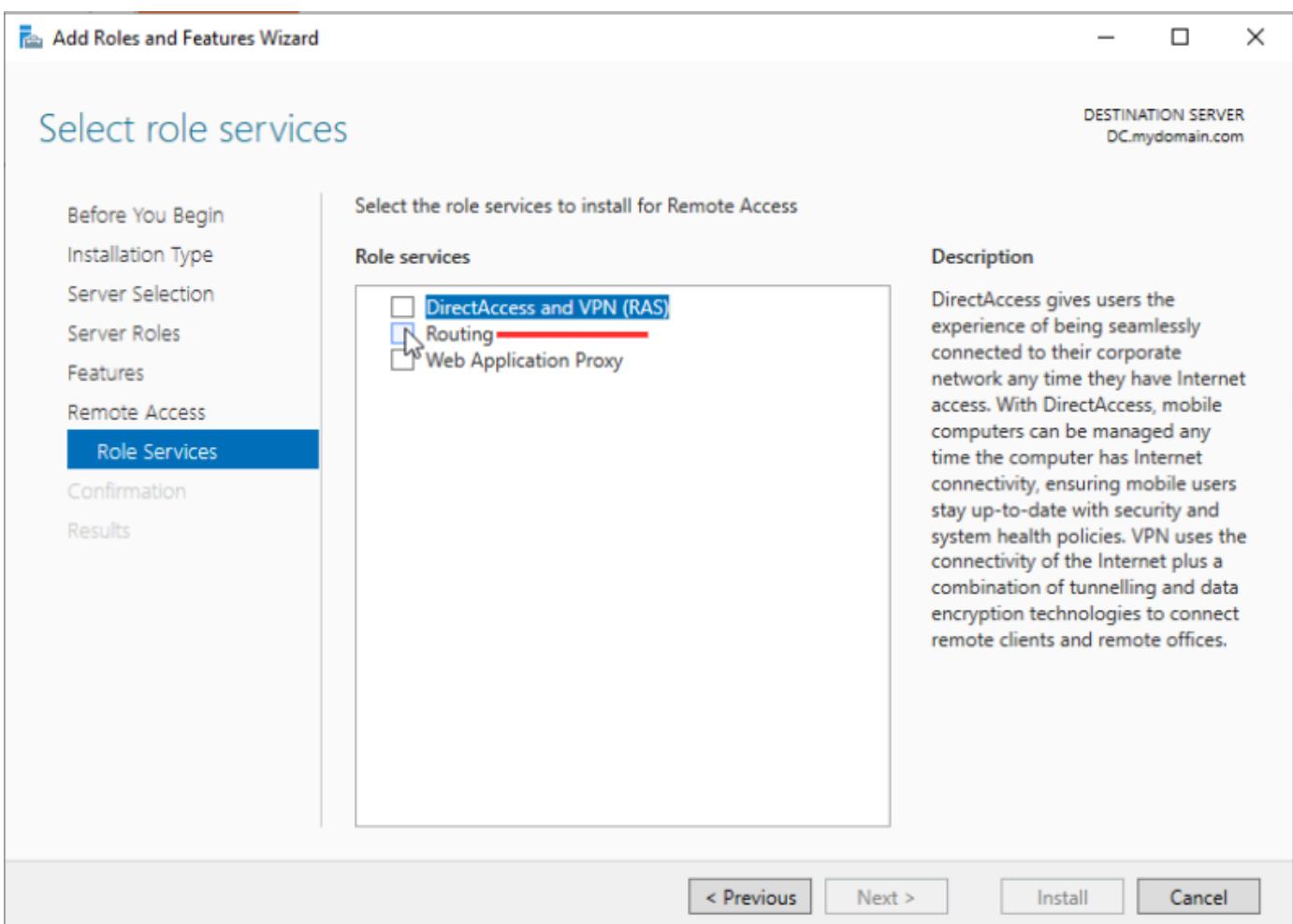
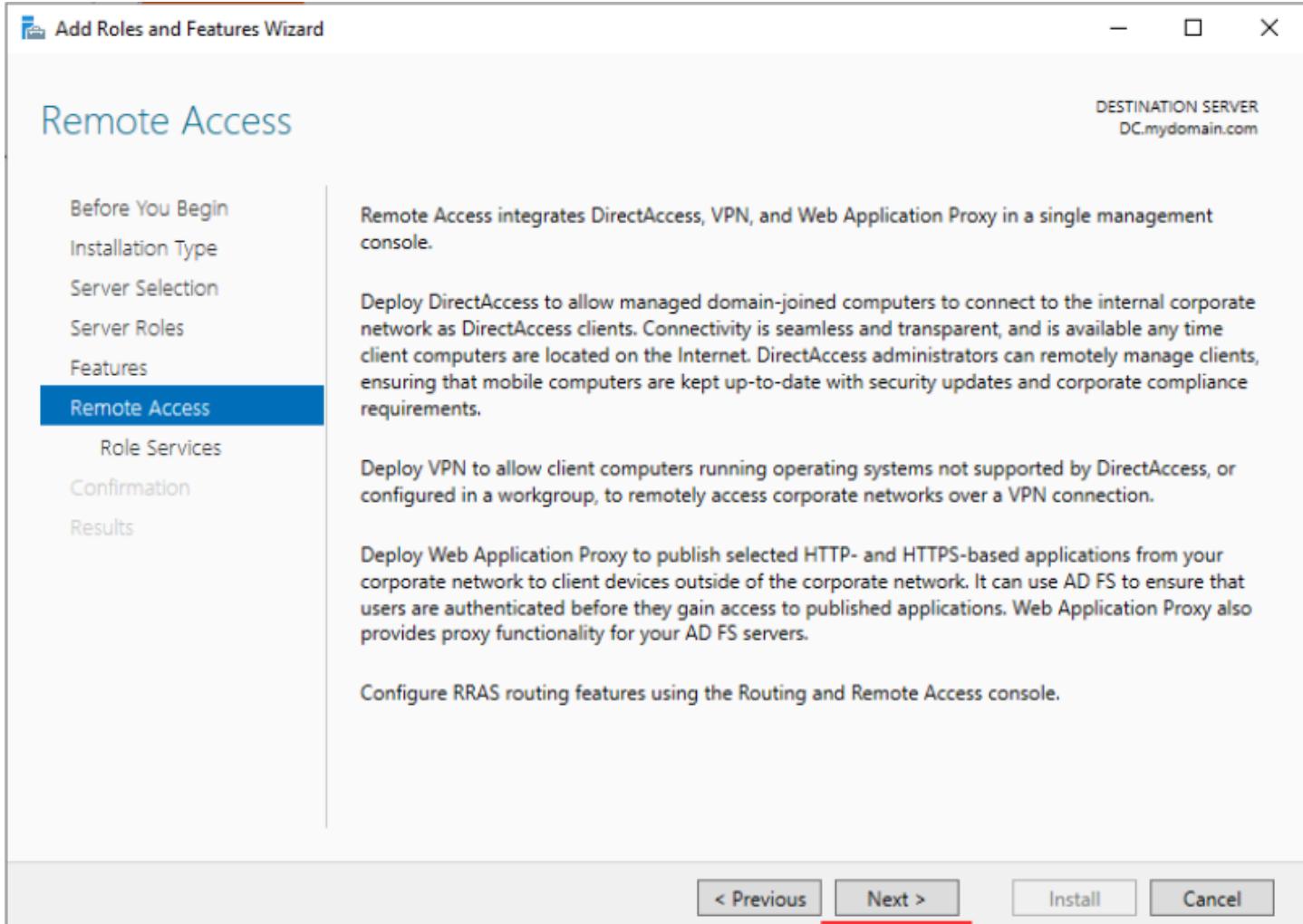
< Previous

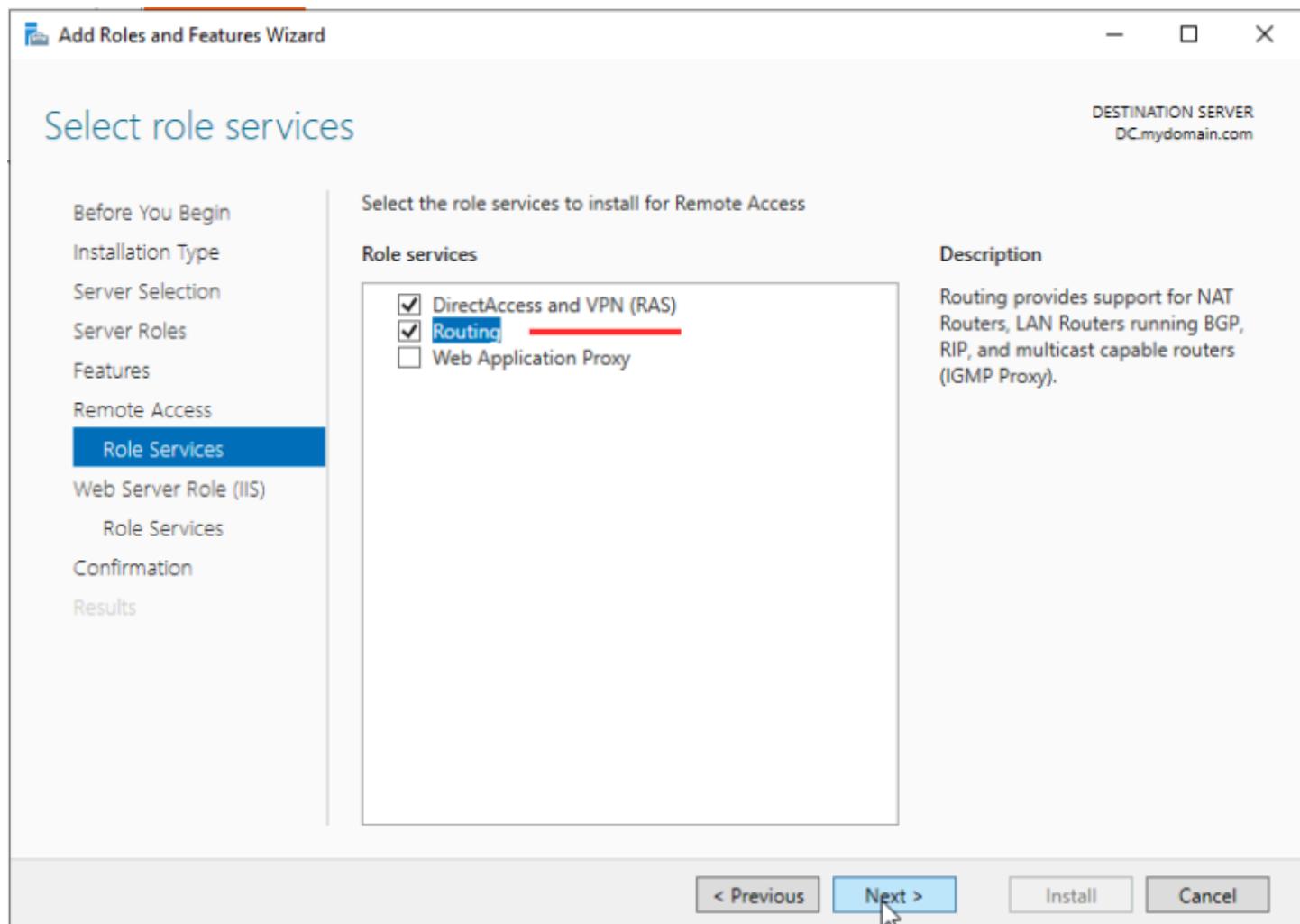
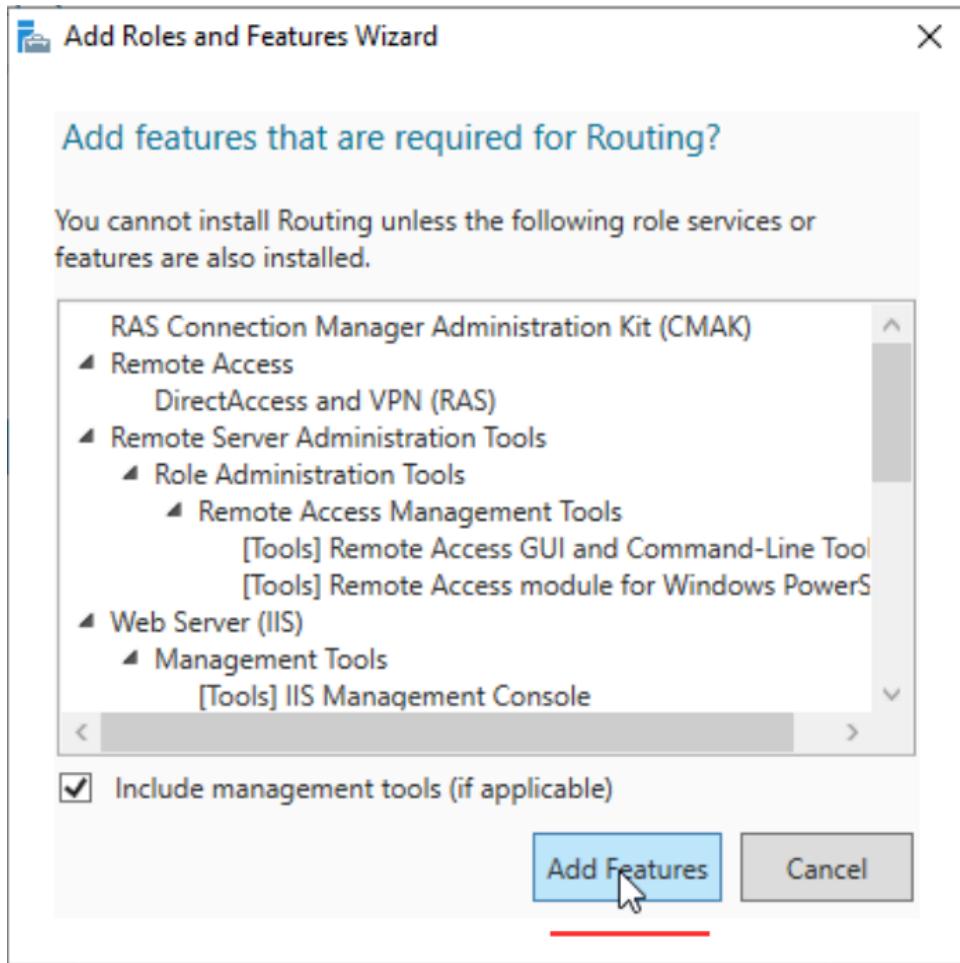
Next >

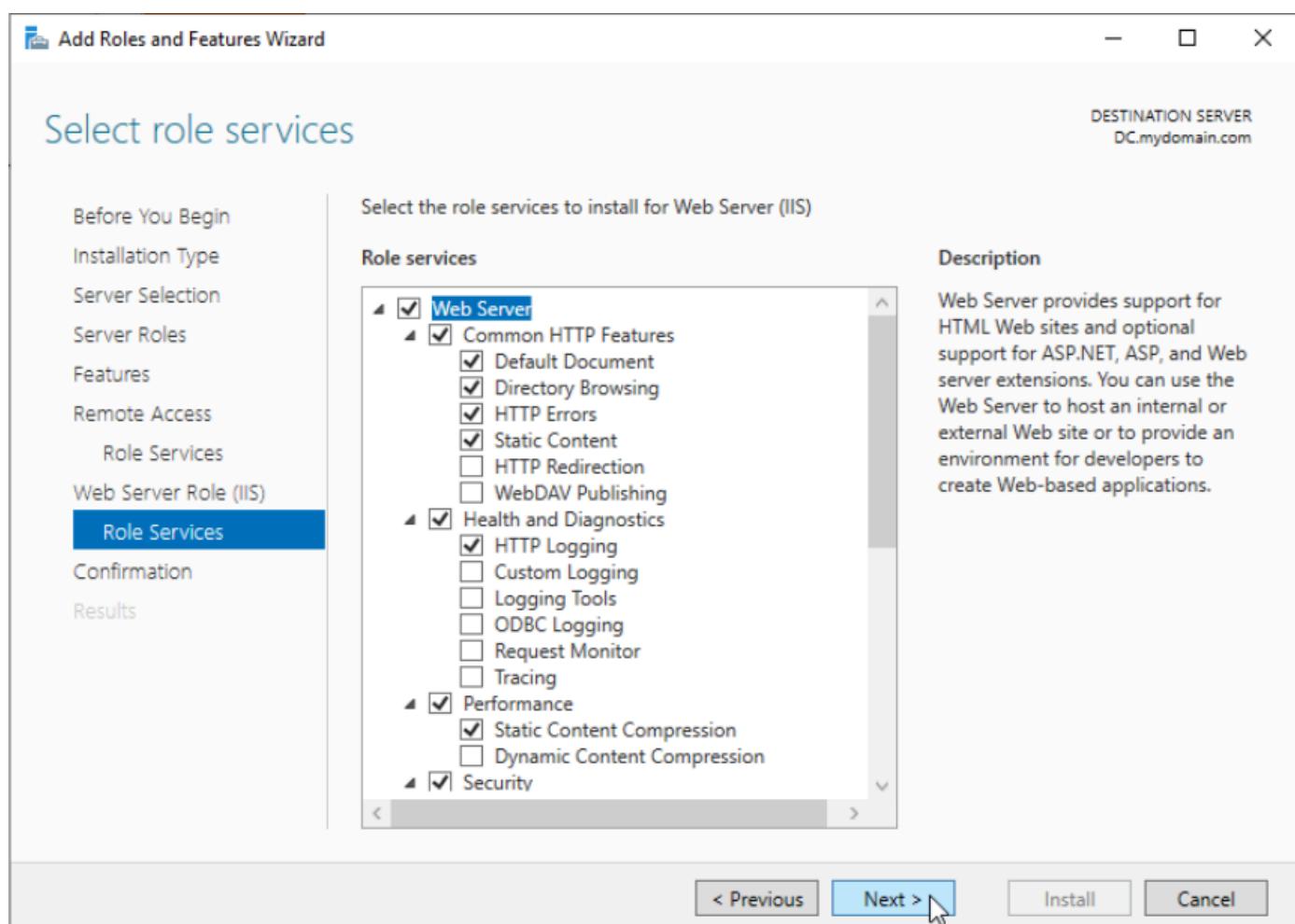
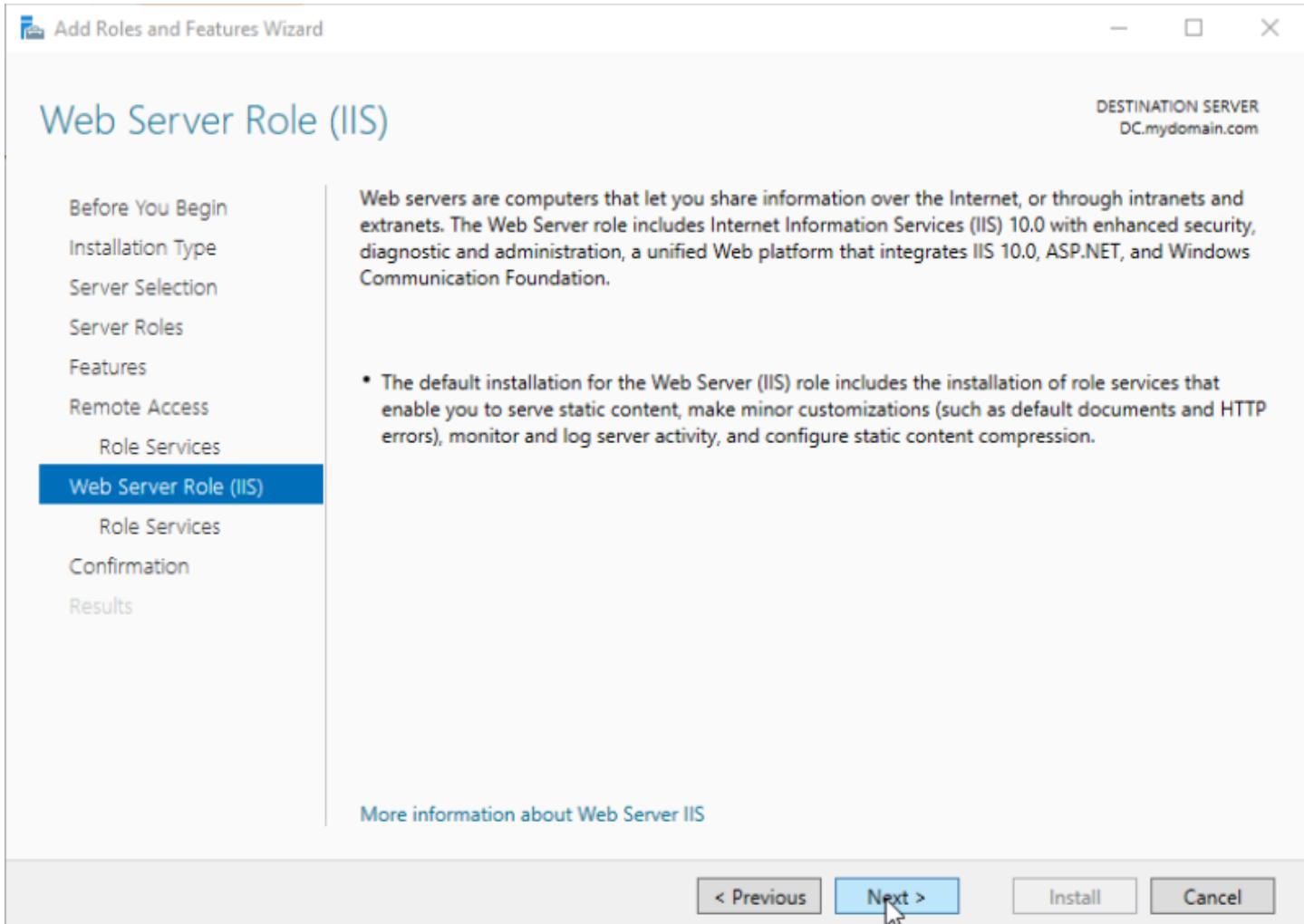
Install

Cancel









DESTINATION SERVER
DC.mydomain.com

Confirm installation selections

Before You Begin
 Installation Type
 Server Selection
 Server Roles
 Features
 Remote Access
 Role Services
 Web Server Role (IIS)
 Role Services
Confirmation
 Results

To install the following roles, role services, or features on selected server, click Install.

Restart the destination server automatically if required

Optional features (such as administration tools) might be displayed on this page because they have been selected automatically. If you do not want to install these optional features, click Previous to clear their check boxes.

RAS Connection Manager Administration Kit (CMAK)**Remote Access**

- DirectAccess and VPN (RAS)
- Routing

Remote Server Administration Tools**Role Administration Tools**

- Remote Access Management Tools
- Remote Access GUI and Command-Line Tools
- Remote Access module for Windows PowerShell

Web Server (IIS)

[Export configuration settings](#)

[Specify an alternate source path](#)

< Previous

Next >

Install

Cancel

DESTINATION SERVER
DC.mydomain.com

Installation progress

Before You Begin
 Installation Type
 Server Selection
 Server Roles
 Features
 Remote Access
 Role Services
 Web Server Role (IIS)
 Role Services
Confirmation
Results

View installation progress

1 Feature installation

Configuration required. Installation succeeded on DC.mydomain.com.

Remote Access

- DirectAccess and VPN (RAS)
- Configure the role
- [Open the Getting Started Wizard](#)

Routing**RAS Connection Manager Administration Kit (CMAK)****Remote Server Administration Tools****Role Administration Tools**

- Remote Access Management Tools
- Remote Access GUI and Command-Line Tools
- Remote Access module for Windows PowerShell

 You can close this wizard without interrupting running tasks. View task progress or open this page again by clicking Notifications in the command bar, and then Task Details.

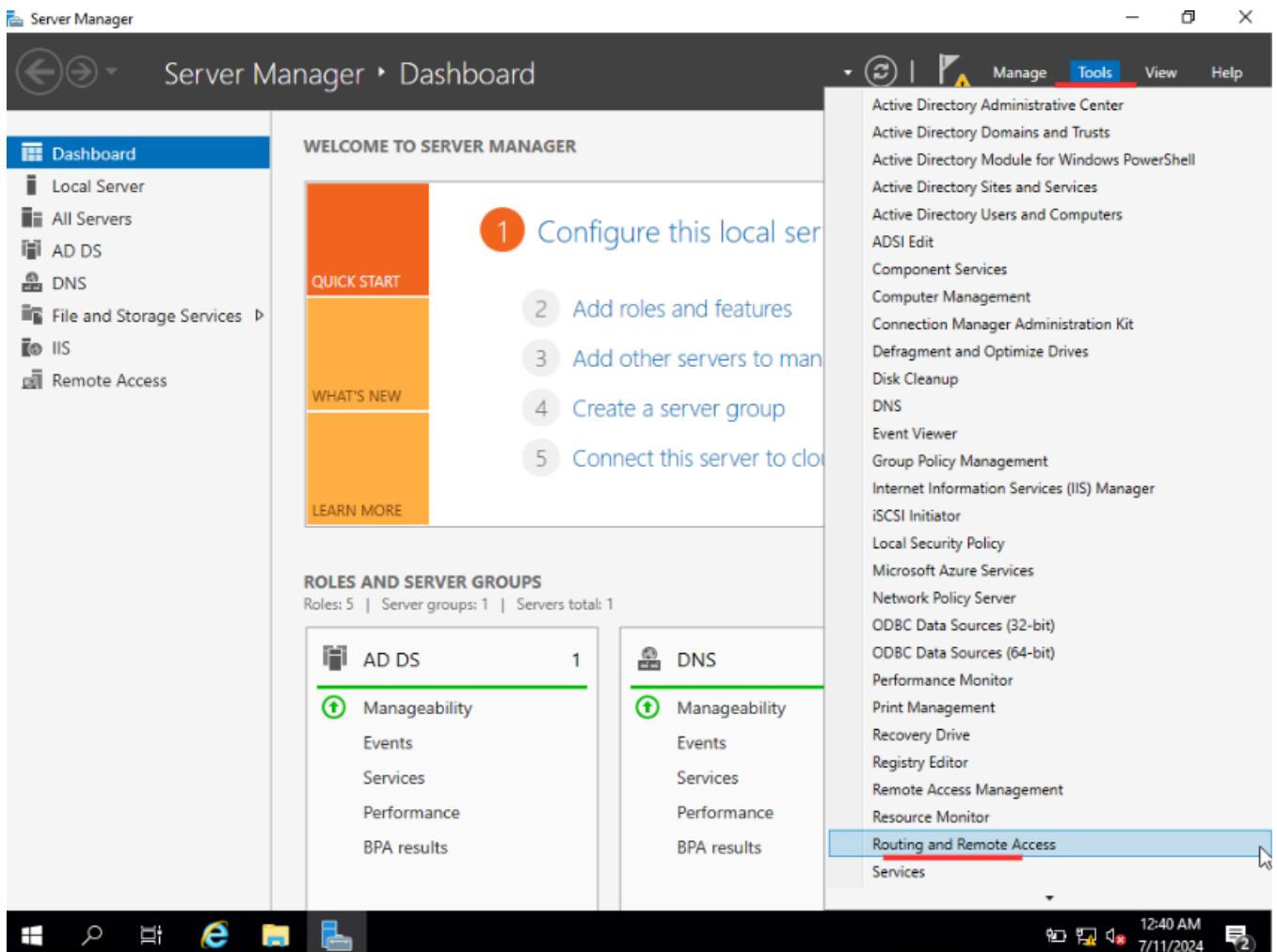
[Export configuration settings](#)

< Previous

Next >

Close

Cancel



Now we will configure Network Address Translation for the internal network

Routing and Remote Access

File Action View Help

Server Status DC (local)

Configure and Enable Routing and Remote Access

Disable Routing and Remote Access

All Tasks

View

Delete

Refresh

Properties

Help

Configures Routing and Remote Access for the selected server

Welcome to the Routing and Remote Access Server Setup Wizard

This wizard helps you set up your server so that you can connect to other networks and allow connections from remote clients.

To continue, click Next.

< Back

Next >

Cancel

ROUTING AND REMOTE ACCESS SERVER SETUP WIZARD

ROUTING AND REMOTE ACCESS SERVER SETUP WIZARD

Configuration

You can enable any of the following combinations of services, or you can customize this server.

Remote access (dial-up or VPN)
Allow remote clients to connect to this server through either a dial-up connection or a secure virtual private network (VPN) Internet connection.

Network address translation (NAT)
Allow internal clients to connect to the Internet using one public IP address.

Virtual private network (VPN) access and NAT
Allow remote clients to connect to this server through the Internet and local clients to connect to the Internet using a single public IP address.

Secure connection between two private networks
Connect this network to a remote network, such as a branch office.

Custom configuration
Select any combination of the features available in Routing and Remote Access.

< Back Next > Cancel

Routing and Remote Access Server Setup Wizard

NAT Internet Connection

You can select an existing interface or create a new demand-dial interface for client computers to connect to the Internet.

Use this public interface to connect to the Internet:

Network Interfaces:

Name	Description	IP Address
INTERNAL	Intel(R) PRO/1000 MT...	172.16.0.1
INTERNET	Intel(R) PRO/1000 MT...	10.0.2.15 (DHCP)

Create a new demand-dial interface to the Internet

A demand-dial interface is activated when a client uses the Internet. Select this option if this server connects with a modem or by using the Point-to-Point Protocol over Ethernet. The Demand-Dial Interface Wizard will start at the end of this wizard.

< Back

Next >

Cancel

If you are not able to select the top radio button, cancel out and try again

It should look like this

Routing and Remote Access Server Setup Wizard

NAT Internet Connection

You can select an existing interface or create a new demand-dial interface for client computers to connect to the Internet.

Use this public interface to connect to the Internet:

Network Interfaces:

Name	Description	IP Address
INTERNAL	Intel(R) PRO/1000 MT...	172.16.0.1
INTERNET	Intel(R) PRO/1000 MT...	10.0.2.15 (DHCP)

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A demand-dial interface is activated when a client uses the Internet. Select this option if this server connects with a modem or by using the Point-to-Point Protocol over Ethernet. The Demand-Dial Interface Wizard will start at the end of this wizard.

< Back

Next >

Cancel

Routing and Remote Access Server Setup Wizard

Completing the Routing and Remote Access Server Setup Wizard

You have successfully completed the Routing and Remote Access Server Setup wizard.

Summary:

Configured NAT for the following Internet interface: _INTERNET_ 

NAT relies on external DNS and DHCP servers. Confirm that these services are configured properly.

Network Address Translation (NAT) cannot start when 

To enable servers to respond to Internet requests, configure port mappings and update your firewall.

To close this wizard, click Finish.

< Back

Finish 

Cancel

Routing and Remote Access Server Setup Wizard

Completing the Routing and Remote Access Server Setup Wizard

Completing Initialization



Please wait while the Routing and Remote Access service finishes initialization.

ng and Remote

vers. Confirm 

Network Address Translation (NAT) cannot start when 

To enable servers to respond to Internet requests, configure port mappings and update your firewall.

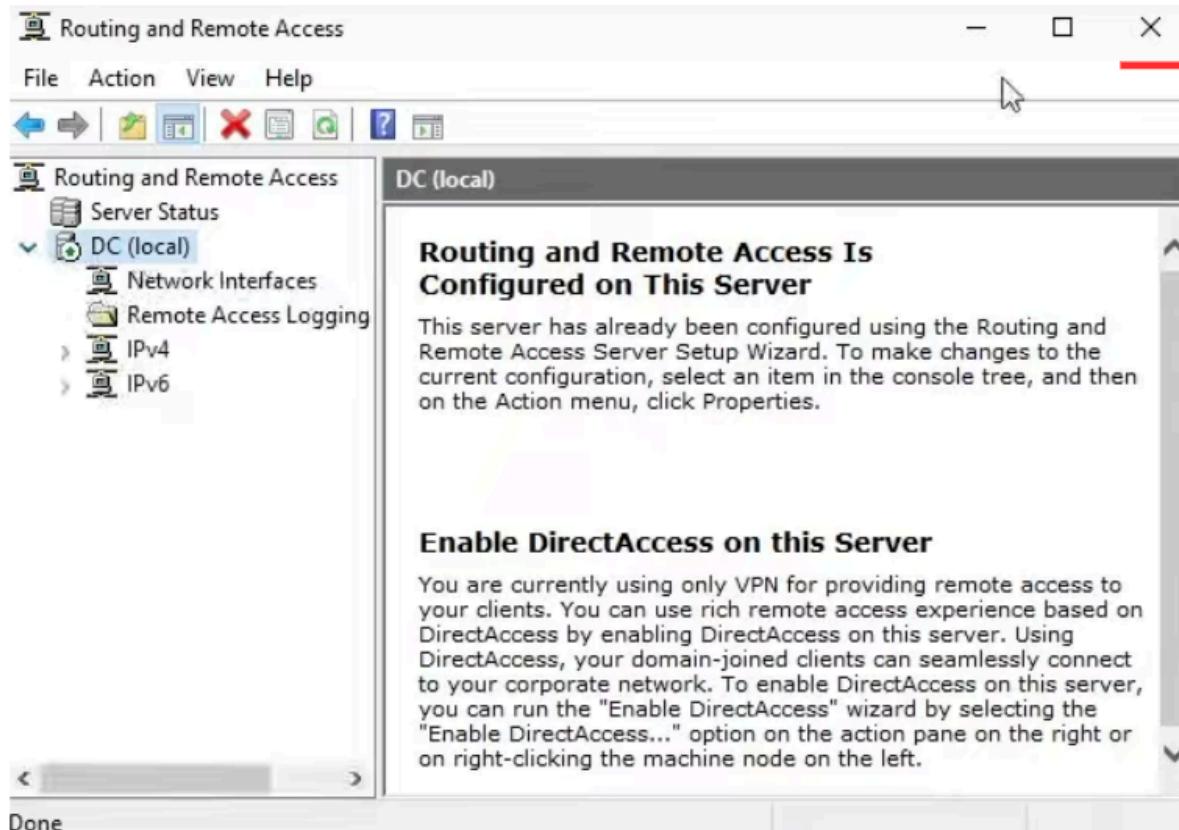
To close this wizard, click Finish.

< Back

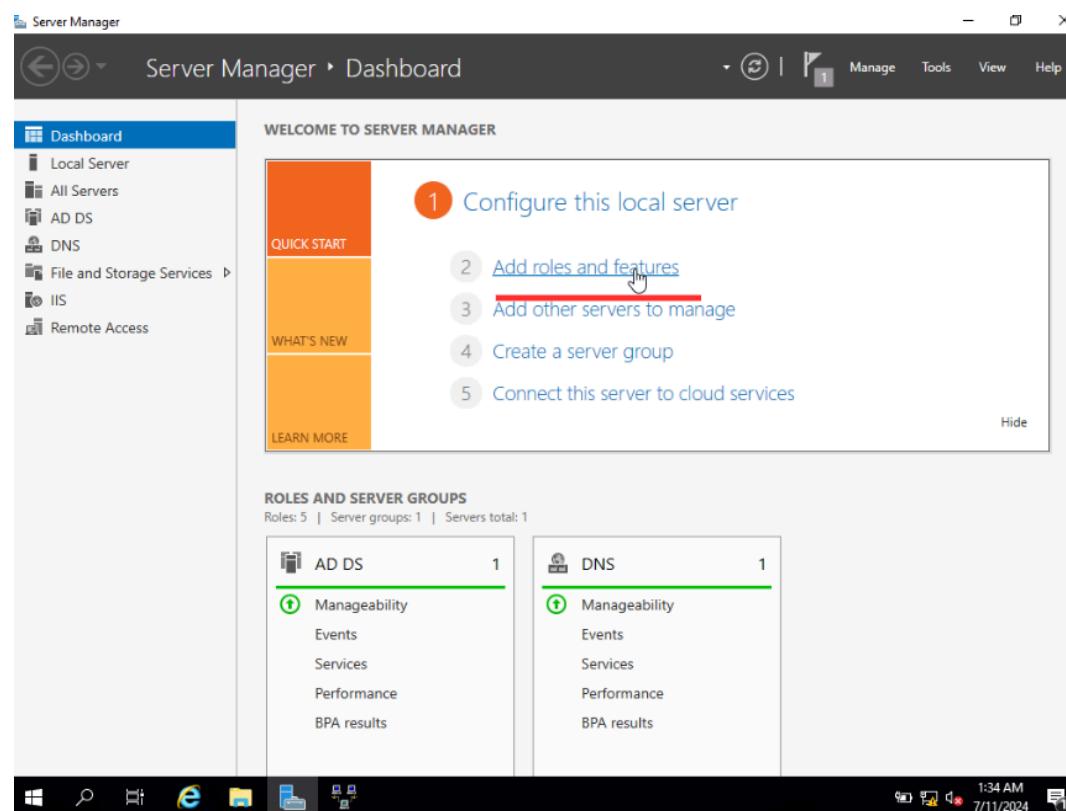
Finish

Cancel

This part of configuring the Domain Controller (DC) with RRAS (Routing and Remote Access Service) is to enable NAT (Network Address Translation) for your internal network. This configuration allows devices on your internal network, such as the Windows 10 VM that will be created soon, to access the internet through the DC.



Now we will create the DHCP. This will allow client computers to get an IP address and connect to the internet even though they will be in a private/ internal network. Installing DHCP on the server



Before you begin

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 installation type

Before You Begin

Installation Type

[Server Selection](#)[Server Roles](#)[Features](#)[Confirmation](#)[Results](#)

Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD).

Role-based or feature-based installation

Configure a single server by adding roles, role services, and features.

Remote Desktop Services installation

Install required role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-based or session-based desktop deployment.

[**< Previous**](#)[**Next >**](#)[Install](#)[Cancel](#)

DESTINATION SERVER
DC.mydomain.com

Select destination server

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Select a server or a virtual hard disk on which to install roles and features.

- Select a server from the server pool
- Select a virtual hard disk

Server Pool

Filter:

Name	IP Address	Operating System
DC.mydomain.com	10.0.2.15,172.1...	Microsoft Windows Server 2019 Standard Evaluation

1 Computer(s) found

This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.

< Previous

Next >

Install

Cancel

DESTINATION SERVER
DC.mydomain.com

Select server roles

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Select one or more roles to install on the selected server.

Roles

Description

<input type="checkbox"/> Active Directory Certificate Services	Active Directory Certificate Services (AD CS) is used to create certification authorities and related role services that allow you to issue and manage certificates used in a variety of applications.
<input checked="" type="checkbox"/> Active Directory Domain Services (Installed)	
<input type="checkbox"/> Active Directory Federation Services	
<input type="checkbox"/> Active Directory Lightweight Directory Services	
<input type="checkbox"/> Active Directory Rights Management Services	
<input type="checkbox"/> Device Health Attestation	
<input type="checkbox"/> DHCP Server	
<input checked="" type="checkbox"/> DNS Server (Installed)	
<input type="checkbox"/> Fax Server	
<input checked="" type="checkbox"/> File and Storage Services (2 of 12 installed)	
<input type="checkbox"/> Host Guardian Service	
<input type="checkbox"/> Hyper-V	
<input type="checkbox"/> Network Policy and Access Services	
<input type="checkbox"/> Print and Document Services	
<input checked="" type="checkbox"/> Remote Access (2 of 3 installed)	
<input type="checkbox"/> Remote Desktop Services	
<input type="checkbox"/> Volume Activation Services	
<input checked="" type="checkbox"/> Web Server (IIS) (10 of 43 installed)	
<input type="checkbox"/> Windows Deployment Services	
<input type="checkbox"/> Windows Server Update Services	

Description

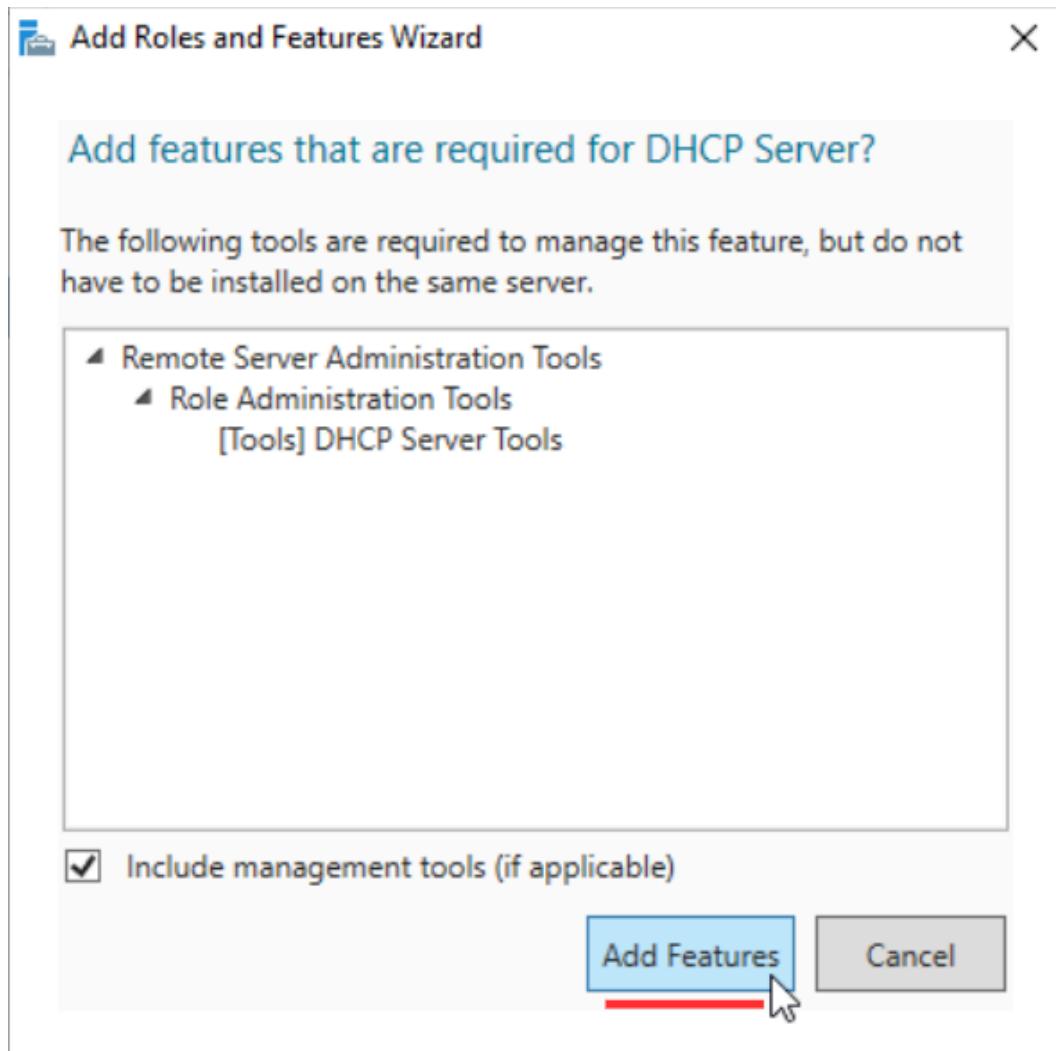
Active Directory Certificate Services (AD CS) is used to create certification authorities and related role services that allow you to issue and manage certificates used in a variety of applications.

< Previous

Next >

Install

Cancel



Add Roles and Features Wizard

DESTINATION SERVER
DC.mydomain.com

Select server roles

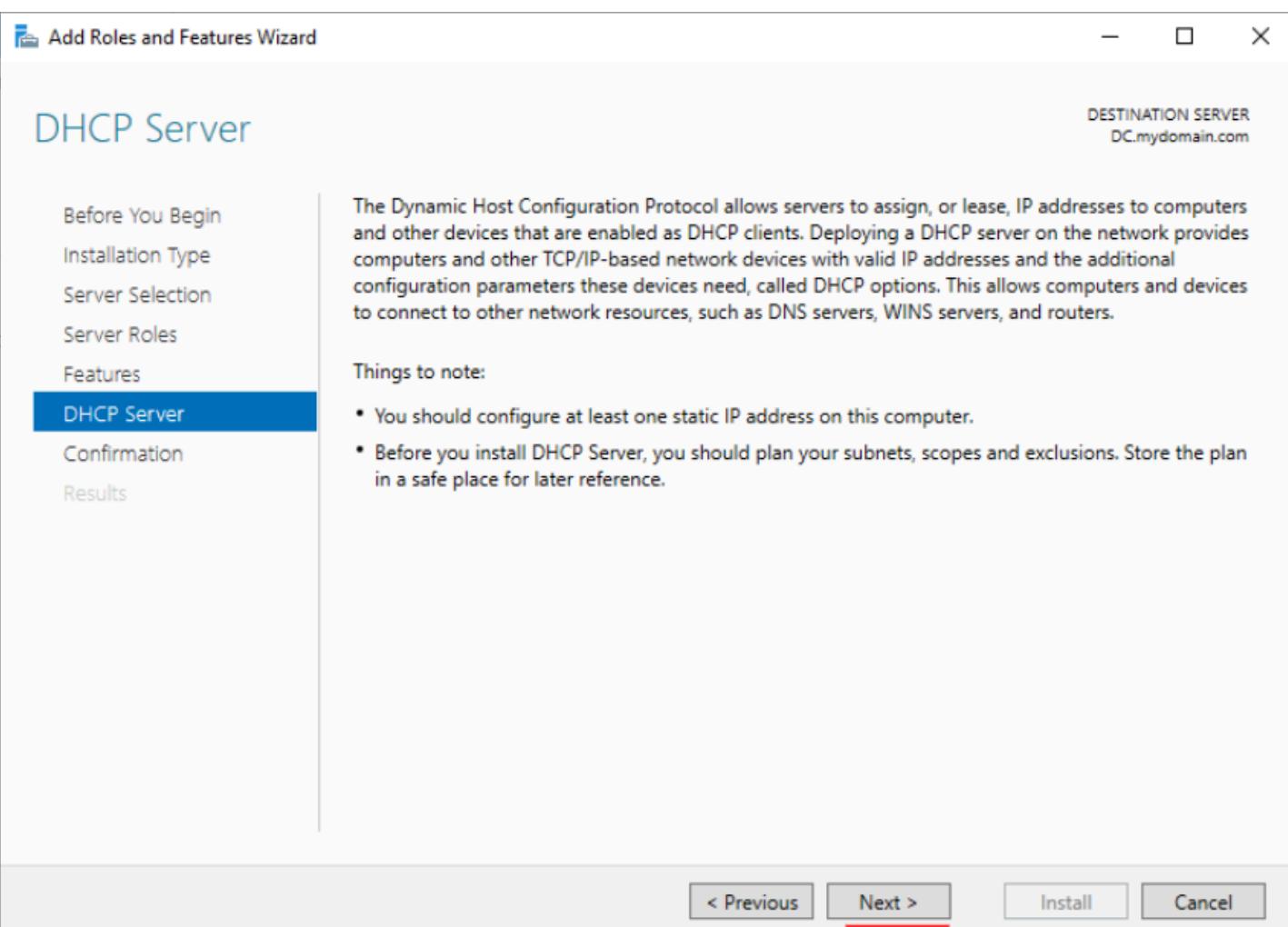
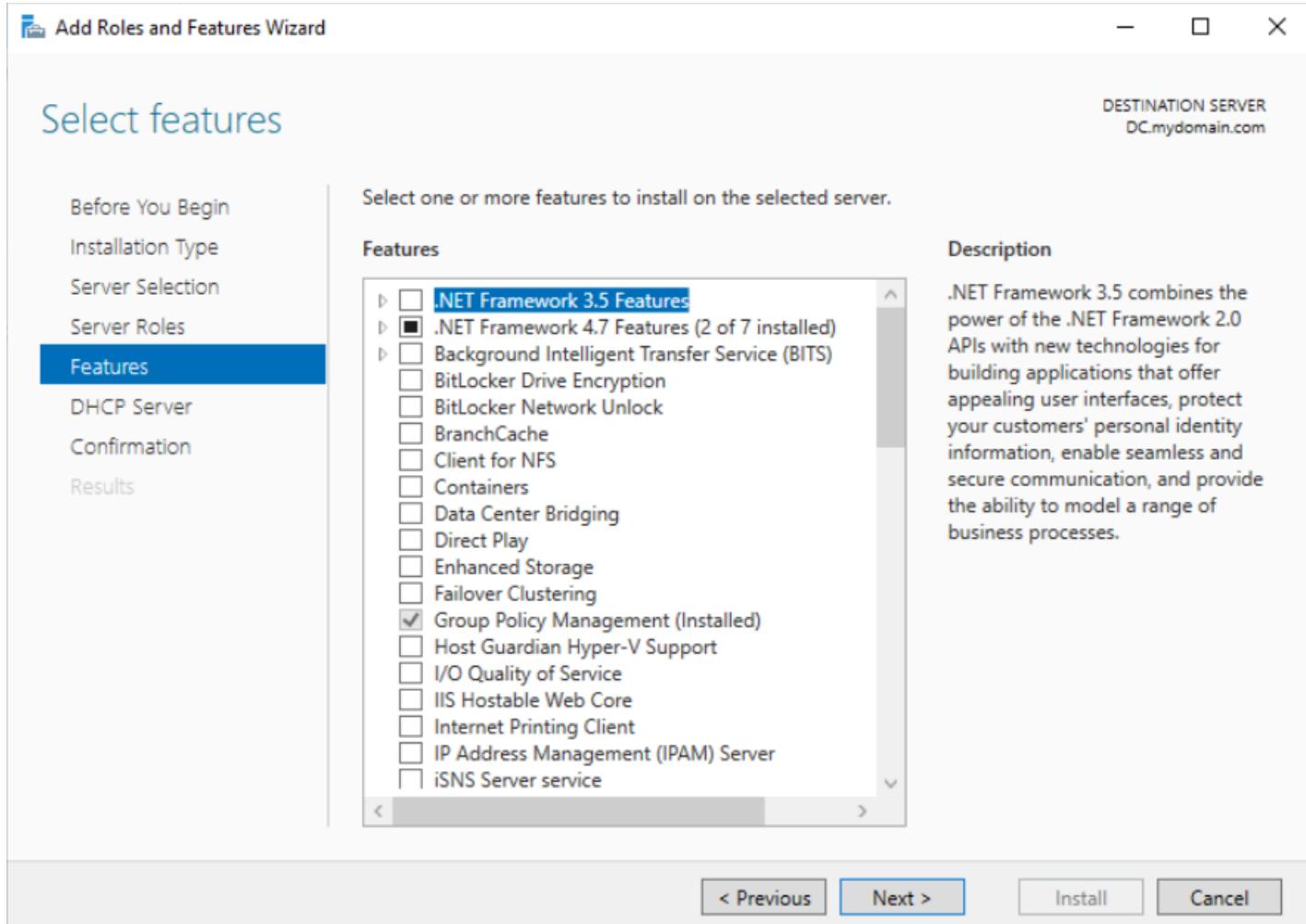
Before You Begin
Installation Type
Server Selection
Server Roles
Features
DHCP Server
Confirmation
Results

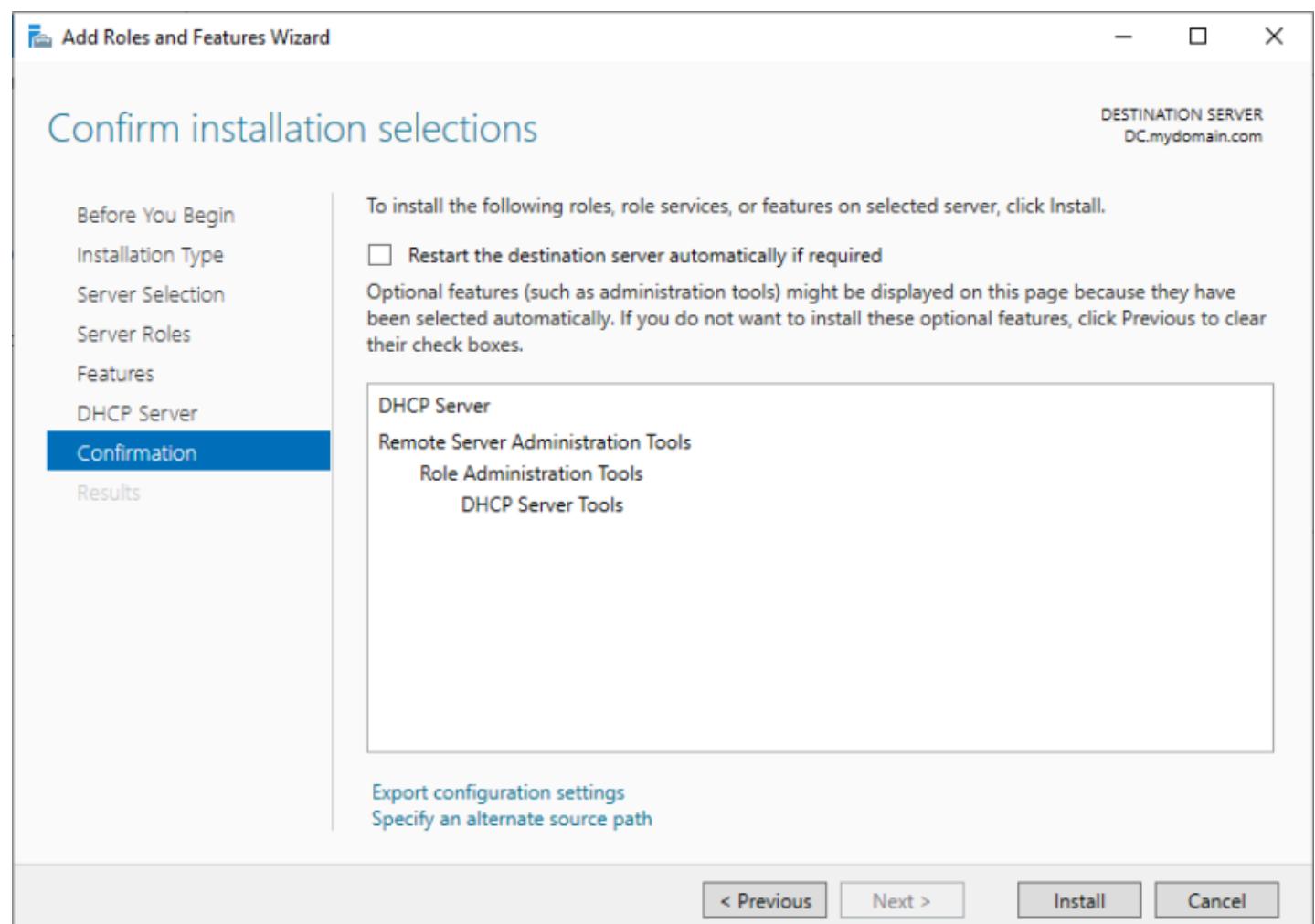
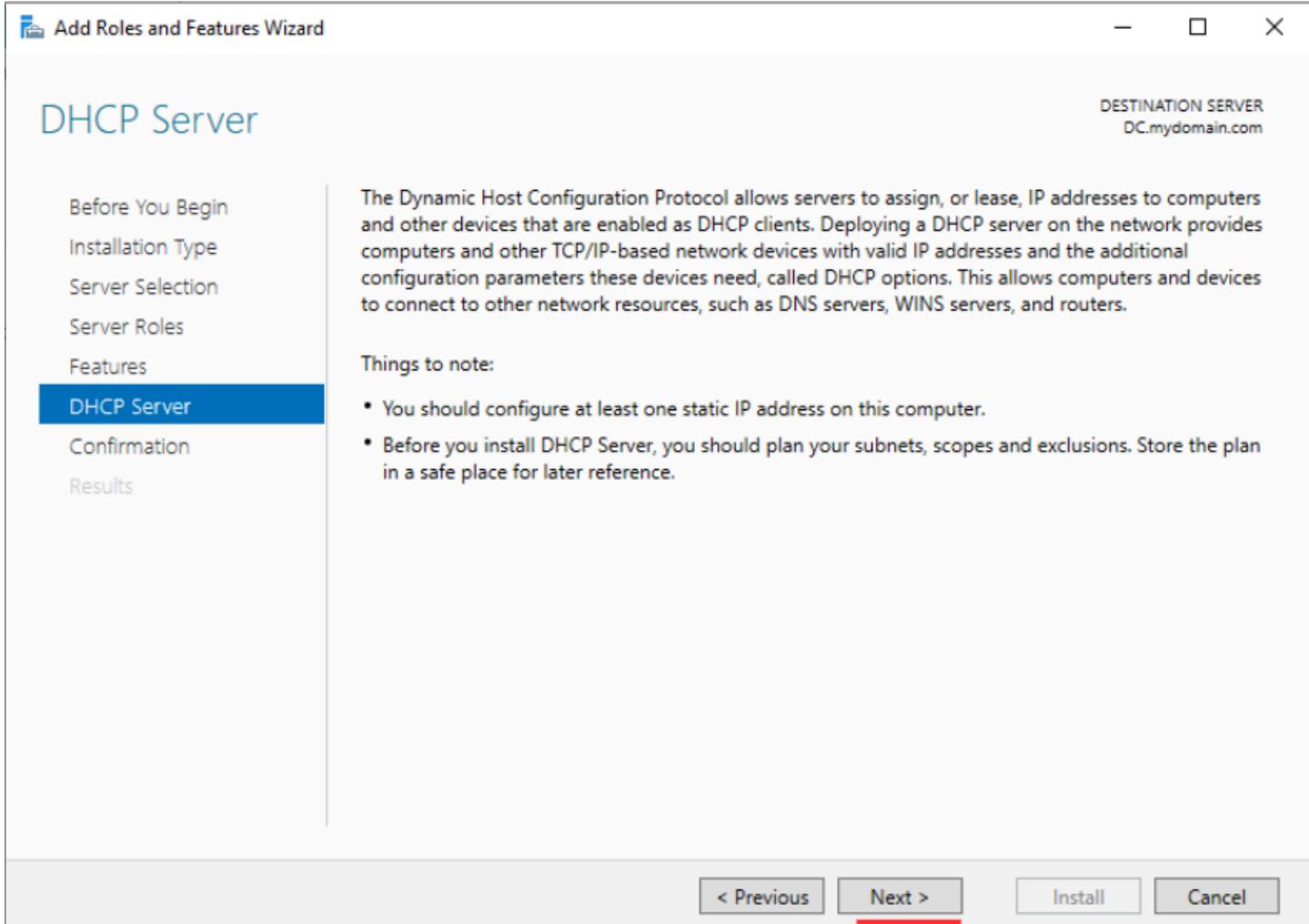
Select one or more roles to install on the selected server.

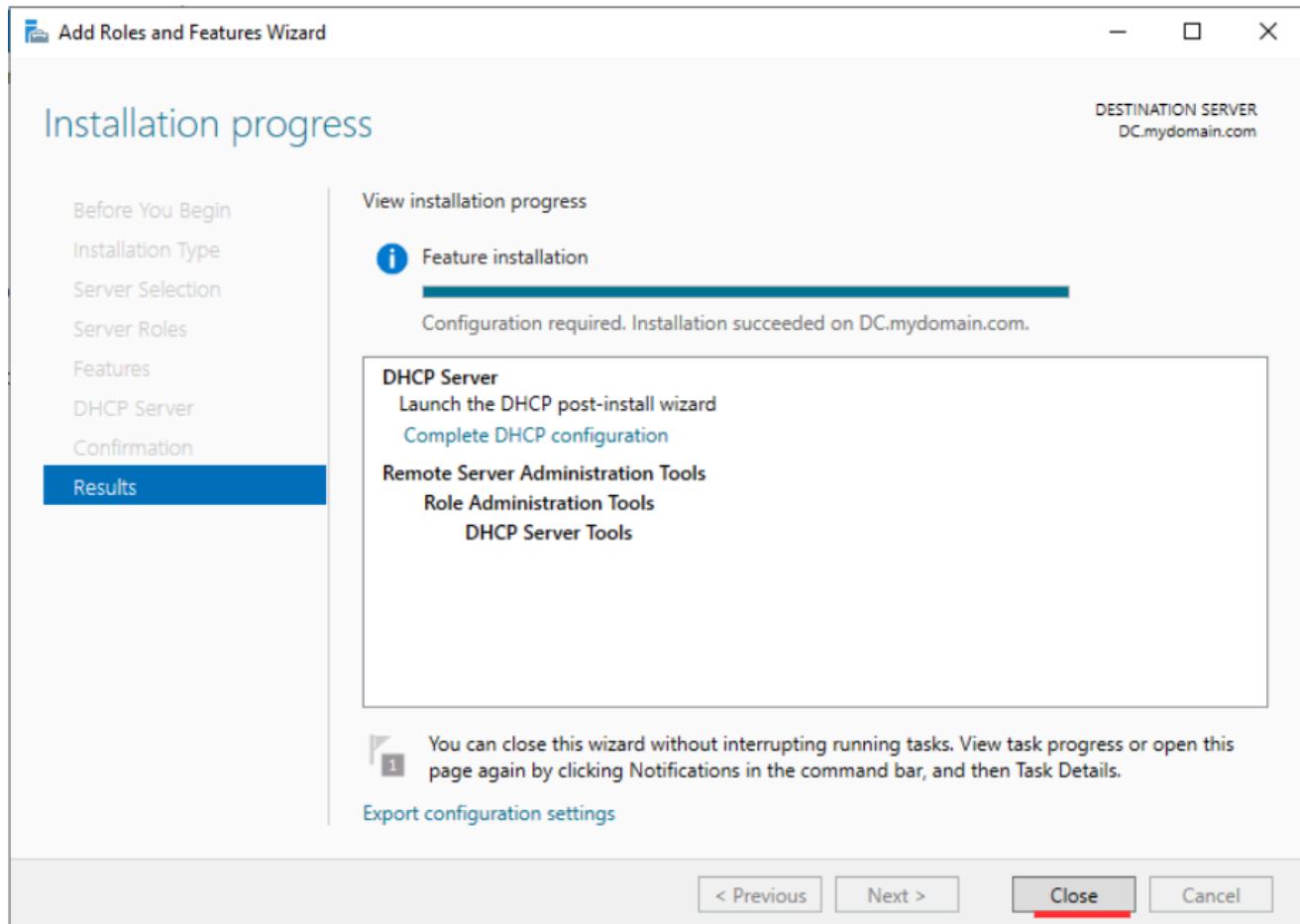
Roles	Description
<input type="checkbox"/> Active Directory Certificate Services	
<input checked="" type="checkbox"/> Active Directory Domain Services (Installed)	
<input type="checkbox"/> Active Directory Federation Services	
<input type="checkbox"/> Active Directory Lightweight Directory Services	
<input type="checkbox"/> Active Directory Rights Management Services	
<input type="checkbox"/> Device Health Attestation	
<input checked="" type="checkbox"/> DHCP Server	Dynamic Host Configuration Protocol (DHCP) Server enables you to centrally configure, manage, and provide temporary IP addresses and related information for client computers.
<input checked="" type="checkbox"/> DNS Server (Installed)	
<input type="checkbox"/> Fax Server	
► <input checked="" type="checkbox"/> File and Storage Services (2 of 12 installed)	
<input type="checkbox"/> Host Guardian Service	
<input type="checkbox"/> Hyper-V	
<input type="checkbox"/> Network Policy and Access Services	
<input type="checkbox"/> Print and Document Services	
► <input checked="" type="checkbox"/> Remote Access (2 of 3 installed)	
<input type="checkbox"/> Remote Desktop Services	
<input type="checkbox"/> Volume Activation Services	
► <input checked="" type="checkbox"/> Web Server (IIS) (10 of 43 installed)	
<input type="checkbox"/> Windows Deployment Services	
<input type="checkbox"/> Windows Server Update Services	

< Previous Next > Install Cancel

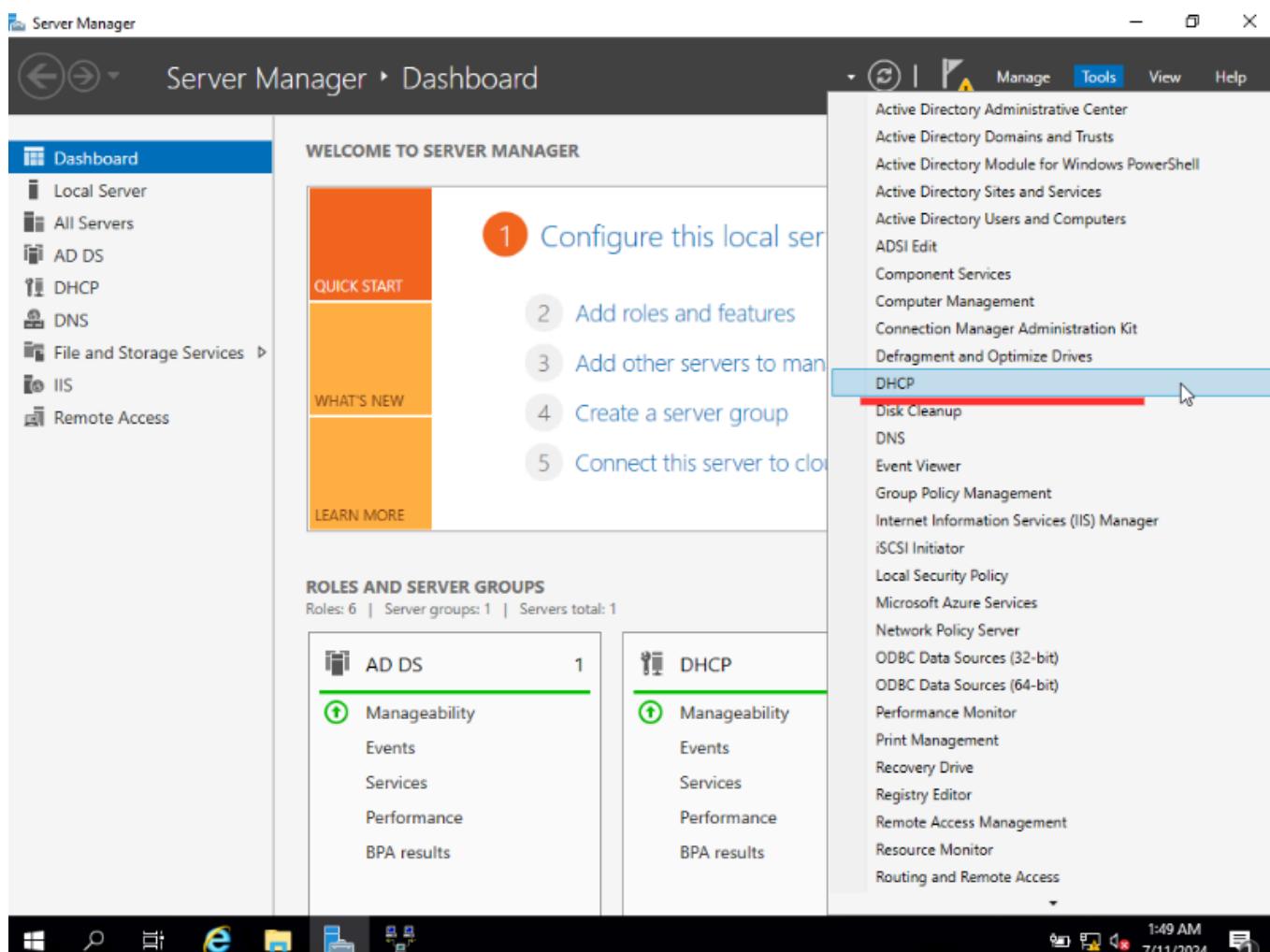
You can see DNS is installed, because it was installed when installing AD DS. DNS is an essential part of AD DS

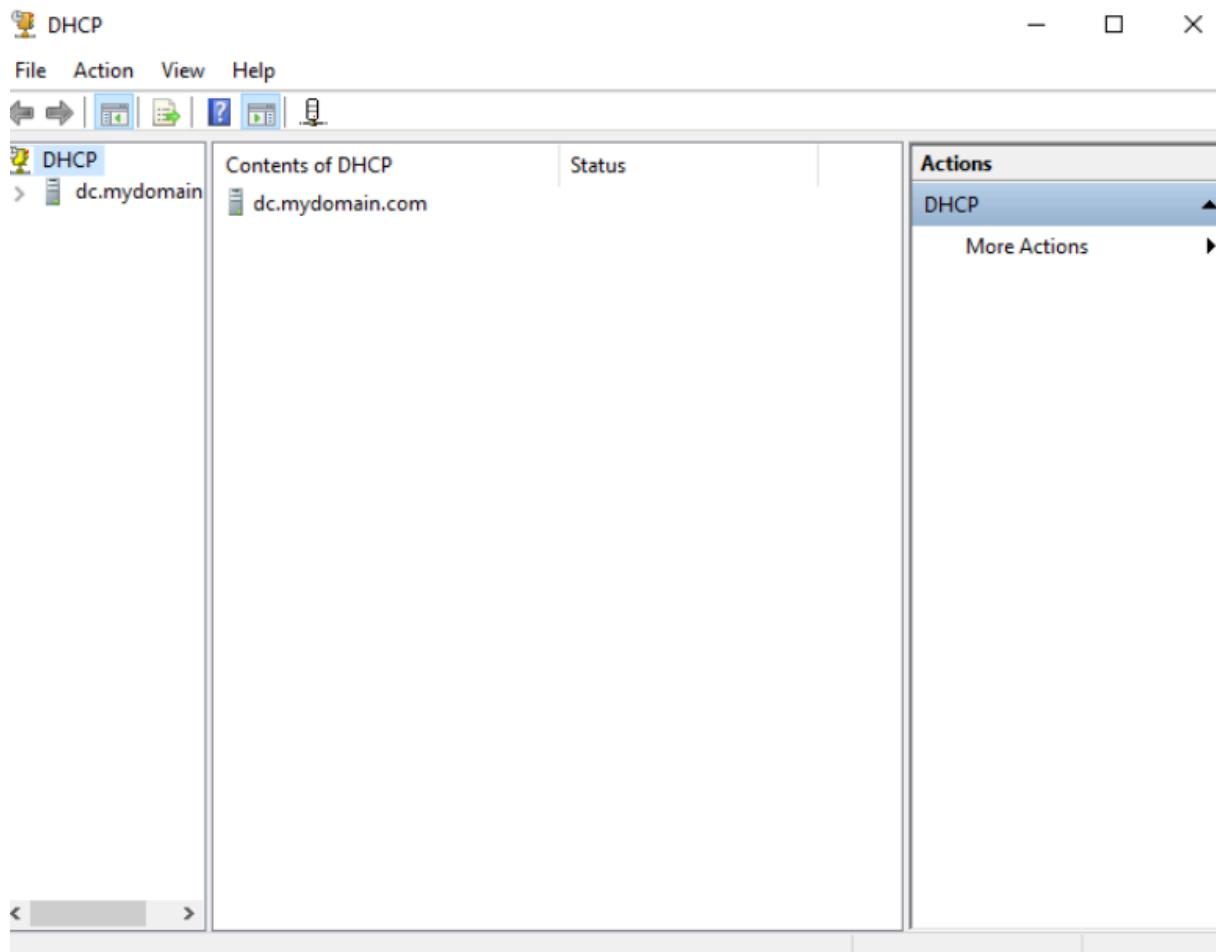






DHCP installation is complete, now he will configure it





Creating a scope for the DHCP lease

A screenshot of the Windows Server DHCP Management Console. The title bar says "DHCP". The menu bar includes "File", "Action", "View", and "Help". The toolbar has icons for back, forward, search, and other common functions. The left navigation pane shows a tree structure with "DHCP" at the root, expanded to show "dc.mydomain", which is further expanded to show "IPv4" and "Actions". Under "Actions", "IPv4" is selected. A context menu is open over the "IPv4" node, with "New Scope..." highlighted and a red box drawn around it. The central pane displays the "Configure the DHCP Server" dialog. The "Actions" pane on the right shows "IPv4" selected. A status message at the bottom says "Create a new scope".

New Scope Wizard



Welcome to the New Scope Wizard

This wizard helps you set up a scope for distributing IP addresses to computers on your network.

To continue, click Next.

< Back

Next >

Cancel

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:

End IP address:

Configuration settings that propagate to DHCP Client

Length:

Subnet mask:

< Back

Next >

Cancel

New Scope Wizard

Add Exclusions and Delay

Exclusions are addresses or a range of addresses that are not distributed by the server. A delay is the time duration by which the server will delay the transmission of a DHCPOFFER message.



Type the IP address range that you want to exclude. If you want to exclude a single address, type an address in Start IP address only.

Start IP address:

End IP address:

Add

Excluded address range:

Remove

Subnet delay in milli second:

< Back

Next >

Cancel

New Scope Wizard

Lease Duration

The lease duration specifies how long a client can use an IP address from this scope.



Lease durations should typically be equal to the average time the computer is connected to the same physical network. For mobile networks that consist mainly of portable computers or dial-up clients, shorter lease durations can be useful.

Likewise, for a stable network that consists mainly of desktop computers at fixed locations, longer lease durations are more appropriate.

Set the duration for scope leases when distributed by this server.

Limited to:

Days: 8 Hours: 0 Minutes: 0

< Back

Next >

Cancel

New Scope Wizard

Configure DHCP Options

You have to configure the most common DHCP options before clients can use the scope.



When clients obtain an address, they are given DHCP options such as the IP addresses of routers (default gateways), DNS servers, and WINS settings for that scope.

The settings you select here are for this scope and override settings configured in the Server Options folder for this server.

Do you want to configure the DHCP options for this scope now?

- Yes, I want to configure these options now
- No, I will configure these options later

< Back

Next >

Cancel

New Scope Wizard

Router (Default Gateway)

You can specify the routers, or default gateways, to be distributed by this scope.



To add an IP address for a router used by clients, enter the address below.

IP address:

Add
Remove
Up
Down

< Back Next > Cancel

Establishing the default gateway for the internal NIC

New Scope Wizard

Router (Default Gateway)

You can specify the routers, or default gateways, to be distributed by this scope.



To add an IP address for a router used by clients, enter the address below.

IP address:

Add
Remove
Up
Down

< Back Next > Cancel

New Scope Wizard

Domain Name and DNS Servers

The Domain Name System (DNS) maps and translates domain names used by clients on your network.



You can specify the parent domain you want the client computers on your network to use for DNS name resolution.

Parent domain:

To configure scope clients to use DNS servers on your network, enter the IP addresses for those servers.

Server name:

IP address:

Add

New Scope Wizard

WINS Servers

Computers running Windows can use WINS servers to convert NetBIOS computer names to IP addresses.



Entering server IP addresses here enables Windows clients to query WINS before they use broadcasts to register and resolve NetBIOS names.

Server name:

IP address:

Add

To change this behavior for Windows DHCP clients modify option 046, WINS/NBT Node Type, in Scope Options.

New Scope Wizard

Activate Scope

Clients can obtain address leases only if a scope is activated.



Do you want to activate this scope now?

Yes, I want to activate this scope now

No, I will activate this scope later

< Back

Next >

Cancel

New Scope Wizard



Completing the New Scope Wizard

You have successfully completed the New Scope wizard.

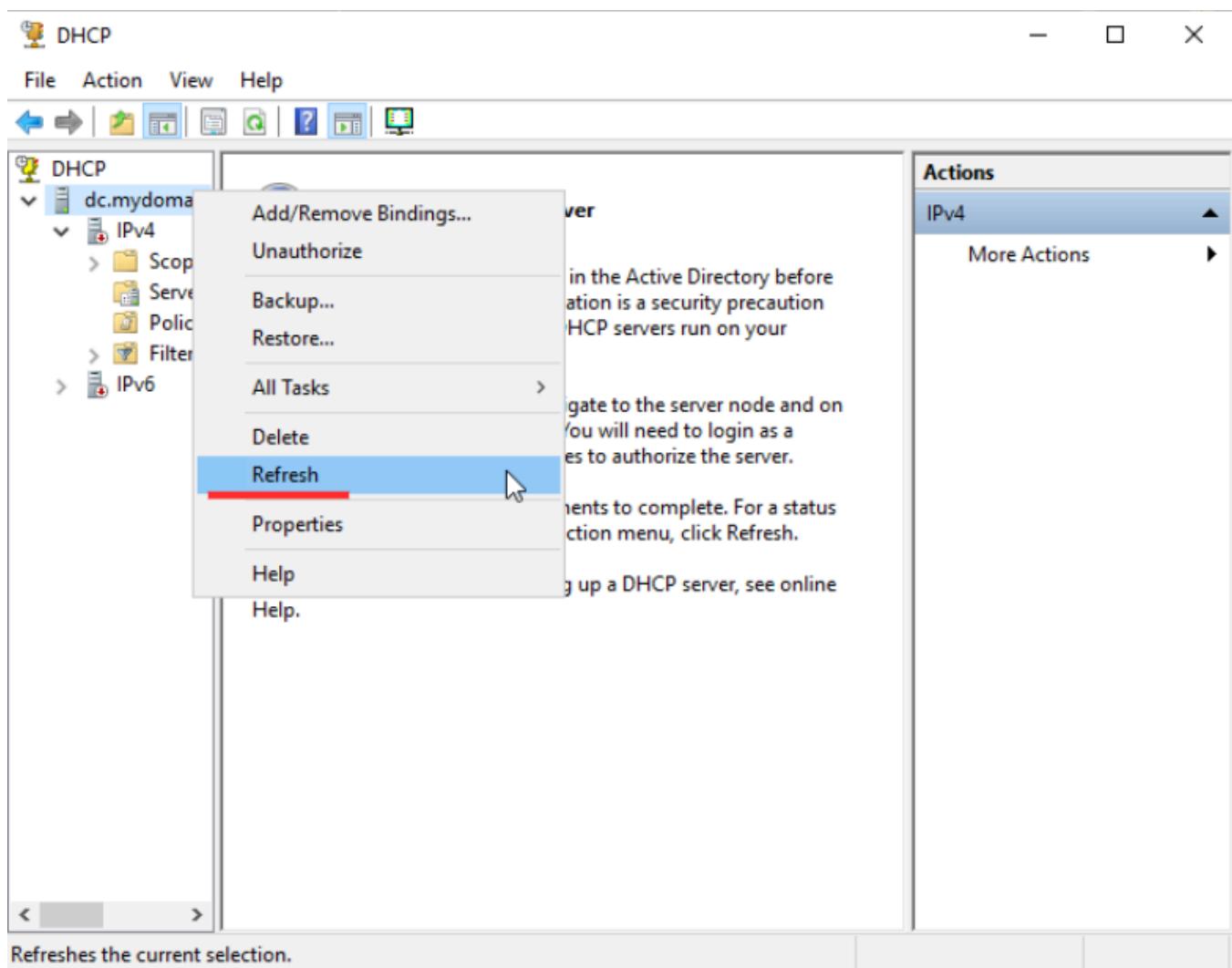
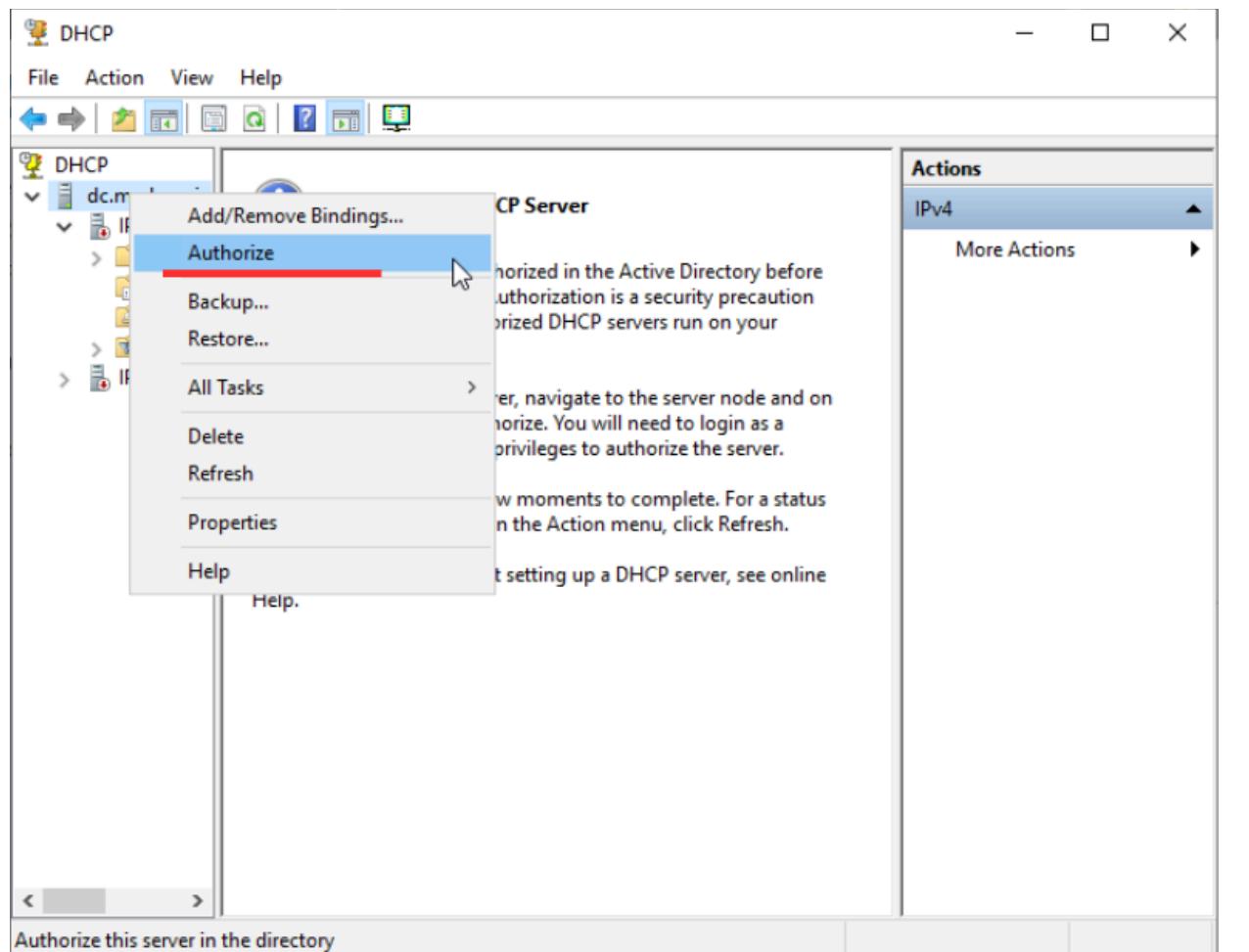
To provide high availability for this scope, configure failover for the newly added scope by right clicking on the scope and clicking on configure failover.

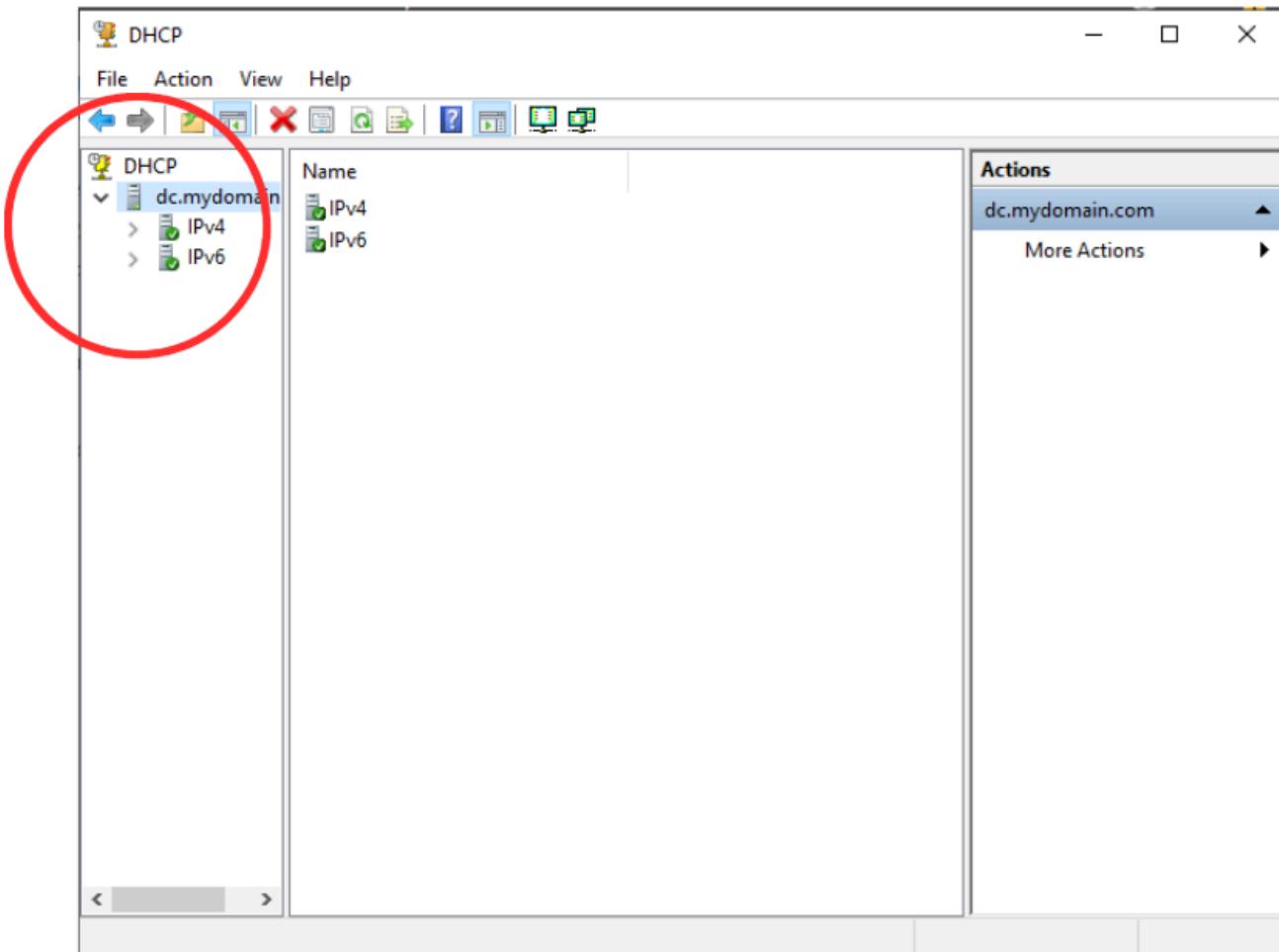
To close this wizard, click Finish.

< Back

Finish

Cancel





Now we will allow the server to browse the internet, this is NOT recommend on a production environment

The screenshot shows the Windows Server Manager Dashboard. The left sidebar lists 'Dashboard', 'Local Server', 'All Servers', 'AD DS', 'DHCP', 'DNS', 'File and Storage Services', 'IIS', and 'Remote Access'. The main area is titled 'WELCOME TO SERVER MANAGER' and features a 'QUICK START' section with numbered steps: 1. Configure this local server (which is underlined and has a mouse cursor icon), 2. Add roles and features, 3. Add other servers to manage, 4. Create a server group, and 5. Connect this server to cloud services. Below this is a 'WHAT'S NEW' section and a 'LEARN MORE' button. At the bottom, it shows 'ROLES AND SERVER GROUPS' with 'Roles: 6 | Server groups: 1 | Servers total: 1'. It lists 'AD DS' (1 instance) and 'DHCP' (1 instance), each with 'Manageability', 'Events', 'Services', 'Performance', and 'BPA results' options. The status bar at the bottom indicates 'Server Manager' and 'Local Server'.

Server Manager

Server Manager ▾ Local Server

PROPERTIES For DC

Last installed updates: 7/8/2024 8:22 PM
Windows Update: Download updates only, using Windows Update
Last checked for updates: Yesterday at 11:16 PM

Windows Defender Antivirus: Real-Time Protection: On
Feedback & Diagnostics
IE Enhanced Security Configuration: On
Time zone: (UTC-08:00) Pacific Time (US & Canada)
Product ID: 00431-10000-00000-AA072 (activated)

IPv6 enabled: .1, IPv6 enabled
Address assigned by DHCP, IPv6 enabled

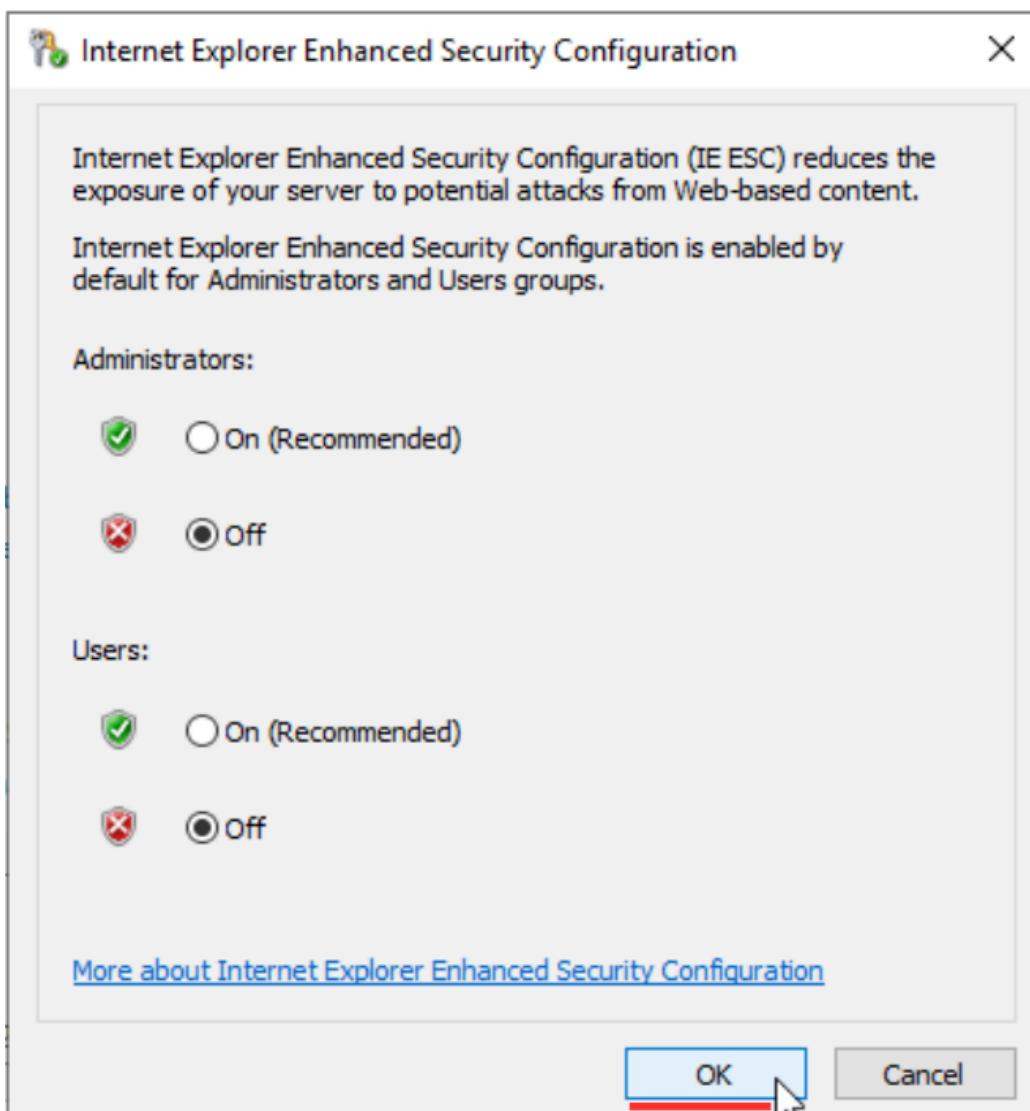
Processor: 11th Gen Intel(R) Core(TM) i5-1155G7 @ 2.50GHz
Installed memory (RAM): 2 GB
Total disk space: 10.16 GB

EVENTS

All events | 21 total

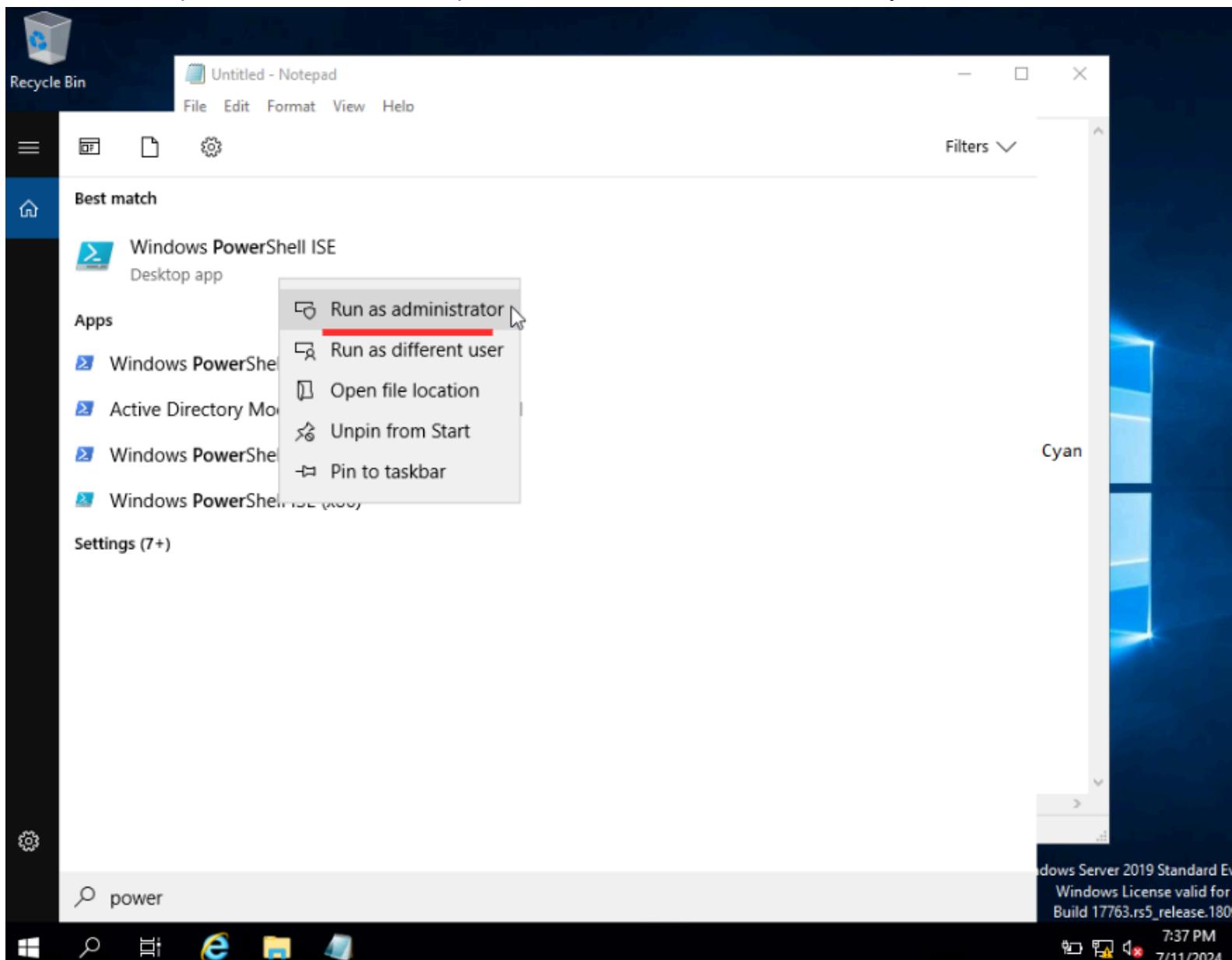
Server Name	ID	Severity	Source	Log	Date and Time
DC	24	Error	Microsoft-Windows-WMI	Application	7/11/2024 12:36:03 AM
DC	24	Error	Microsoft-Windows-WMI	Application	7/11/2024 12:36:03 AM
DC	24	Error	Microsoft-Windows-WMI	Application	7/11/2024 12:36:02 AM

I am turning it off so I can access the list of names to add to the domain, I will turn it back on later experiments



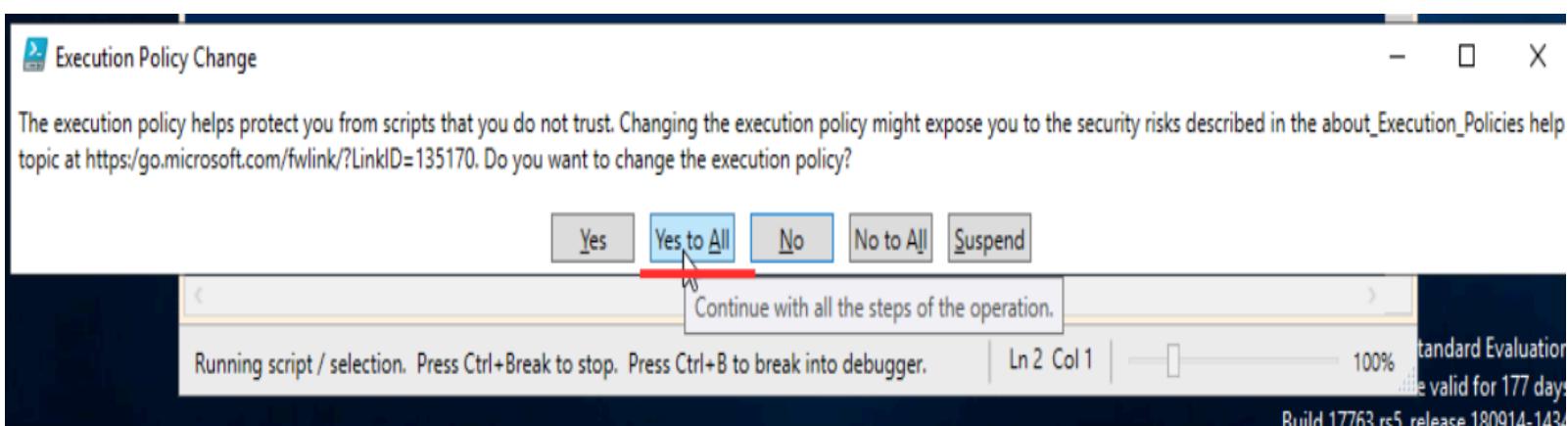
ain.com	Last installed updates Windows Update Last checked for updates	7/8/2024 8:22 PM Download updates only, using Windows Update Yesterday at 11:16 PM
On	Windows Defender Antivirus	Real-Time Protection: On
	Feedback & Diagnostics	Settings
	IE Enhanced Security Configuration	Off
.1, IPv6 enabled	Time zone	(Local)-08:00 Pacific Time (US & Canada)
Address assigned by DHCP, IPv6 enabled	Product ID	00431-10000-00000-AA072 (activated)
It Windows Server 2019 Standard Evaluation	Processors	11th Gen Intel(R) Core(TM) i5-1155G7 @ 2.50GHz
GmbH VirtualBox	Installed memory (RAM)	2 GB
	Total available	10.16 GB

Now we will use powershell to run the script to create users for the active directory





A screenshot of a PowerShell window. The command entered is `PS C:\Windows\system32> Set-ExecutionPolicy Unrestricted`. A red horizontal bar highlights the word "Unrestricted". Below the command, the message "Intellisense timed out" is displayed.



Allowing the PowerShell script to create the users

```
PS C:\Windows\system32> Set-ExecutionPolicy Unrestricted
```

```
PS C:\Windows\system32> |
```

Completed

```
PS C:\Windows\system32> Set-ExecutionPolicy Unrestricted
```

```
PS C:\Windows\system32> cd C:\Users\a-mosman\Downloads\AD_PS-master\AD_PS-master
```

| Ln 3 Col 81 |

```
PS C:\Windows\system32> Set-ExecutionPolicy Unrestricted
```

```
PS C:\Windows\system32> cd C:\Users\a-mosman\Downloads\AD_PS-master\AD_PS-master
```

```
PS C:\Users\a-mosman\Downloads\AD_PS-master\AD_PS-master> ls
```

| Ln 5 Col 61 |

```
PS C:\Windows\system32> cd C:\Users\a-mosman\Downloads\AD_PS-master\AD_PS-master
PS C:\Users\a-mosman\Downloads\AD_PS-master\AD_PS-master> ls

    Directory: C:\Users\a-mosman\Downloads\AD_PS-master\AD_PS-master

Mode                LastWriteTime         Length Name
----                -----          ----
-a---        7/11/2024  2:40 AM      1811 .gitignore
-a---        7/11/2024  2:40 AM      1025 1_CREATE_USERS.ps1
-a---        7/11/2024  2:40 AM     1532 Generate-Names-Create-Users.ps1
-a---        7/11/2024  3:15 AM     15583 names.txt

PS C:\Users\a-mosman\Downloads\AD_PS-master\AD_PS-master>
```

Administrator: Windows PowerShell ISE

File Edit View Tools Debug Add-ons Help

Untitled1.ps1* Run Script (F5)

```
1 # -----
2 $PASSWORD_FOR_USERS = "Password1"
3 $USER_FIRST_LAST_LIST = Get-Content .\names.txt
4 # -----
5
6 $password = ConvertTo-SecureString $PASSWORD_FOR_USERS -AsPlainText -Force
7 New-ADOrganizationalUnit -Name _USERS -ProtectedFromAccidentalDeletion $false
8
9 foreach ($n in $USER_FIRST_LAST_LIST) {
10     $first = $n.Split(" ")[0].ToLower()
11     $last = $n.Split(" ")[1].ToLower()
12     $username = $($first.Substring(0,1))$($last).ToLower()
13     Write-Host "Creating user: $($username)" -BackgroundColor Black -ForegroundColor Cyan
14 }
```

PS C:\Windows\system32> cd C:\Users\a-mosman\Downloads\AD_PS-master\AD_PS-master
PS C:\Users\a-mosman\Downloads\AD_PS-master\AD_PS-master> ls

```

PS C:\WINDOWS\system32> # Define the default password for the users
$PASSWORD_FOR_USERS = "Password1"

# Read the list of user names (first and last names) from the file 'names.txt'
$USER_FIRST_LAST_LIST = Get-Content .\names.txt

# Convert the plain text password to a secure string
$password = ConvertTo-SecureString $PASSWORD_FOR_USERS -AsPlainText -Force

# Create a new Active Directory Organizational Unit (OU) named '_USERS'
# and make it unprotected from accidental deletion
New-ADOrganizationalUnit -Name _USERS -ProtectedFromAccidentalDeletion $false

# Loop through each name in the list of user names
foreach ($n in $USER_FIRST_LAST_LIST) {
    # Extract the first name and convert it to lowercase
    $first = $n.Split(" ")[0].ToLower()
    # Extract the last name and convert it to lowercase
    $last = $n.Split(" ")[1].ToLower()
    # Create a username by combining the first initial and the last name,
    # then convert it to lowercase
    $username = "$($first.Substring(0,1))$($last)".ToLower()
    # Output the username being created to the console
    Write-Host "Creating user: $($username)" -BackgroundColor Black -ForegroundColor Cyan

    # Create a new Active Directory user with the specified properties
    New-AdUser -AccountPassword $password ` # Set the account password
        -GivenName $first ` # Set the given name (first name)
        -Surname $last ` # Set the surname (last name)
        -DisplayName $username ` # Set the display name to the username
        -Name $username ` # Set the name to the username
        -EmployeeID $username ` # Set the employee ID to the username
        -PasswordNeverExpires $true ` # Set the password to never expire
        -Path "ou=_USERS,$(([ADSI]`""").distinguishedName)" ` # Set the path to the new
OU
        -Enabled $true ` # Enable the user account
}

```

This is the script used in the PowerShell script with explanation

File Edit View Tools Debug Add-ons Help

The screenshot shows a Windows PowerShell ISE window. The title bar reads "Administrator: Windows PowerShell ISE". The menu bar includes "File", "Edit", "View", "Tools", "Debug", "Add-ons", and "Help". The toolbar contains various icons for file operations like Open, Save, Copy, Paste, and Find.

The code editor window is titled "Untitled1.ps1*". It contains a PowerShell script for creating users in Active Directory. The script sets a password, reads a list of first and last names from a file, converts the password to a secure string, creates an organizational unit named "_USERS", and then loops through the list to create individual users, outputting each creation message to the host.

```
1 # -----
2 $PASSWORD_FOR_USERS = "Password1"
3 $USER_FIRST_LAST_LIST = Get-Content .\names.txt
4 # -----
5
6 $password = ConvertTo-SecureString $PASSWORD_FOR_USERS -AsPlainText -Force
7 New-ADOrganizationalUnit -Name _USERS -ProtectedFromAccidentalDeletion $false
8
9 foreach ($n in $USER_FIRST_LAST_LIST) {
10     $first = $n.Split(" ")[0].ToLower()
11     $last = $n.Split(" ")[1].ToLower()
12     $username = $($first.Substring(0,1))$($last).ToLower()
13     Write-Host "Creating user: $($username)" -BackgroundColor Black -ForegroundColor Cyan
14 }
```

The output pane below the code editor shows the results of the script execution, listing each user being created:

```
Creating user: smcastro
Creating user: rrector
Creating user: dmowrey
Creating user: tdelpriore
Creating user: ehowey
Creating user: dfrausto
Creating user: msingh
Creating user: gdarville
Creating user: lmciver
Creating user: kbutcher
Creating user: mchestnut
Creating user: nlefeuvre
Creating user: cwestover
Creating user: vezzell
Creating user: dannunziata
Creating user: smitschke
Creating user: kmarden
Creating user: mraper
Creating user: dwillmore
Creating user: tbasio
Creating user: bgilmer
Creating user: cconboy
Creating user: mhakes
Creating user: arettig
```

The command prompt at the bottom shows the path "PS C:\Users\...". The status bar at the bottom right indicates "Completed", "Ln 1065 Col 59", and "100%".

names - Notepad

File Edit Format View Help

Mahamud Osman
Monroe Mcelroy
Annamaria Loy
Corliss Levett
Merilyn Escovedo
Danica Pulsifer
Carolee Philbrook
Dannette Mouton
Guadalupe Joachim
Wiley Capella
Mayra Warring
Alberto Deguzman
Inga Larochelle
Carmelia Bruen
Chanda Zemlicka
Yun Picard
Sofia Dike
Brigid Smalls
Ma Robinett
Norma Larkey
Carlo Larger
Arica Gannon
Ara Molino
Latarsha Finlay
Chery Raber
Jere Satterwhite
Latonya Westover
Calandra Hetrick
Mechelle Liechty
Allie Maske
Louella Beumer
Betty Abshire
Verlie Schuler
Le Olson

< > Window Ln 1, Co 100%

Active Directory Users and Computers

File Action View Help

Active Directory Users and Computers

Saved Queries

mydomain.com

ADMINS

_USERS

Builtin

Computers

Domain Controllers

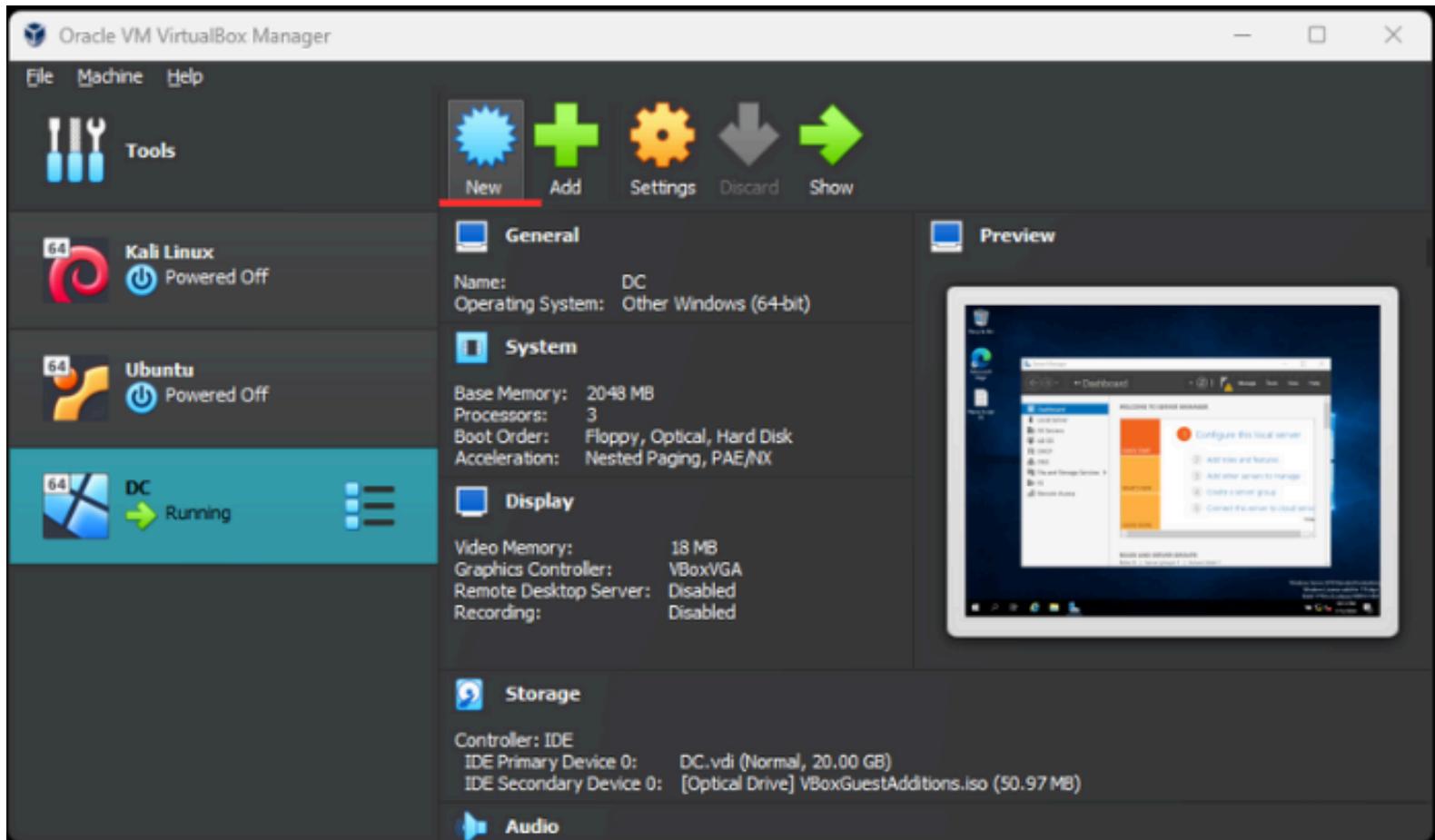
ForeignSecurityPrincipal

Managed Service Account

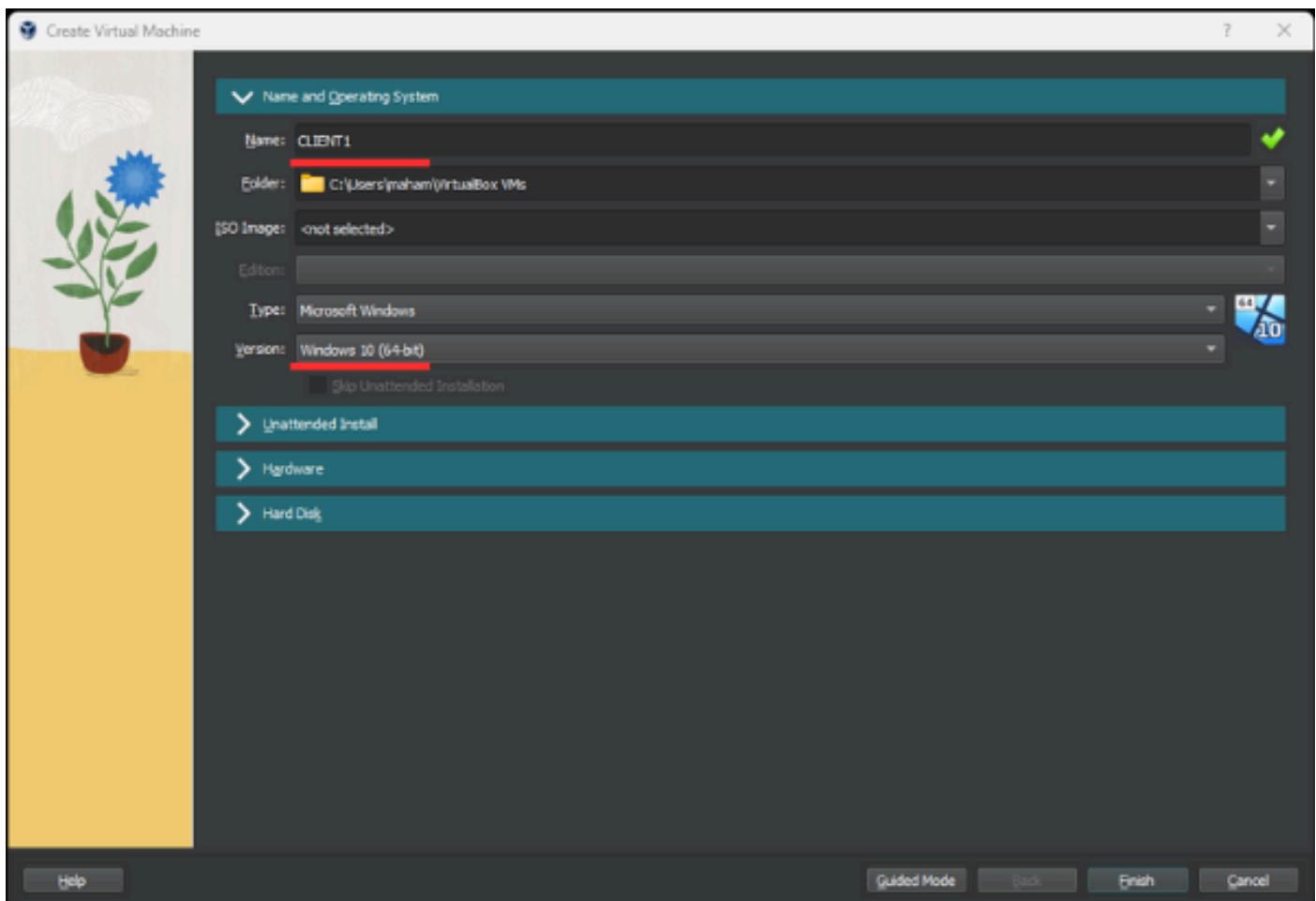
Users

Name	Type	Description
aabrev	User	
aacre	User	
abargo	User	
abilderback	User	
abirk	User	
abblackwater	User	
ablaker	User	
abonavita	User	
abreedlove	User	
aburtt	User	
acarron	User	
acastleberry	User	
acoke	User	
acosey	User	
adandrea	User	
adeguzman	User	
ademello	User	
adove	User	
aebinger	User	
afasching	User	
afeqan	User	

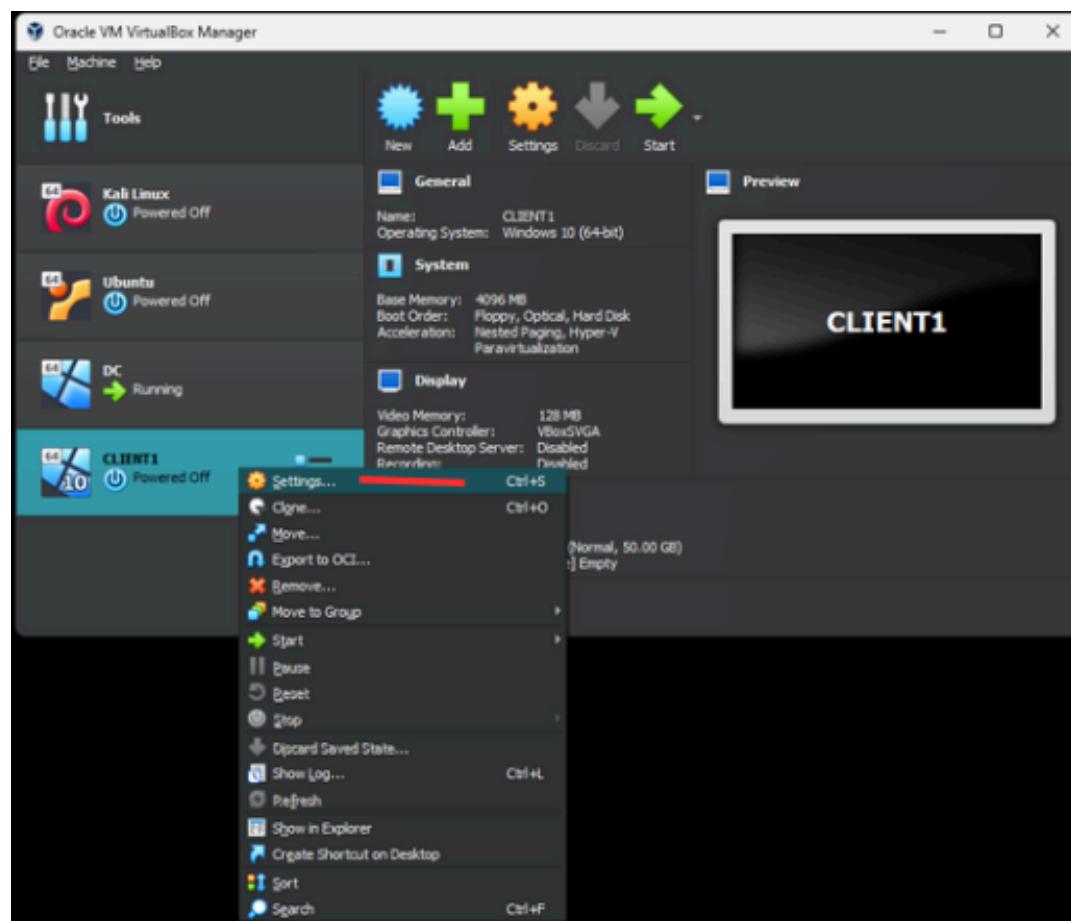
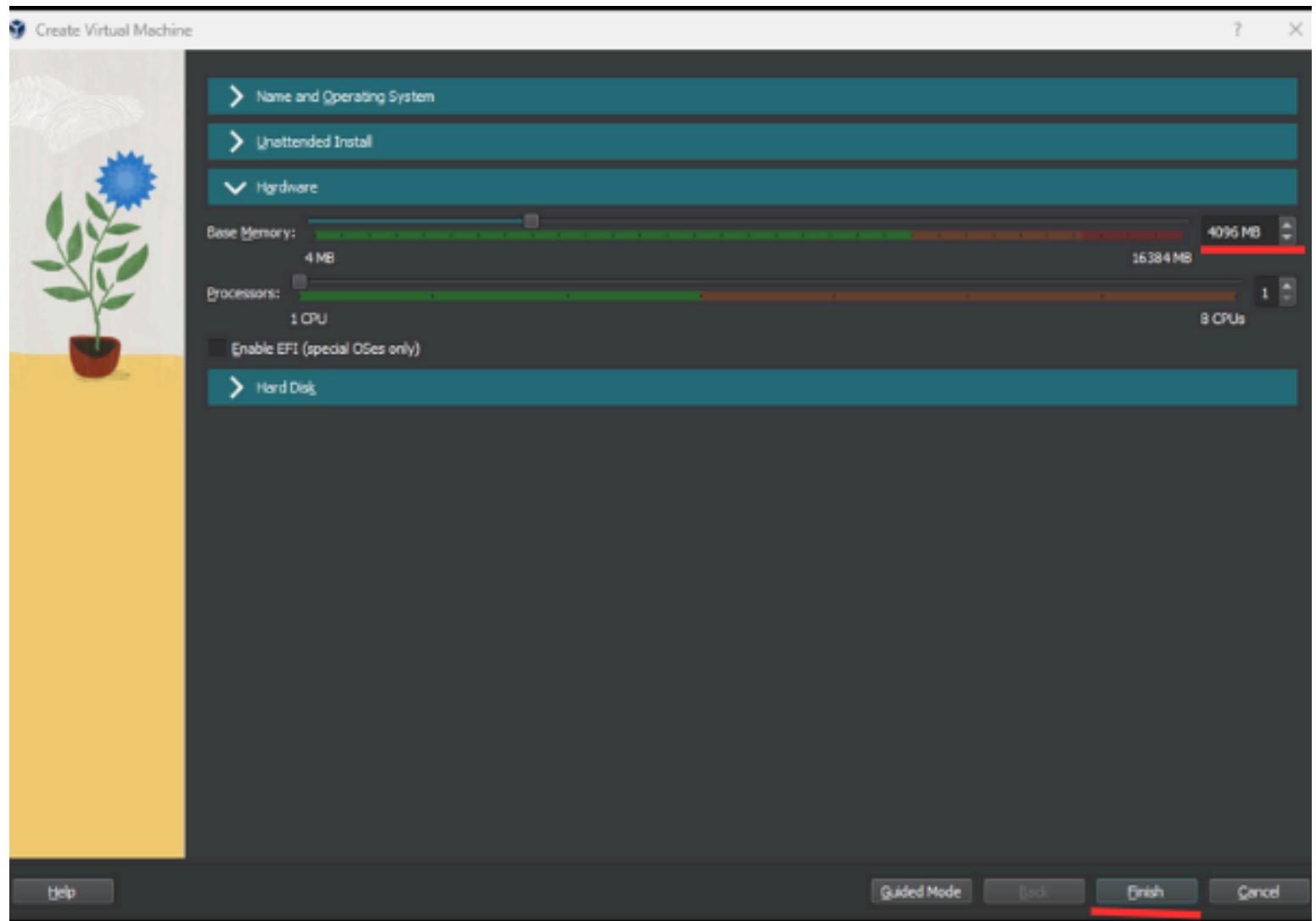
Now we will create a client computer that will connect to the internet through the domain controller.

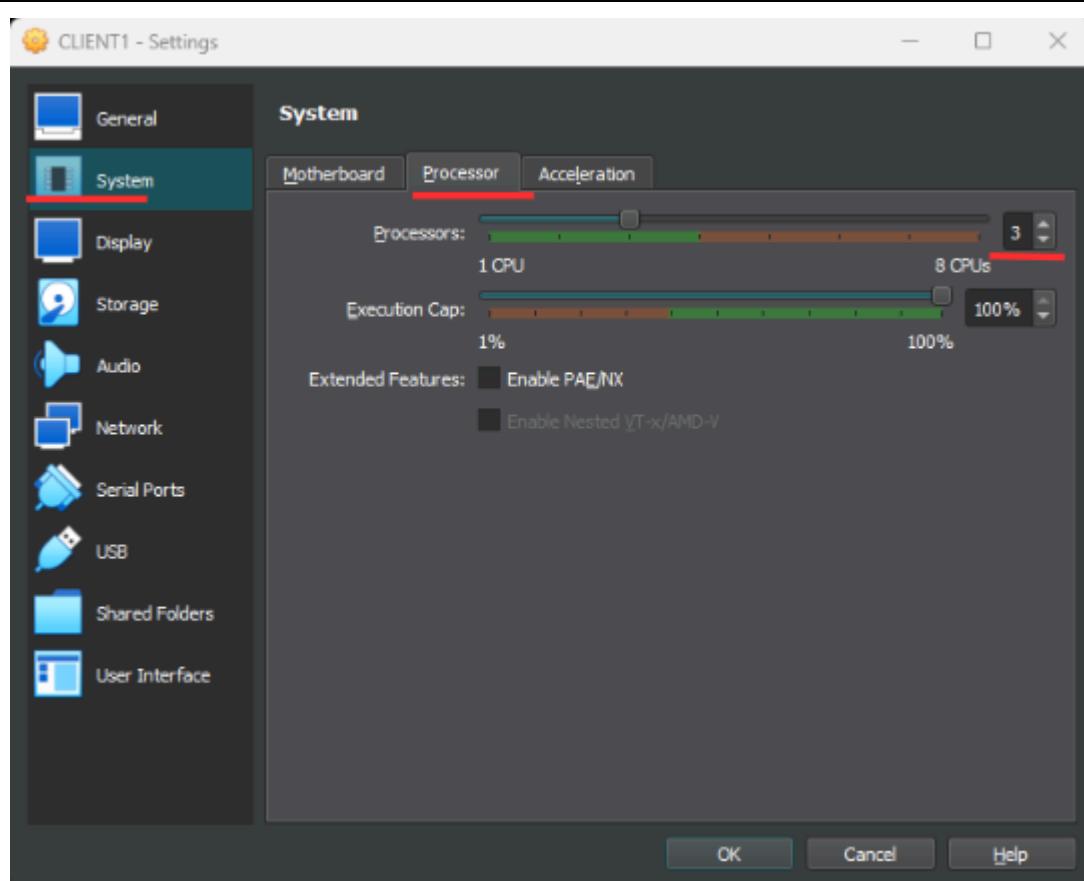
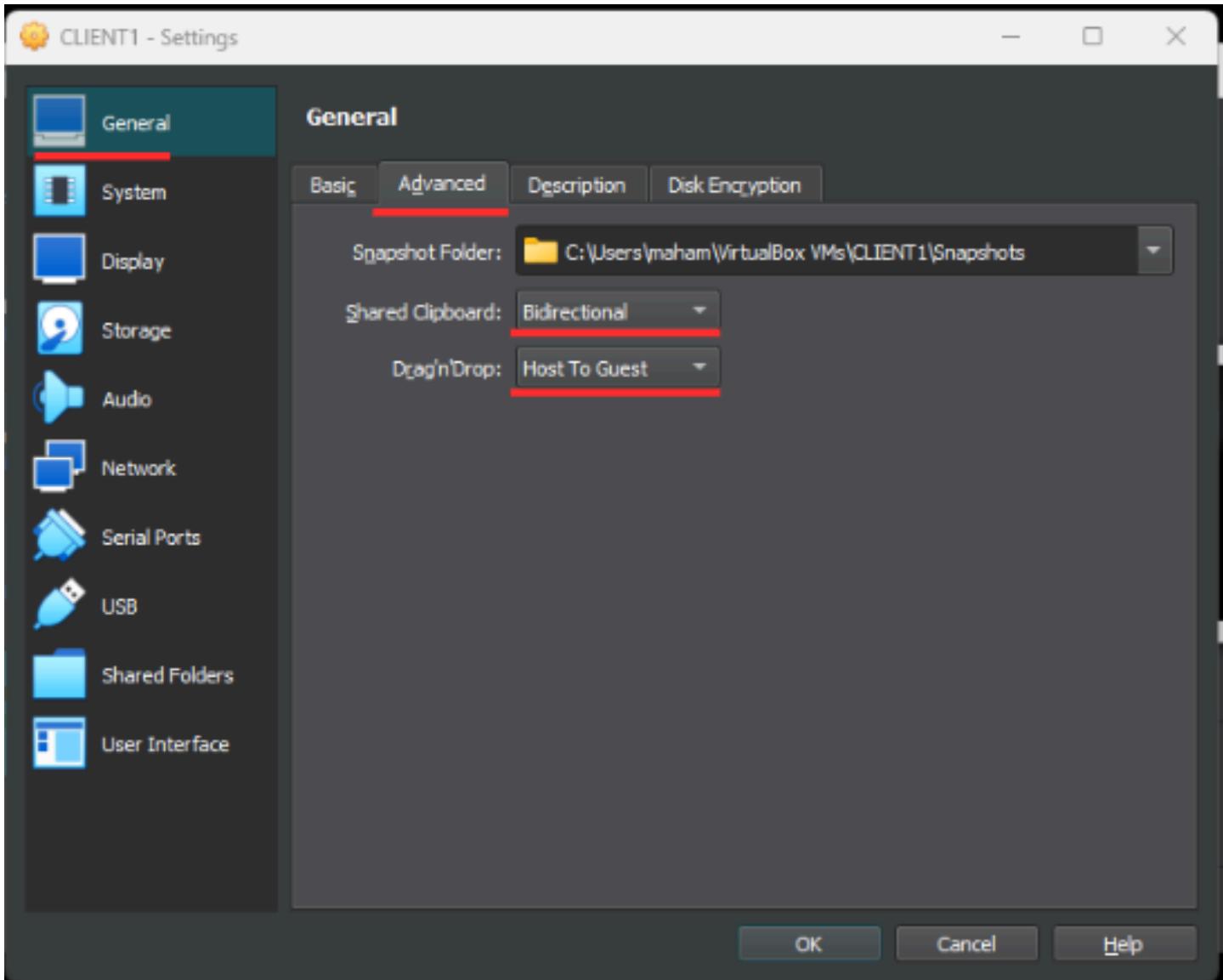


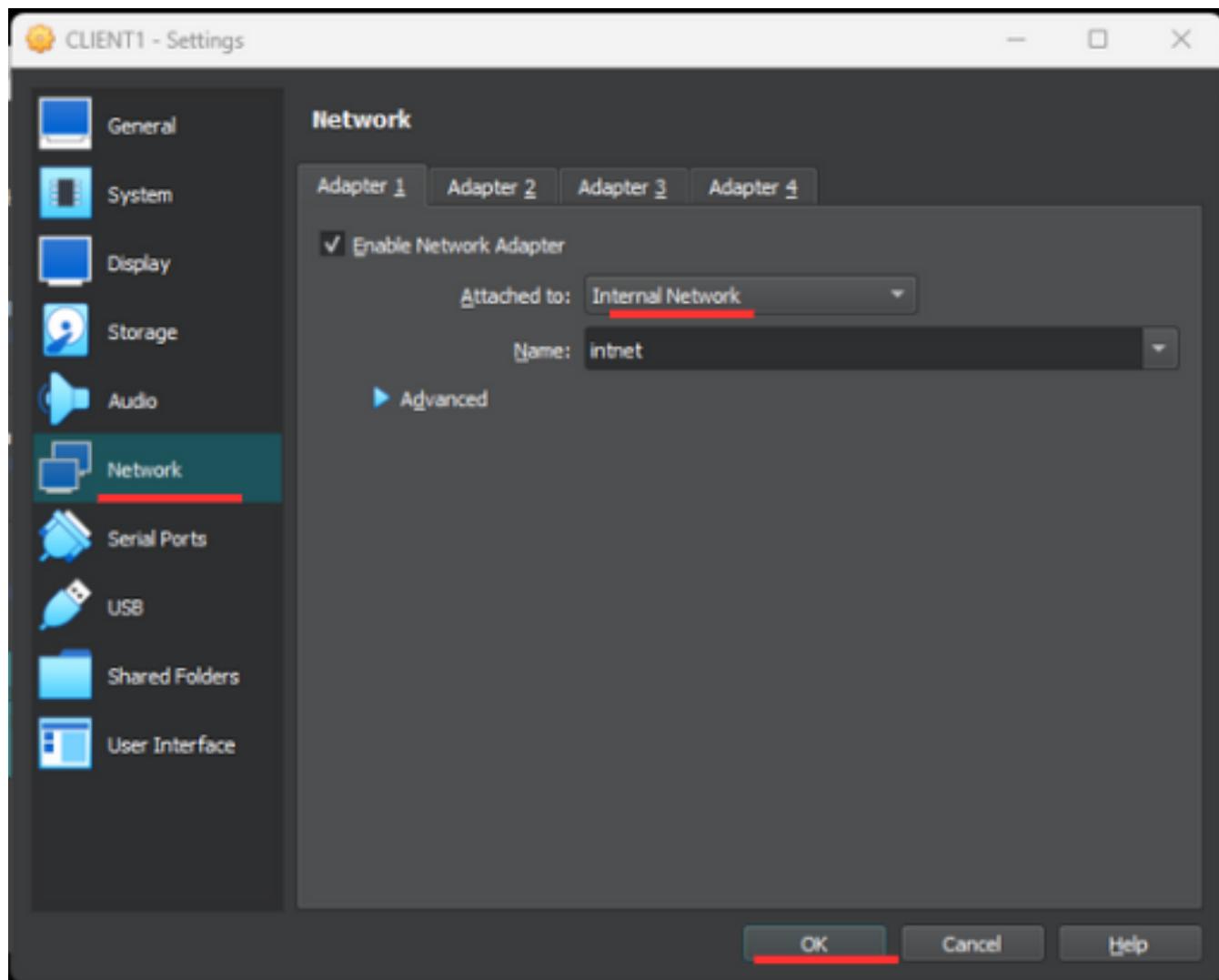
Creating CLIENT1



4095 MB



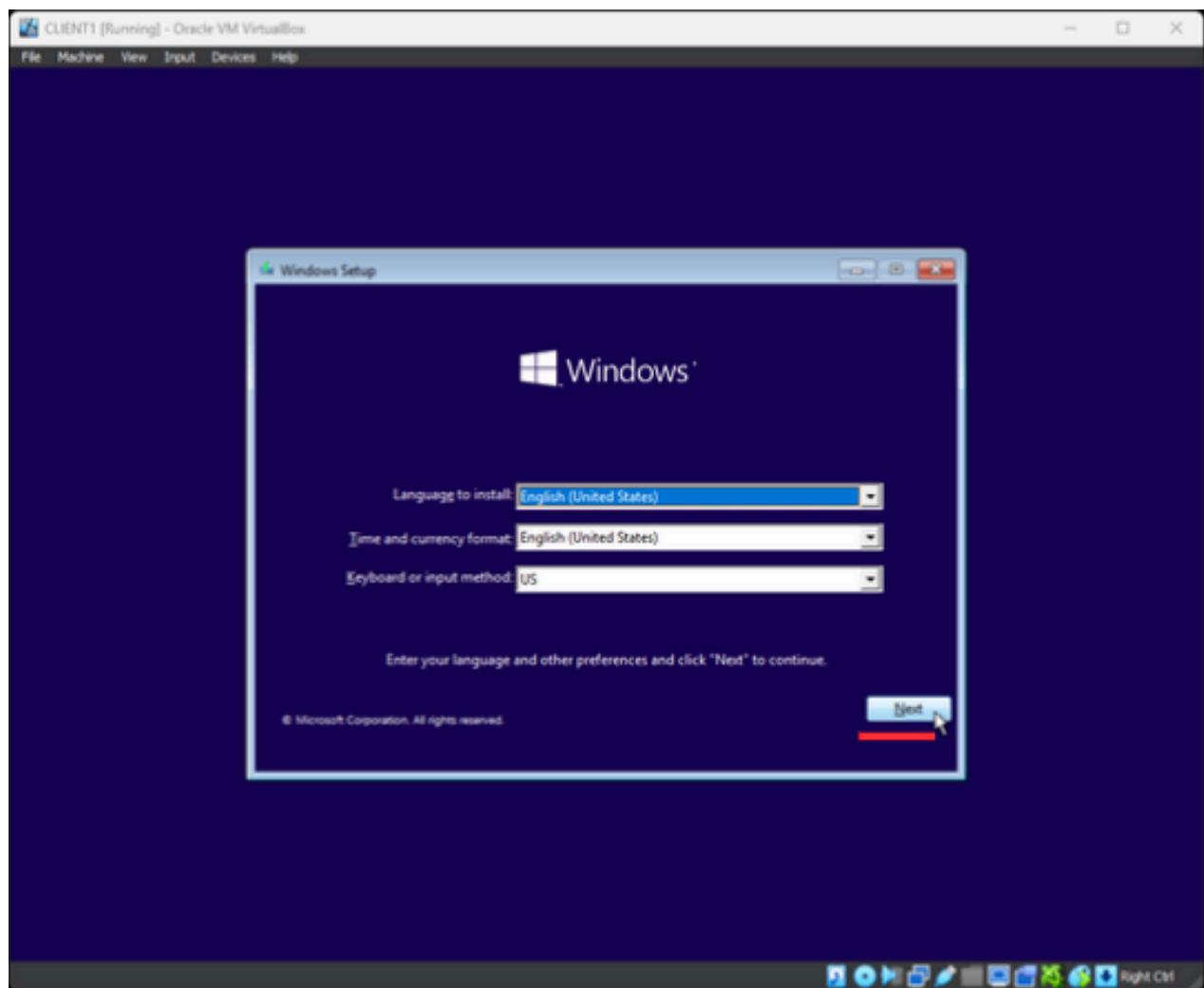
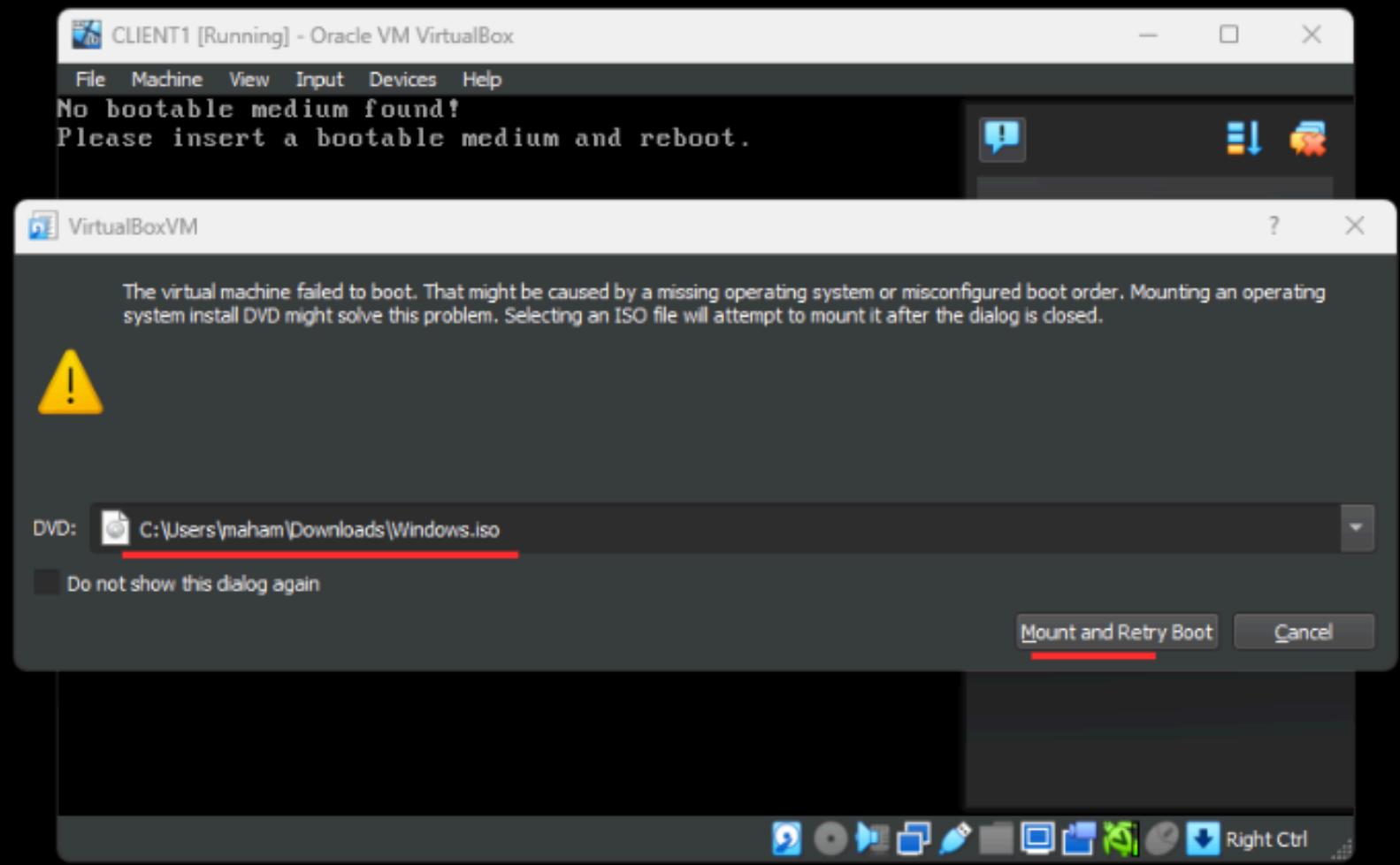


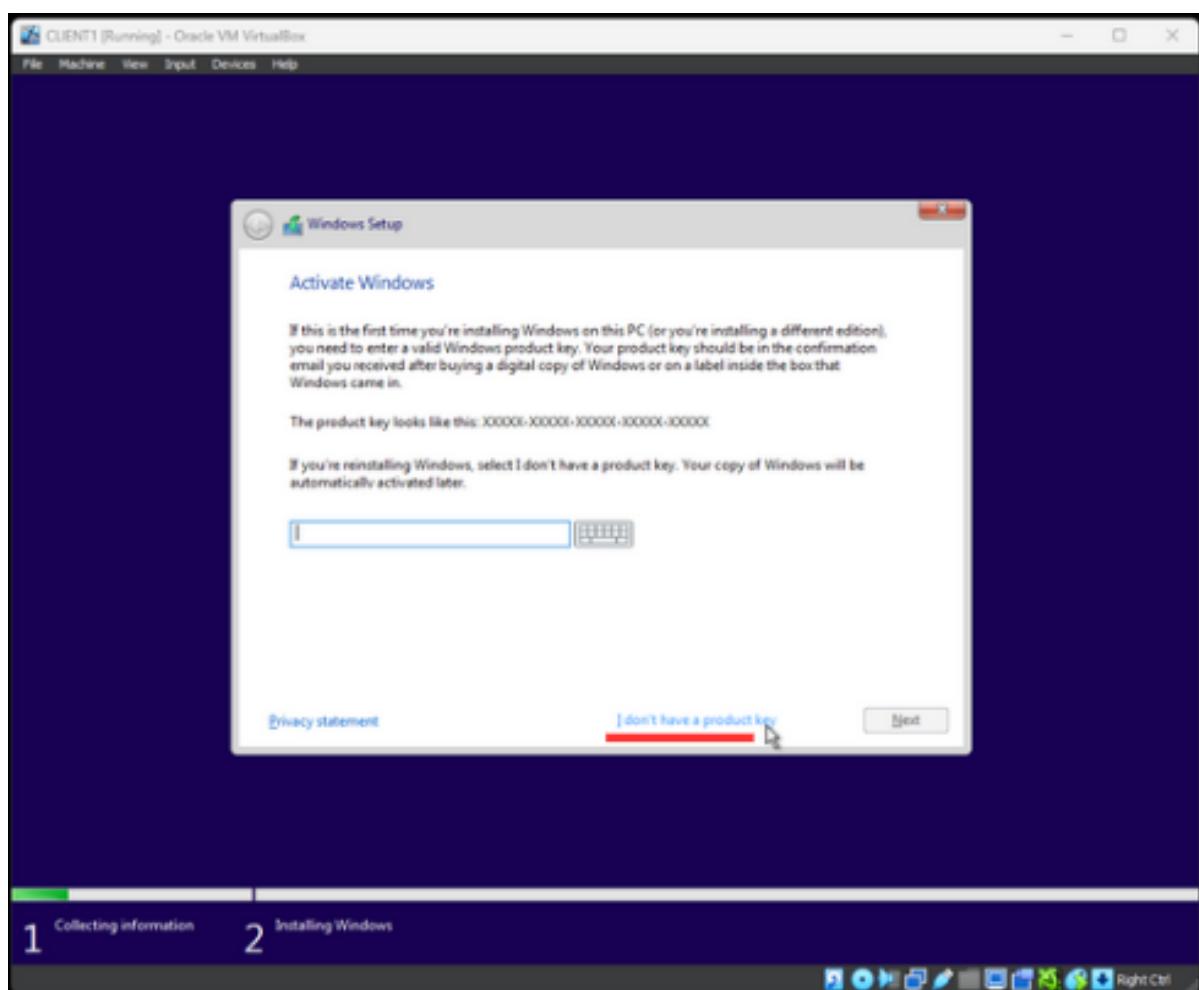
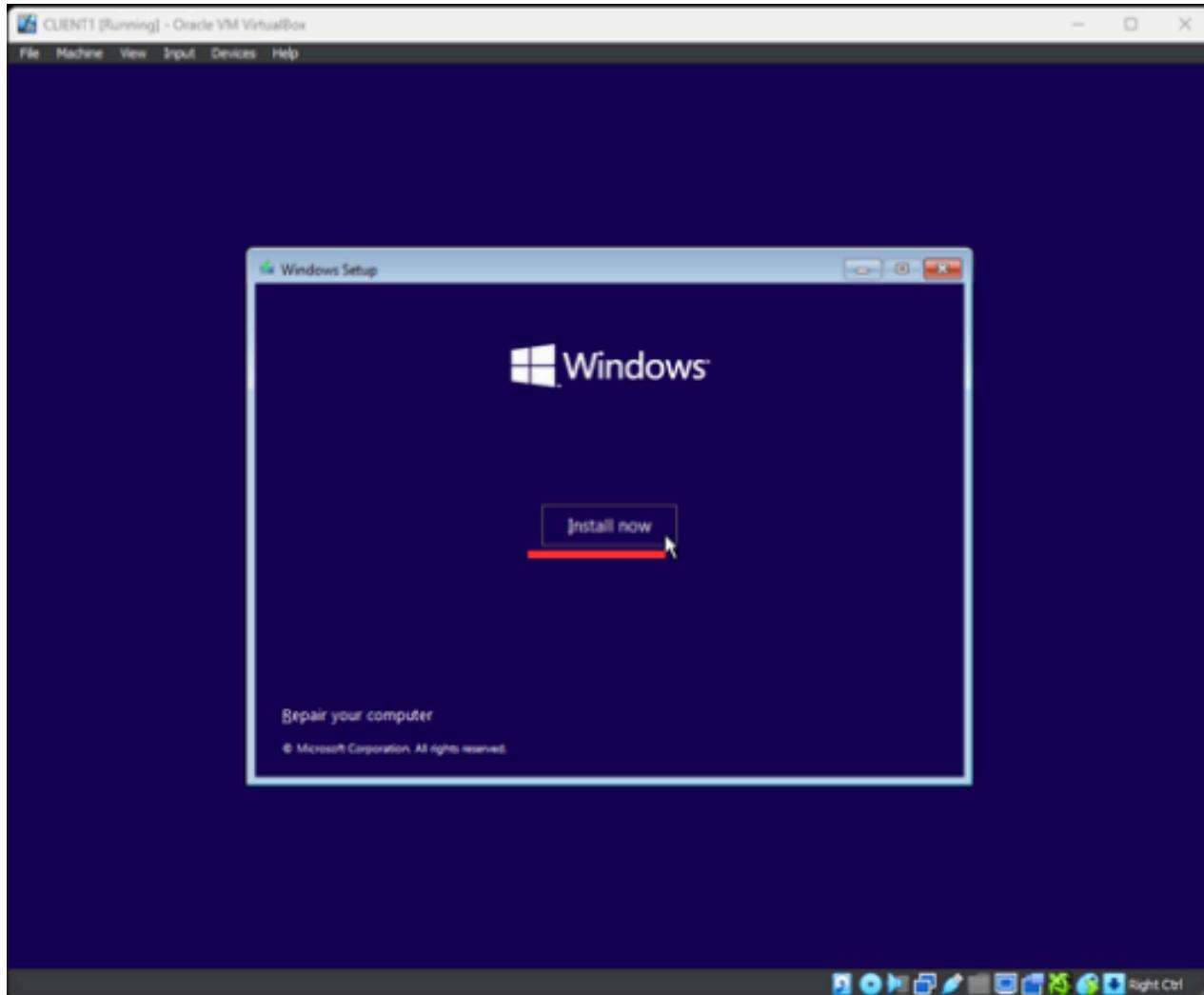


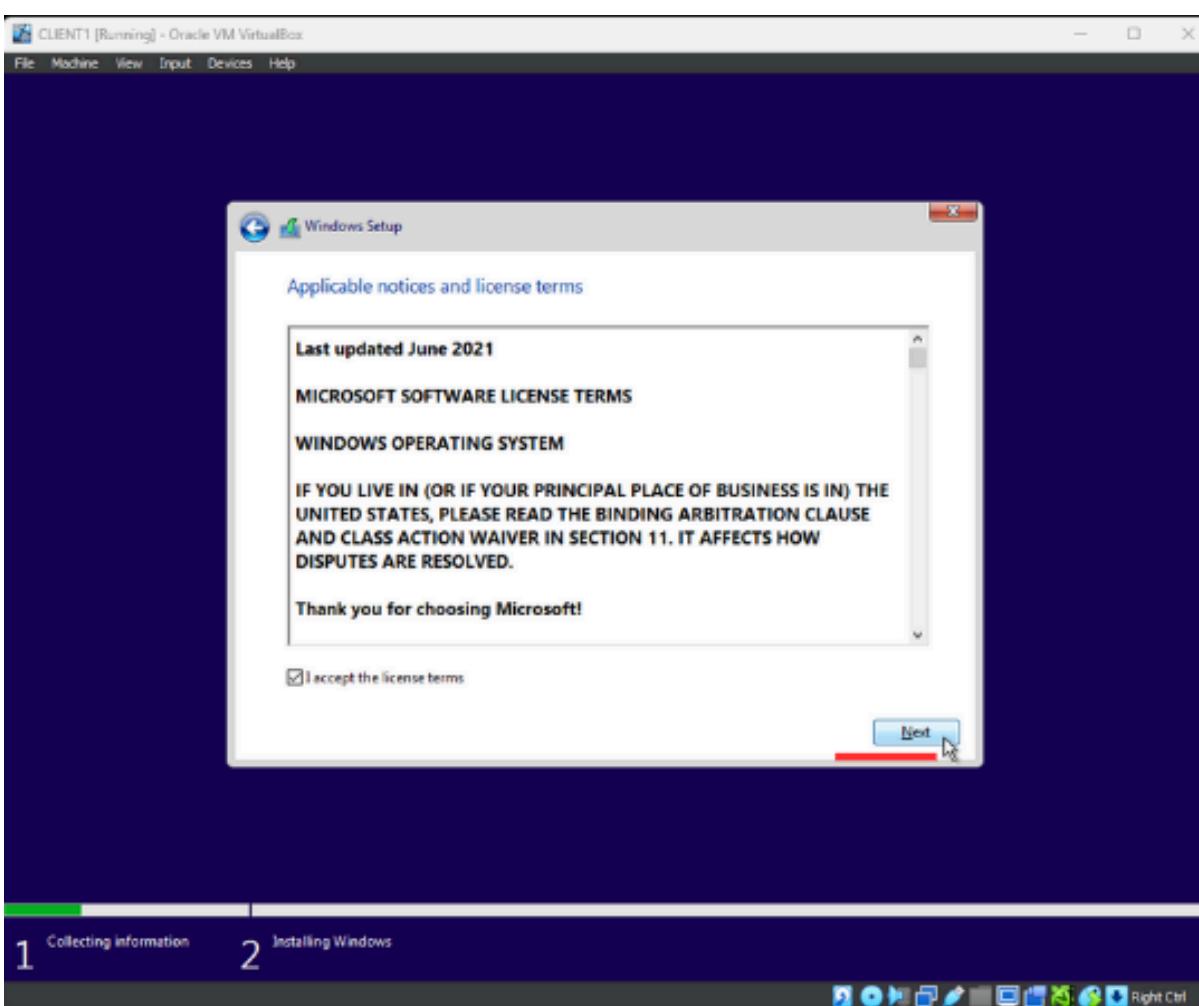
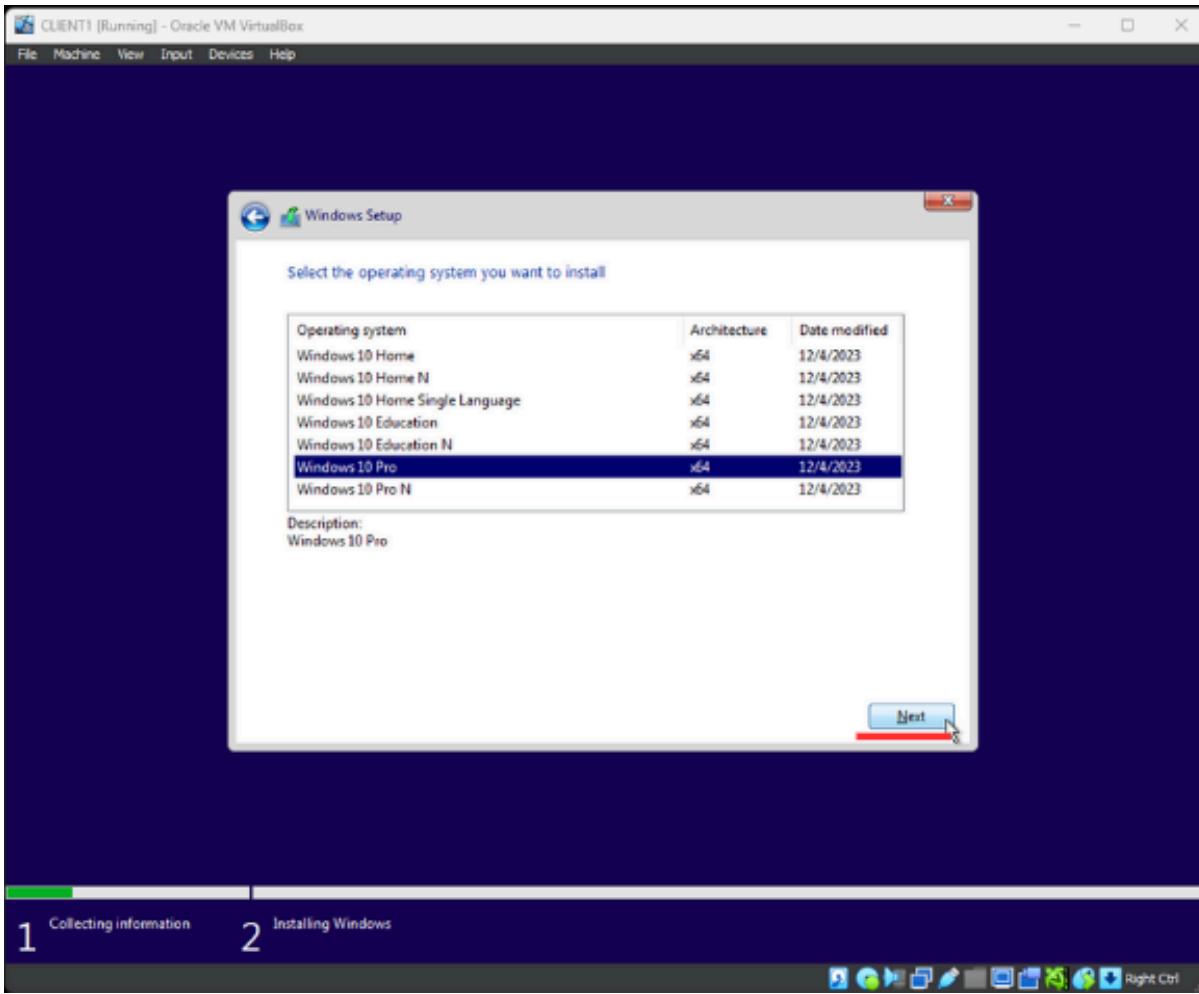
The screenshot shows the Oracle VM VirtualBox Manager interface. The top navigation bar includes 'File', 'Machine', and 'Help' menus. Below the menu bar are several icons: 'Tools' (represented by wrenches), 'New' (blue starburst), 'Add' (green plus), 'Settings' (orange gear), 'Discard' (grey arrow), and 'Start' (green arrow). The main area displays a list of virtual machines:

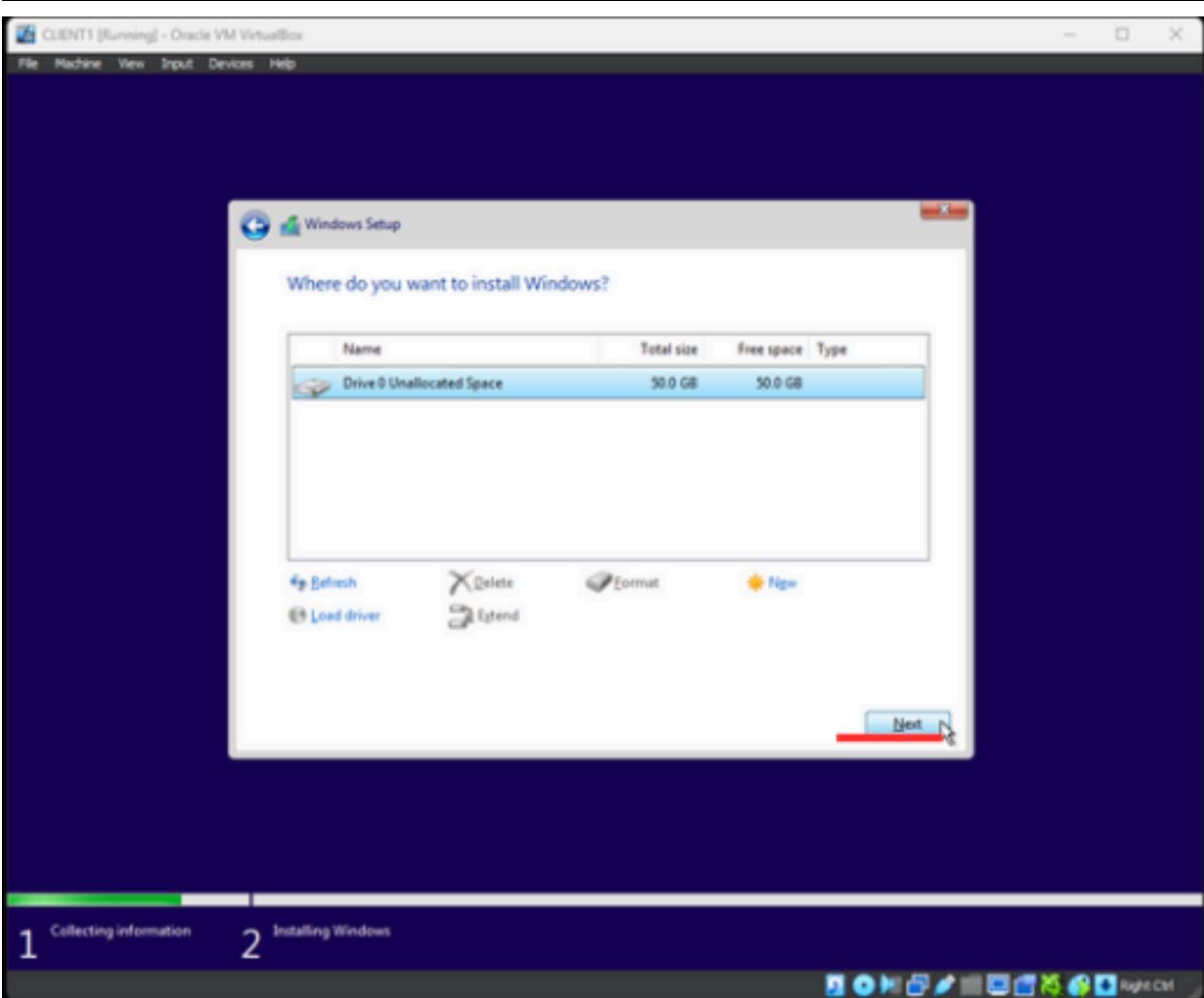
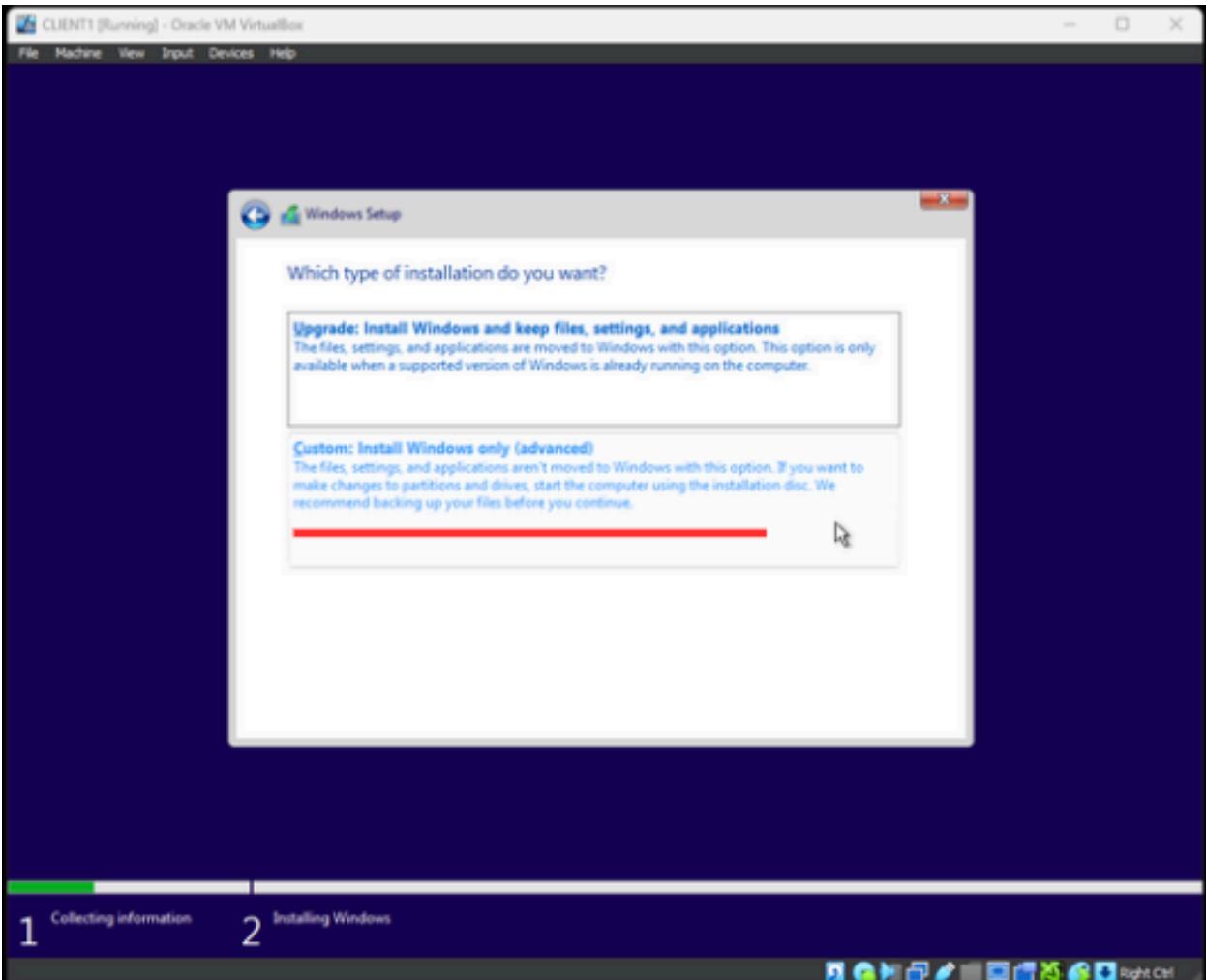
- Kali Linux**: 64-bit, Powered Off. General settings show Name: CLIENT1 and Operating System: Windows 10 (64-bit).
- Ubuntu**: 64-bit, Powered Off. General settings show Base Memory: 4096 MB, Processors: 3, Boot Order: Floppy, Optical, Hard Disk, Acceleration: Nested Paging, Hyper-V, Paravirtualization.
- DC**: 64-bit, Running. General settings show Base Memory: 4096 MB, Processors: 3, Boot Order: Floppy, Optical, Hard Disk, Acceleration: Nested Paging, Hyper-V, Paravirtualization.
- CLIENT1**: 64-bit, Powered Off. This machine is currently selected, indicated by a large red cursor icon pointing to its row. General settings show Name: CLIENT1, Operating System: Windows 10 (64-bit). Preview window shows the text 'CLIENT1'.
- CLIENT1**: 64-bit, Powered Off. General settings show Name: CLIENT1, Operating System: Windows 10 (64-bit).

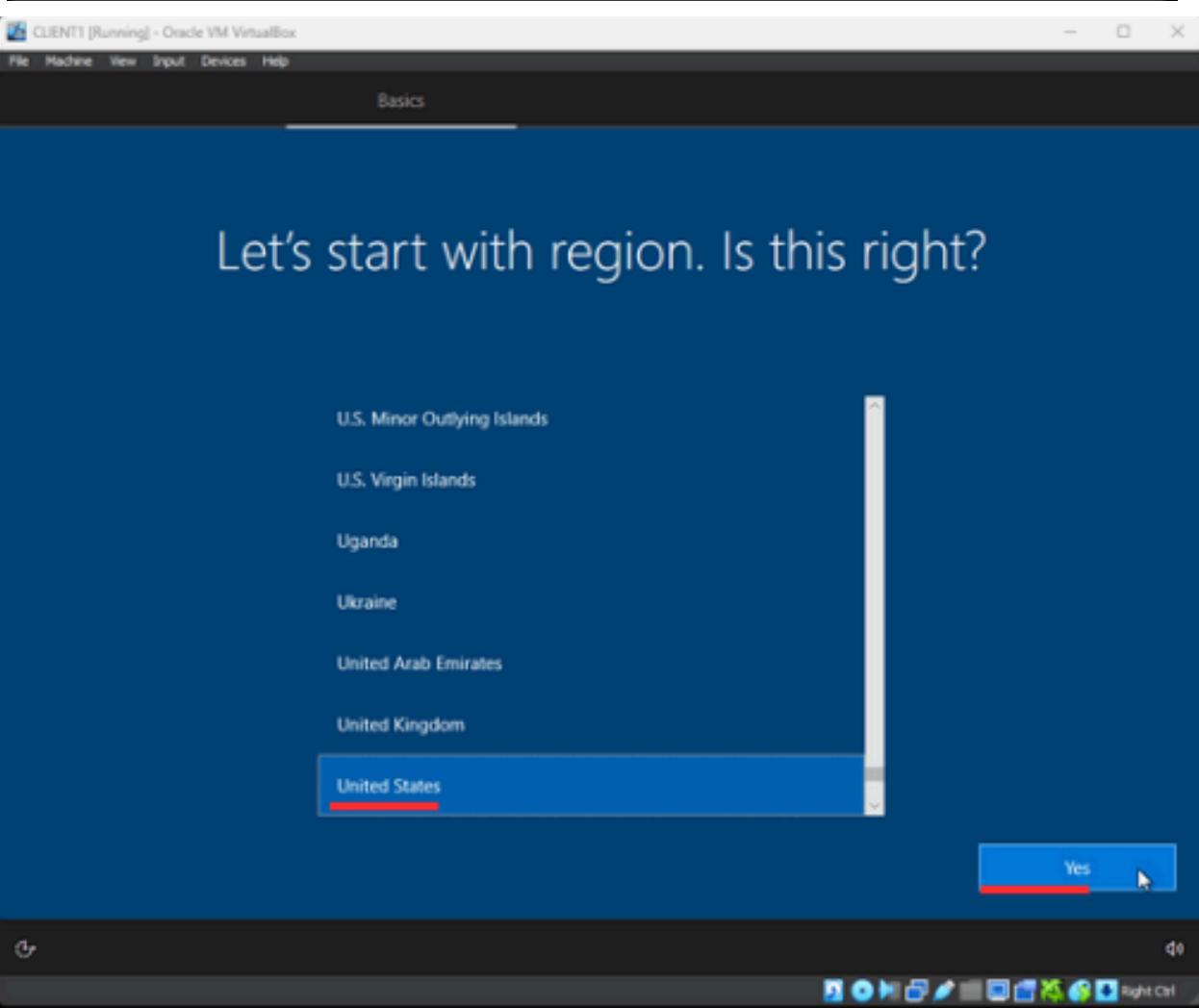
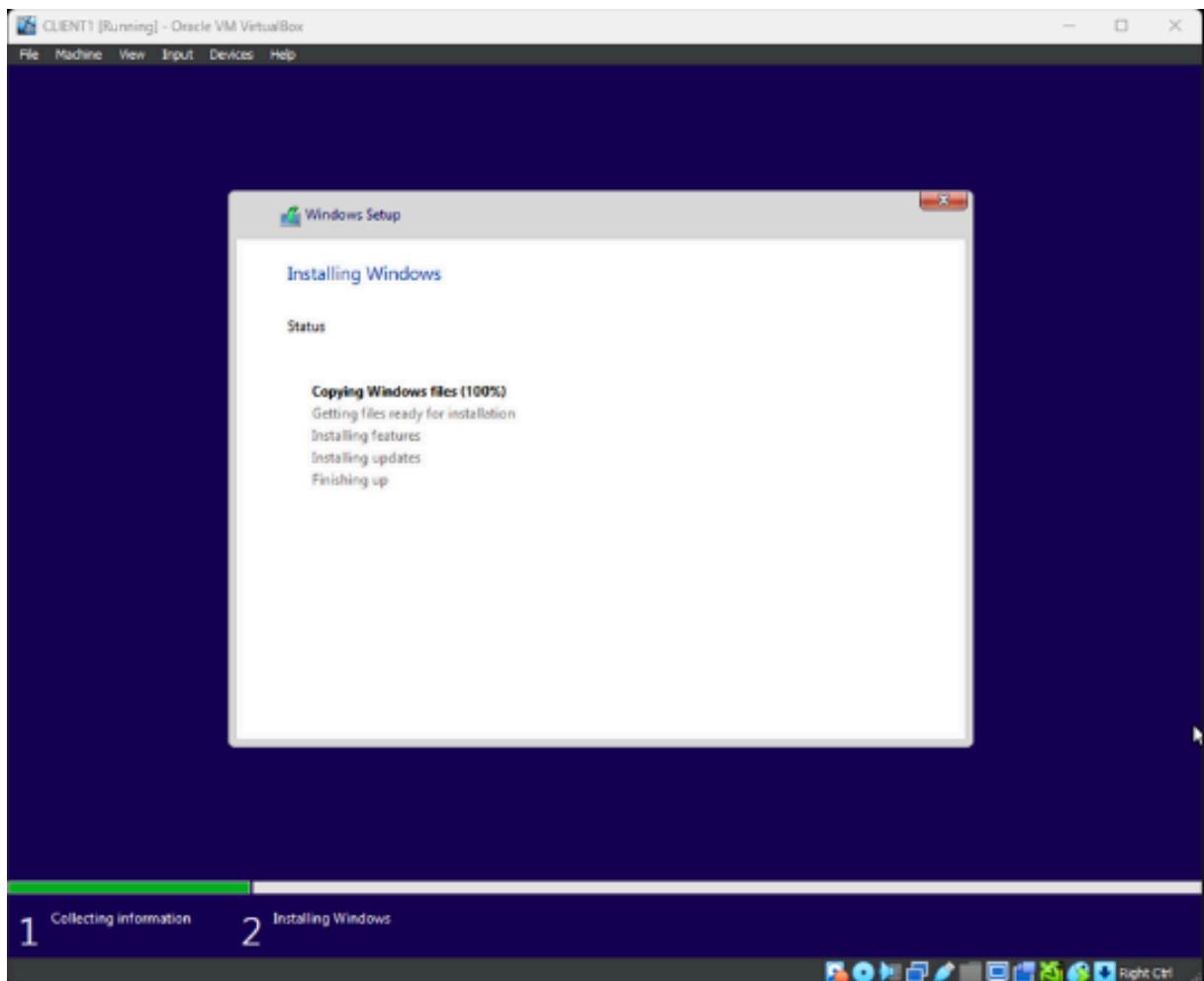
On the far right, there are sections for 'General', 'System', 'Display', 'Storage', and 'Audio' settings, which are partially visible for the selected 'CLIENT1' machine.

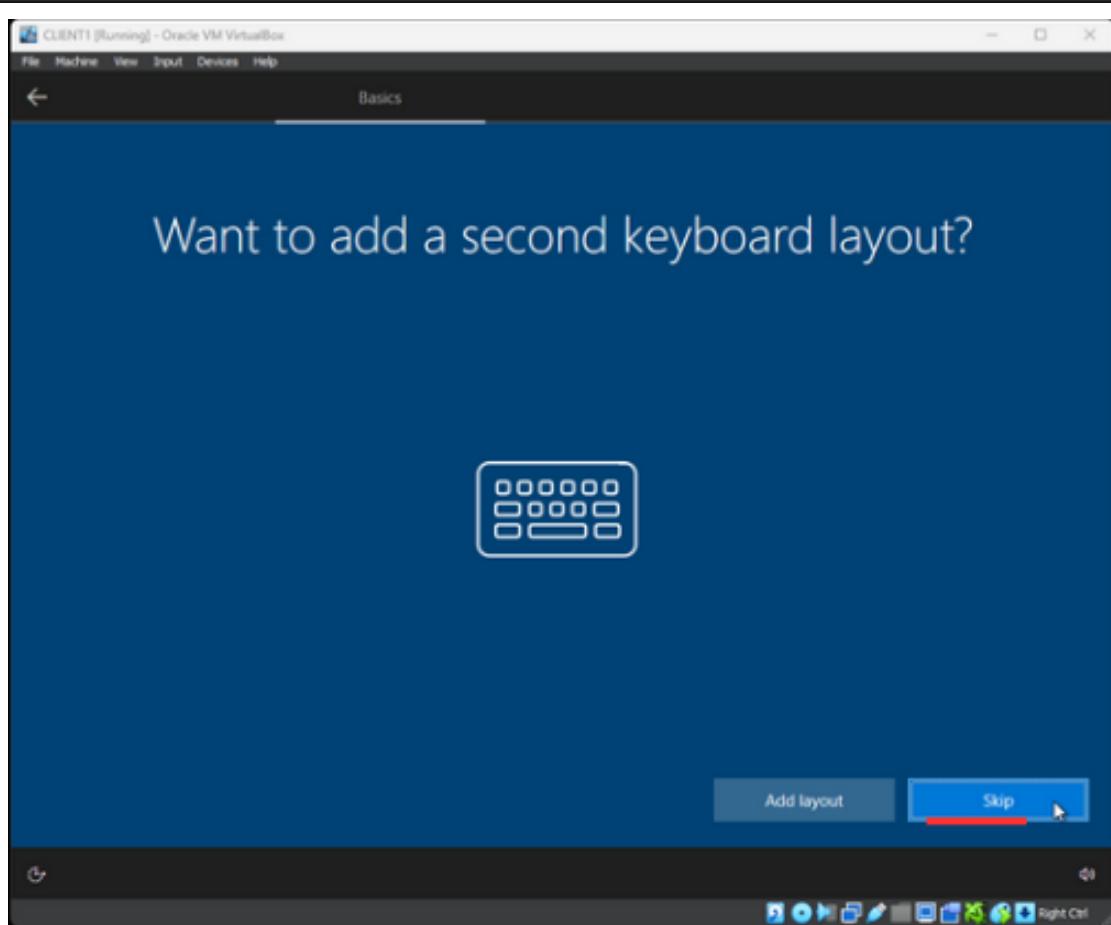
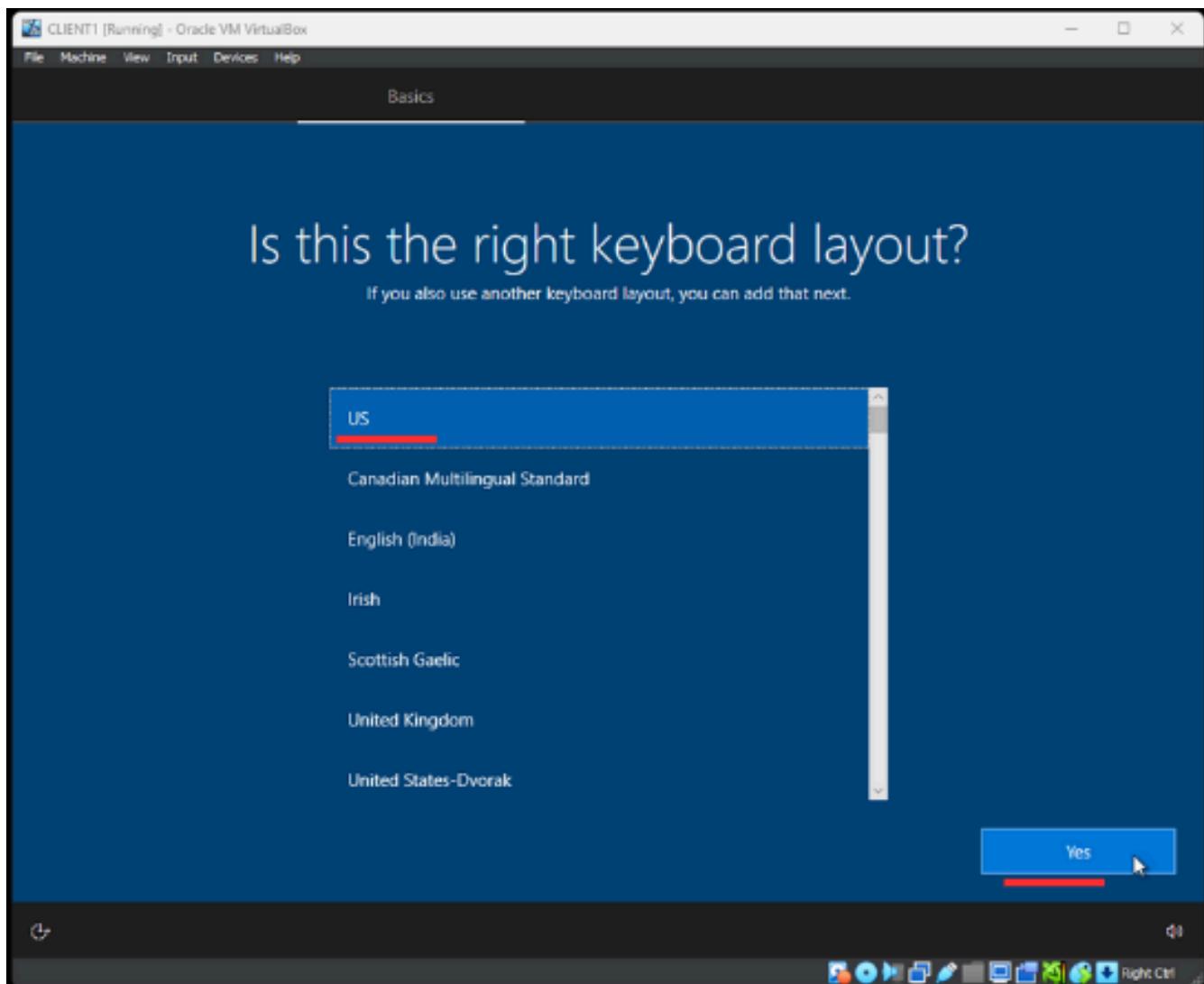


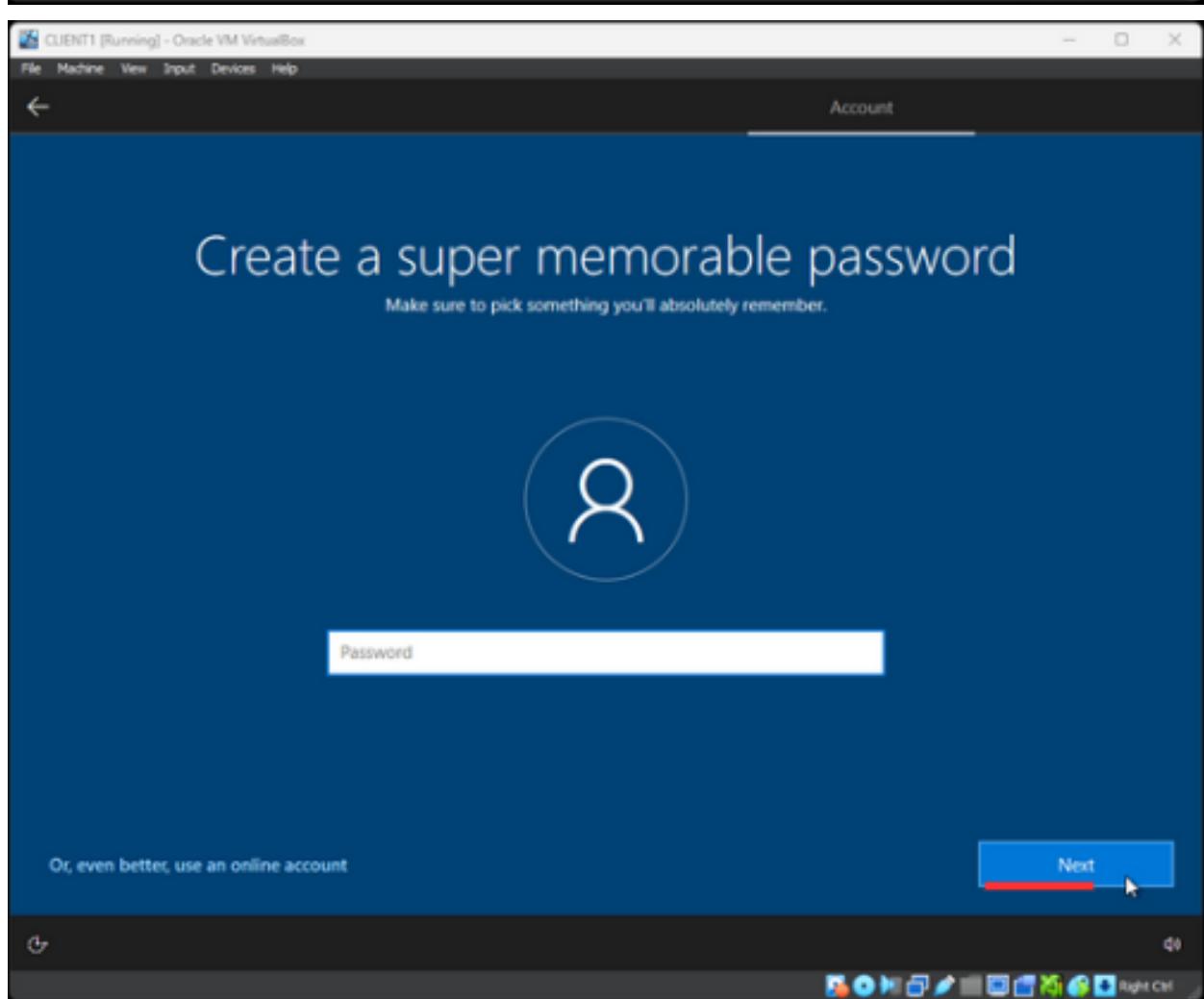
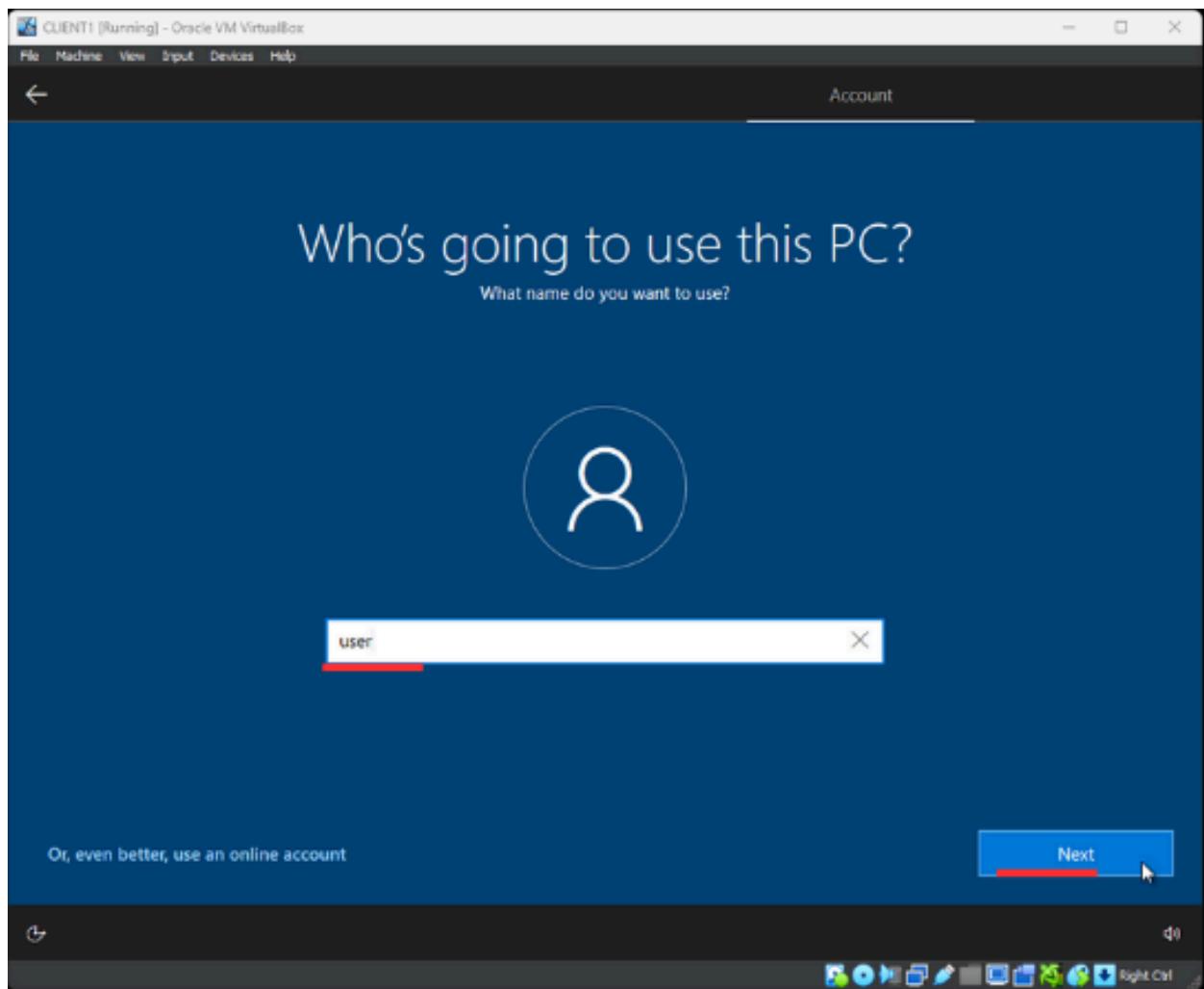


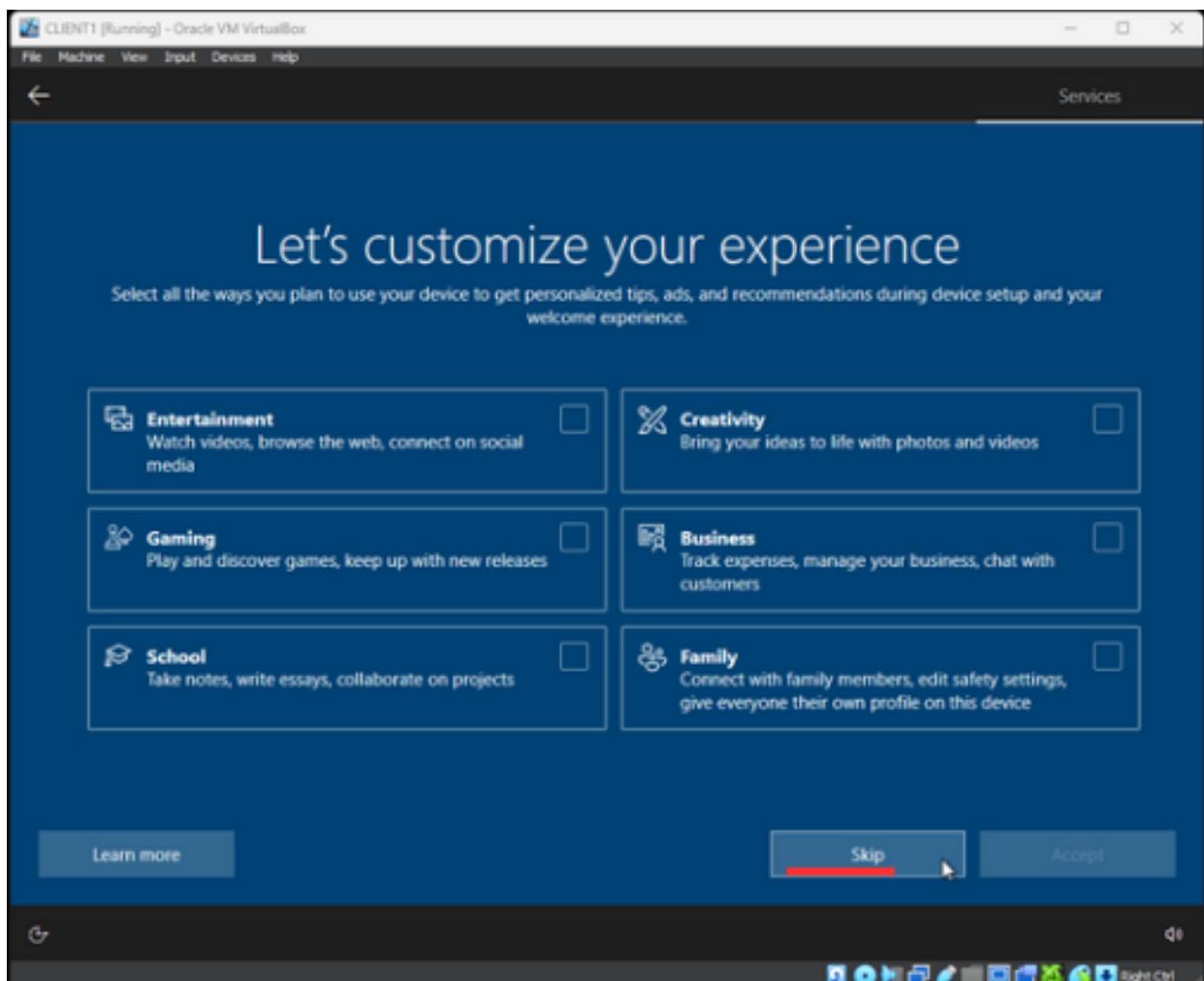
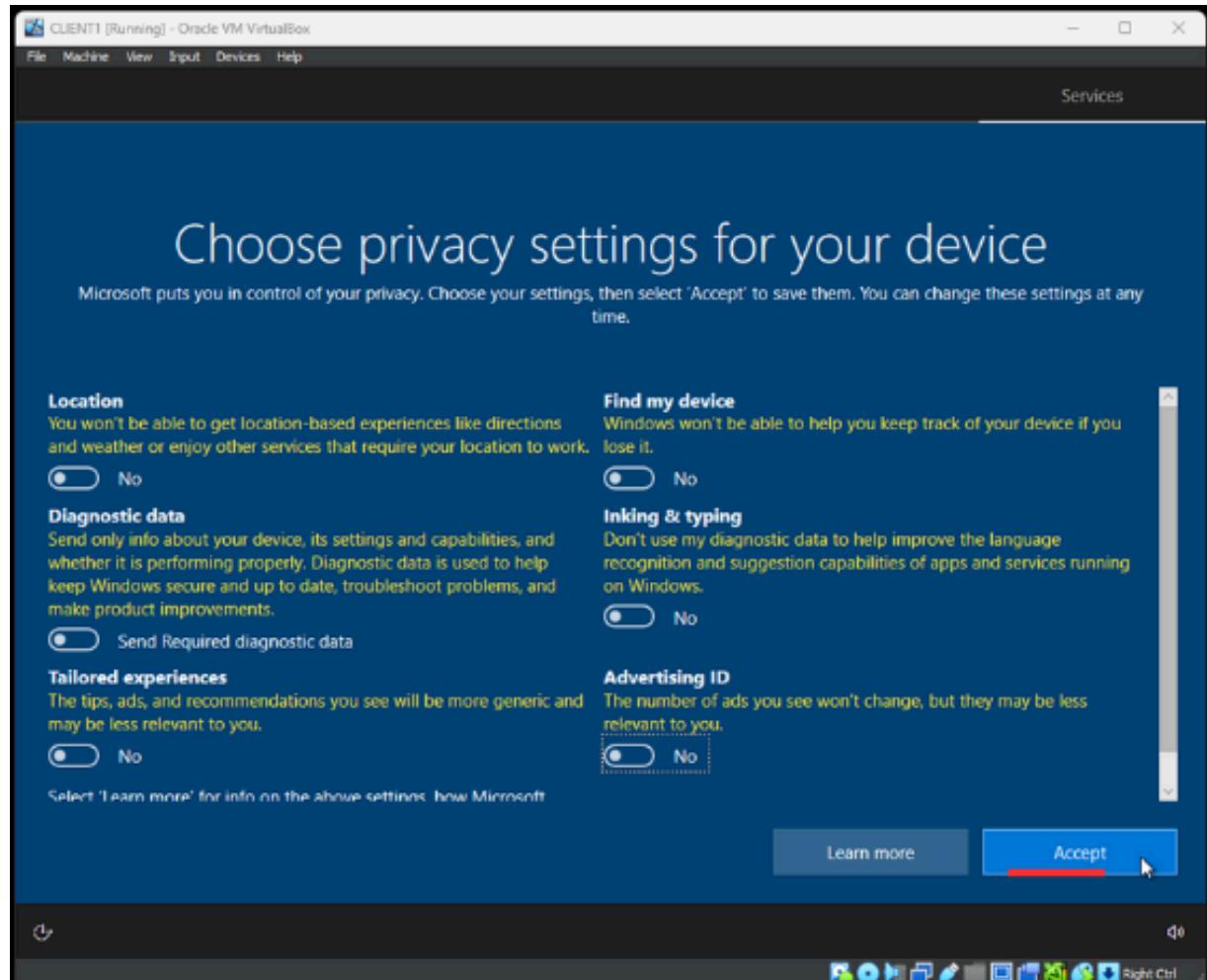


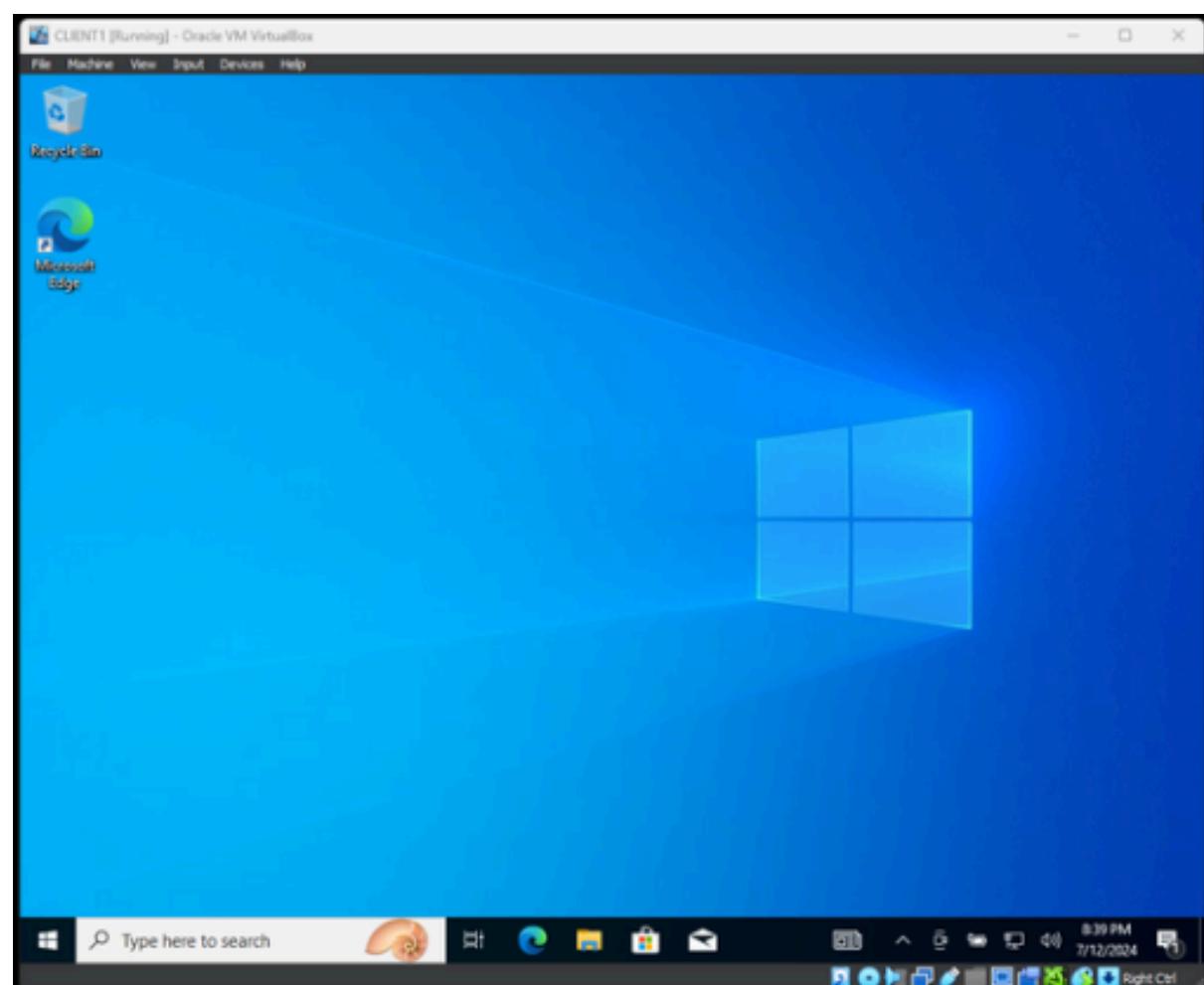
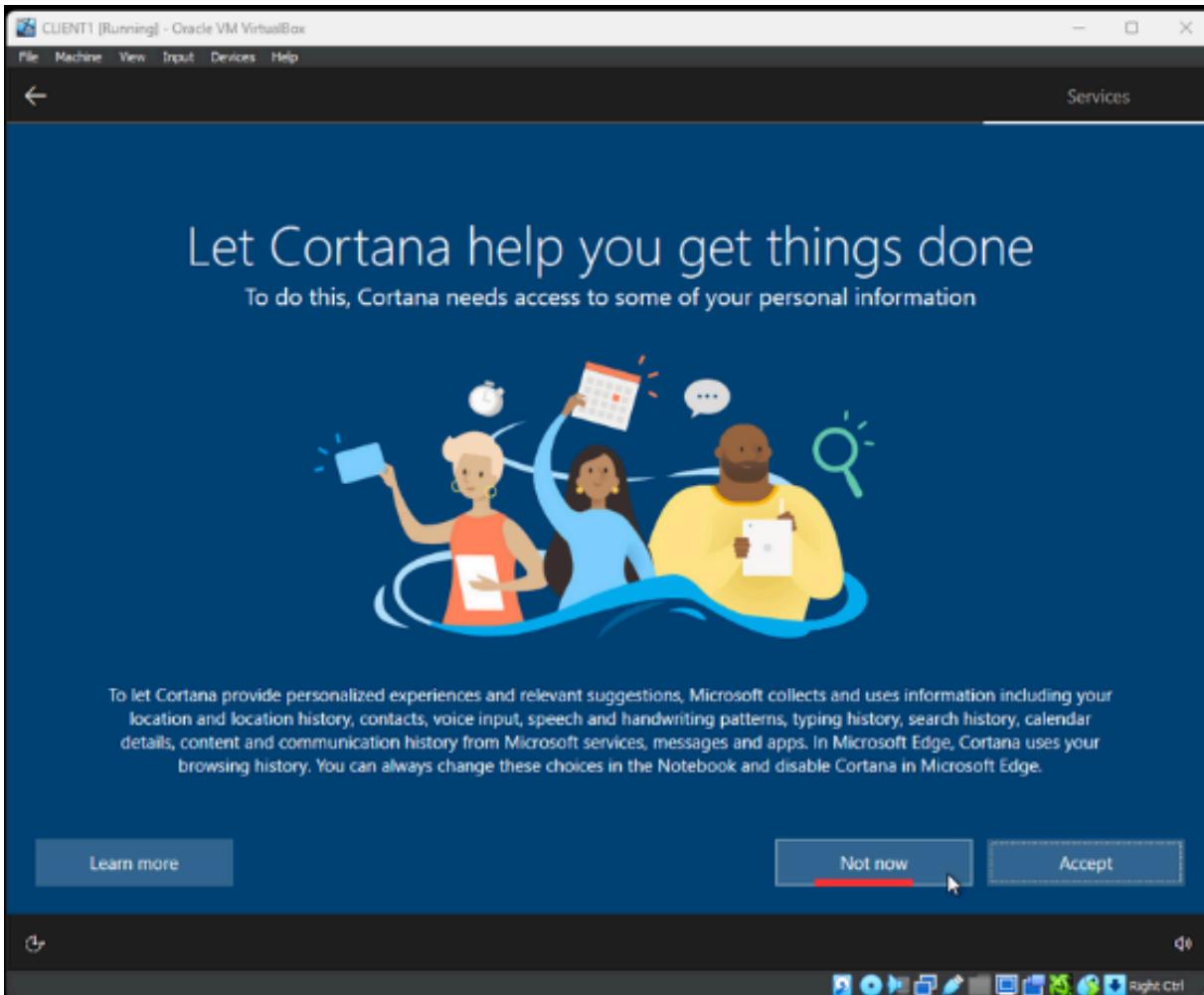


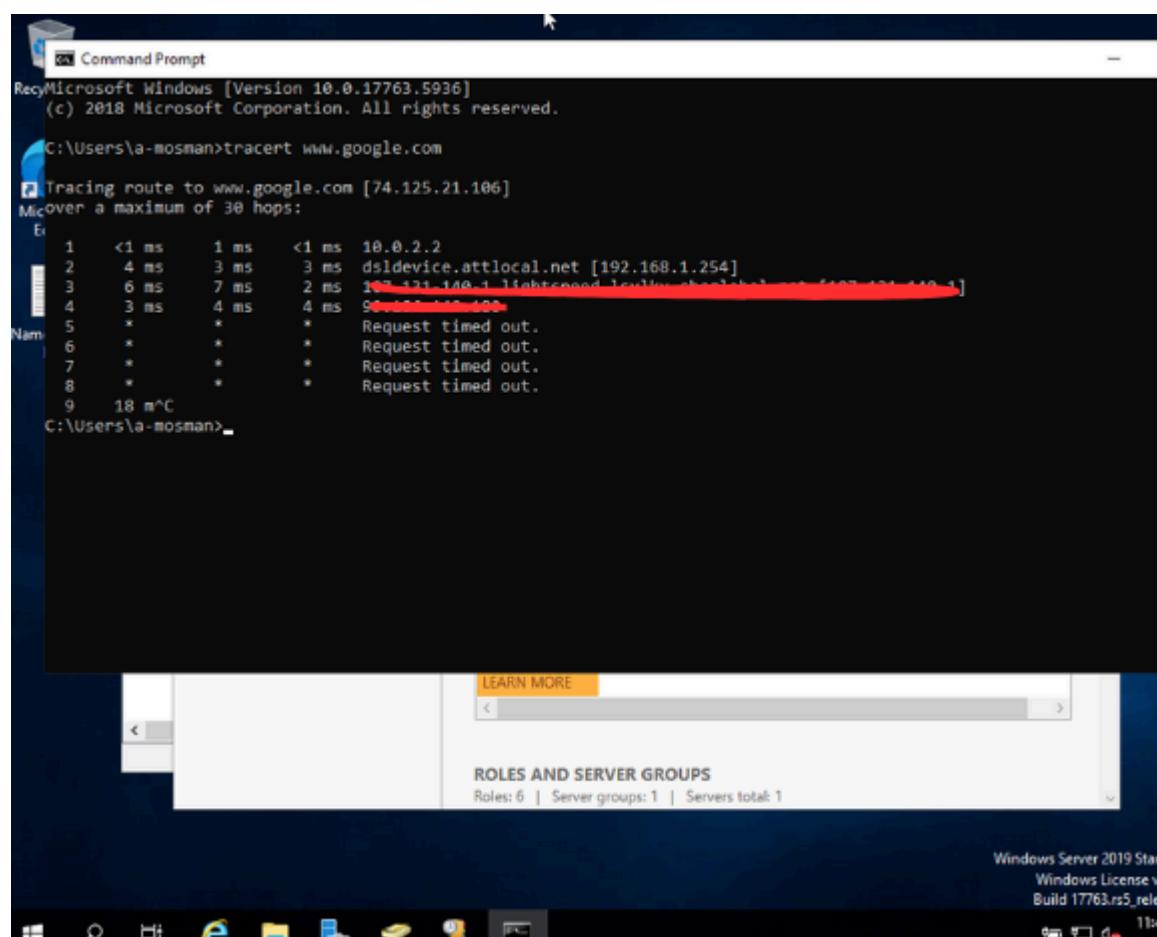
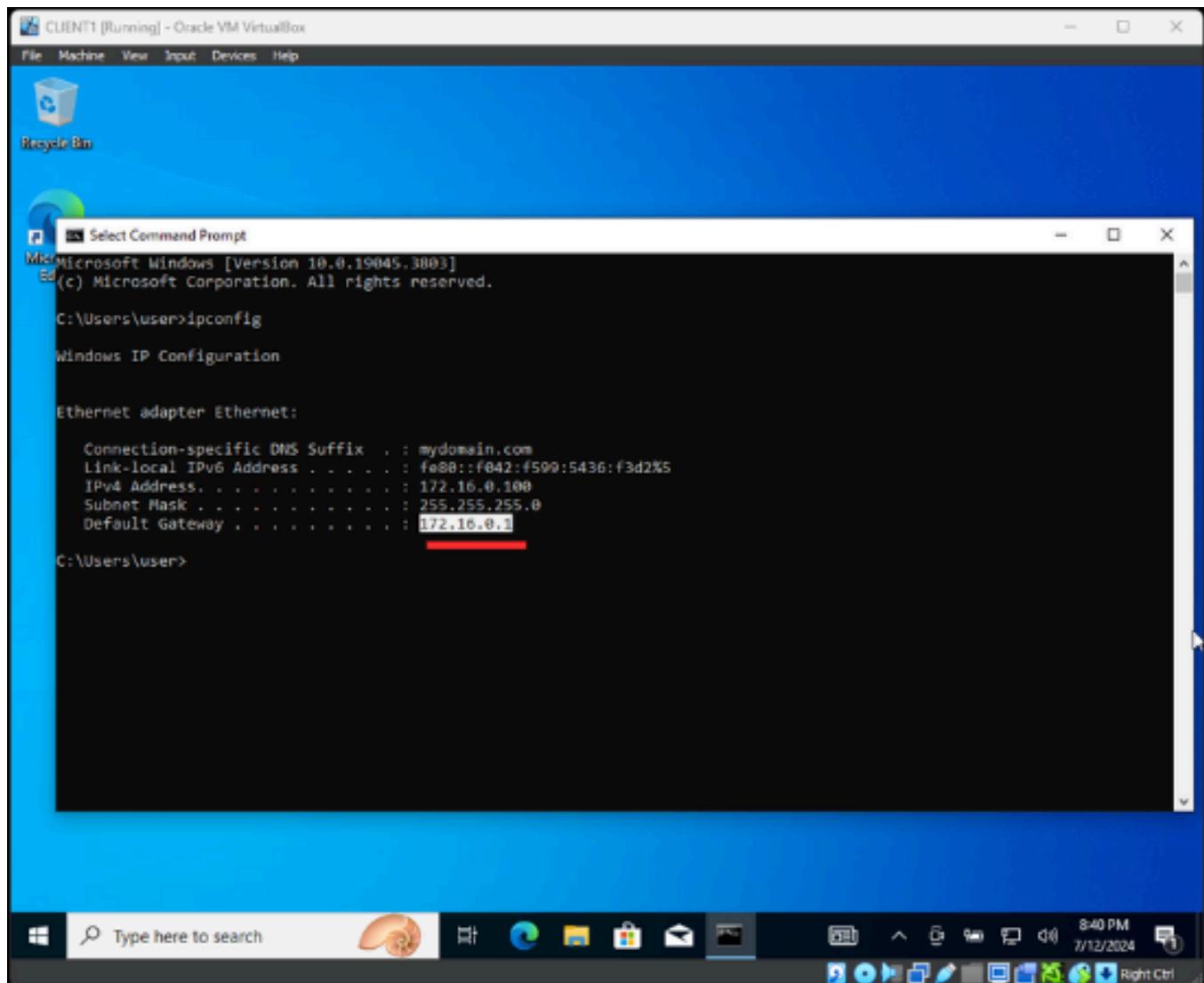












CLIENT1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Recycle Bin

Microsoft Edge

Command Prompt

```
Microsoft Windows [Version 10.0.19045.3803]
(c) Microsoft Corporation. All rights reserved.

C:\Users\user>ipconfig
Windows IP Configuration

Ethernet adapter Ethernet:

Connection-specific DNS Suffix . : mydomain.com
Link-local IPv6 Address . . . . . : fe80::f042:f999:5436:f3d2%5
IPv4 Address. . . . . : 172.16.0.100
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 172.16.0.1

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

Pinging www.google.com [74.125.21.105] with 32 bytes of data:
Reply from 74.125.21.105: bytes=32 time=17ms TTL=56
Reply from 74.125.21.105: bytes=32 time=19ms TTL=56
Reply from 74.125.21.105: bytes=32 time=17ms TTL=56
Reply from 74.125.21.105: bytes=32 time=17ms TTL=56

Ping statistics for 74.125.21.105:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 17ms, Maximum = 19ms, Average = 17ms

C:\Users\user>tracert www.google.com

Tracing route to www.google.com [74.125.21.105]
over a maximum of 30 hops:
1    <1 ms      *      1 ms  DC [172.16.0.1]
2      *      *      Request timed out.
3     2 ms     2 ms     2 ms  10.0.2.2
```



The domain controller functions as the default gateway for the client computer. It forwards packets to the Oracle IP address, which then passes them to the ISP's default gateway. From there, the packets traverse various hops and routers until they reach the Google server.

CLIENT1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

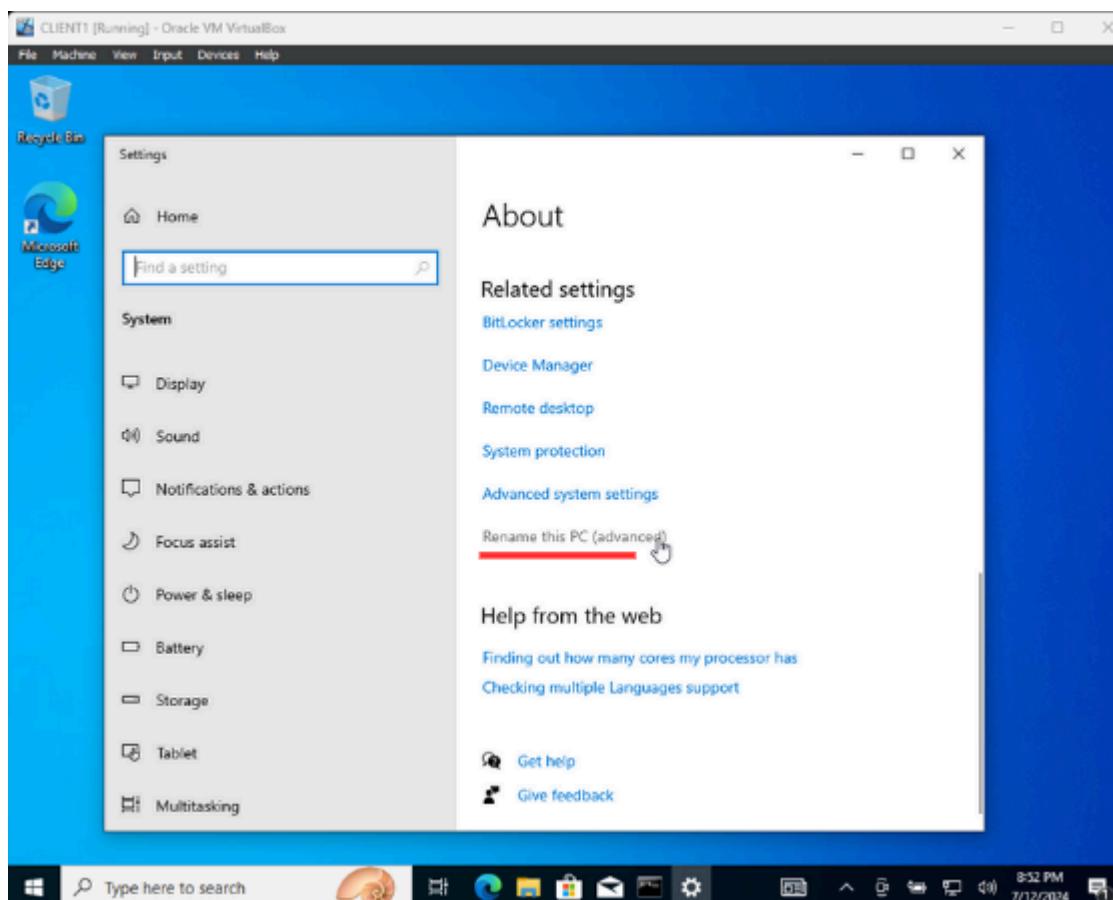
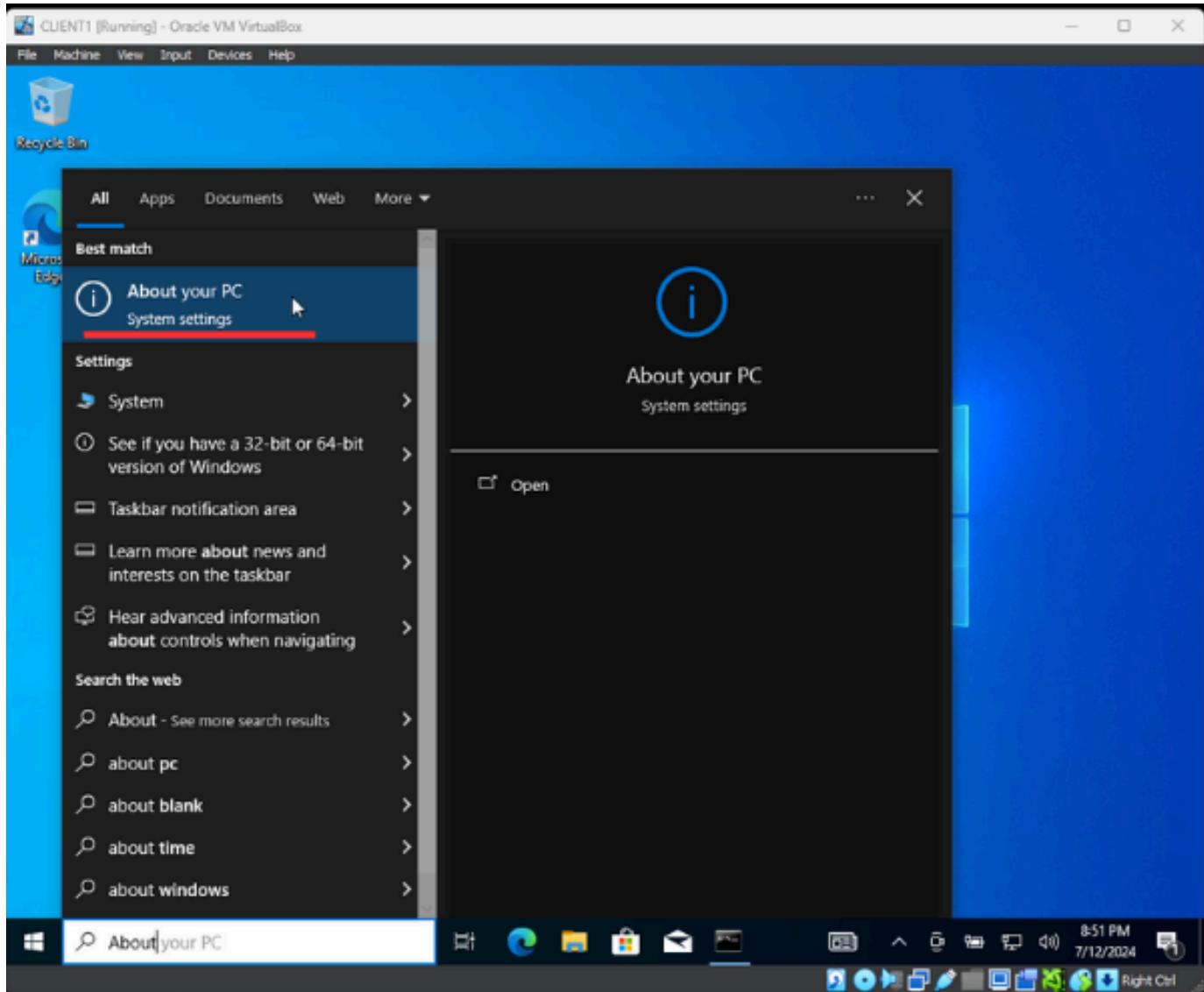
Recycle Bin

Microsoft Edge

Command Prompt

```
Microsoft Windows [Version 10.0.19045.3803]
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C:\Users\user>hostname
DESKTOP-DE1CDTB
C:\Users\user>
```



System Properties

Computer Name Hardware Advanced System Protection Remote



Windows uses the following information to identify your computer on the network.

Computer description:

For example: "Kitchen Computer" or "Mary's Computer".

Full computer name: DESKTOP-DE1CDTB

Workgroup: WORKGROUP

To use a wizard to join a domain or workgroup, click Network ID...

Network ID...

To rename this computer or change its domain or workgroup, click Change.

Change...

OK

Cancel

Apply

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

Member of:

Domain:

mydomain.com

Workgroup:

WORKGROUP

OK

Cancel

Apply

This part also adds the computer to the domain. Computer becomes a member of "mydomain.com"

Windows Security

Computer Name/Domain Changes

Enter the name and password of an account with permission to join the domain.

a-mosman

OK

Cancel

Computer Name/Domain Changes



Welcome to the mydomain.com domain.

OK

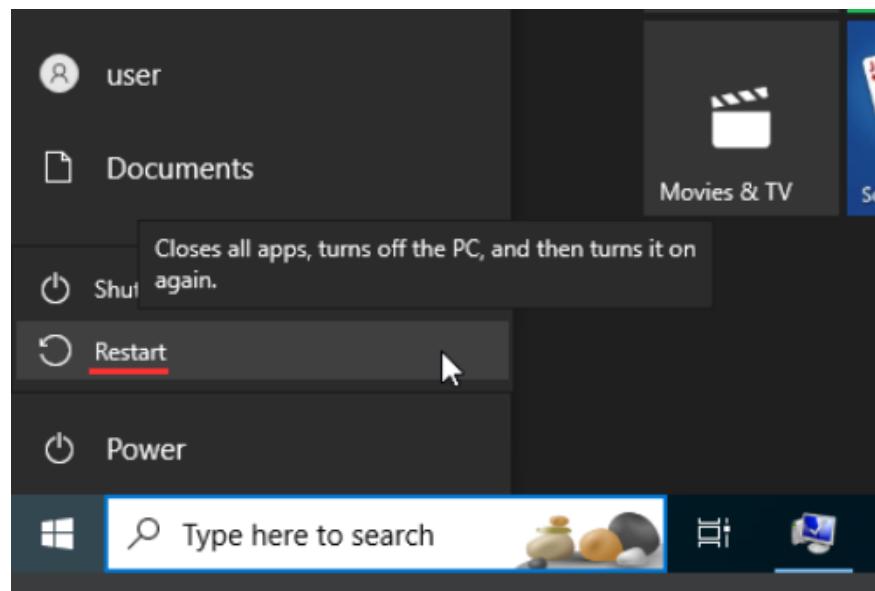
Computer Name/Domain Changes



You must restart your computer to apply these changes

Before restarting, save any open files and close all programs.

OK



A screenshot of the Microsoft DHCP Manager. The left pane shows a tree structure for a domain 'dc.mydomain.com' under 'IPv4'. A scope 'Scope [172.16.0.0] 172.16.0.100-200' is selected, with its details shown in the center pane. The right pane lists client leases. One lease is selected, showing the client IP address '172.16.0.100', name 'CLIENT1.mydomain.com', lease expiration '7/21/2024 12:05:50 AM', type 'DHCP', unique ID '080027871...', and description 'Address Lease...'. A 'More A...' button is visible at the bottom of the list.

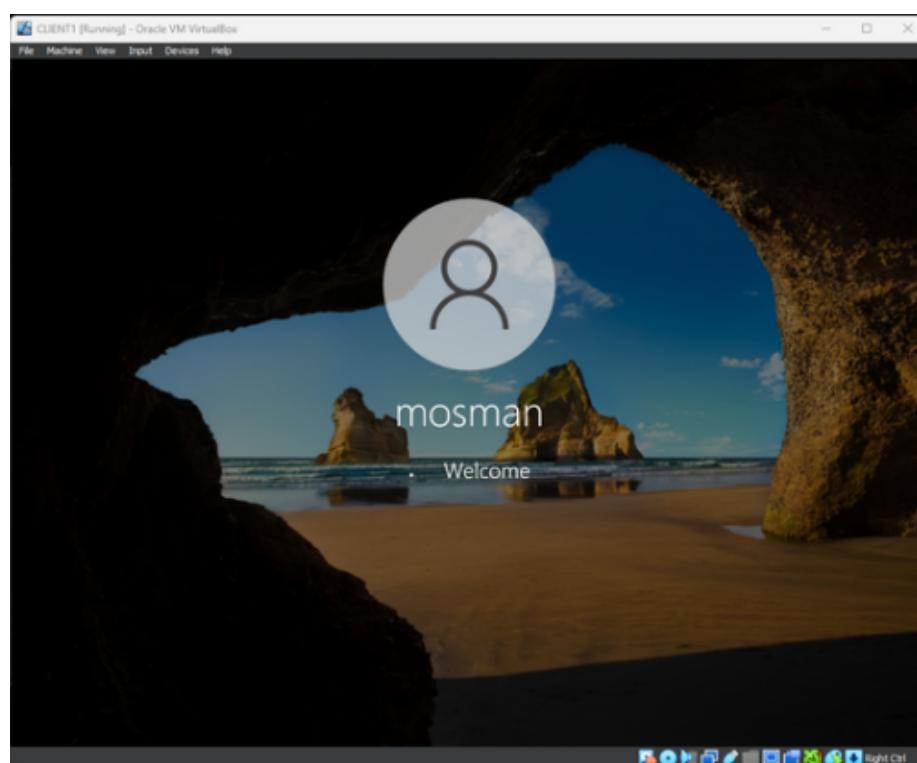
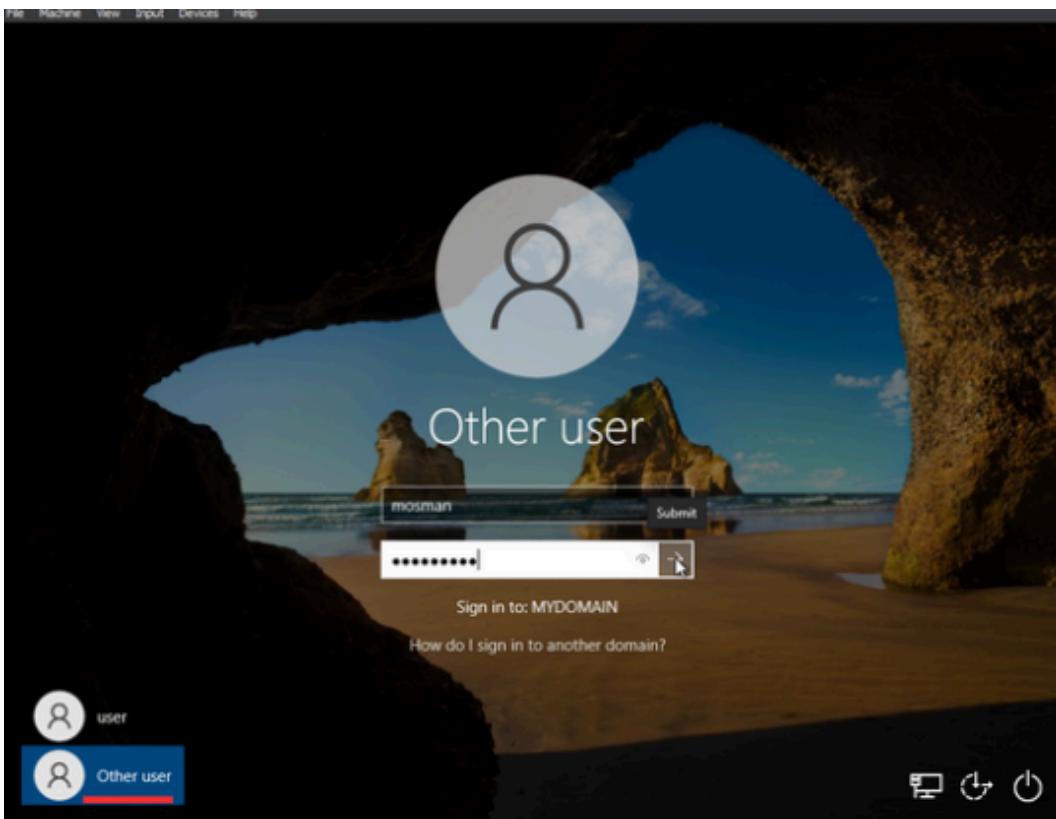
Action
Address Lease...

On the DC server you can verify that the Client 1 computer has been assigned an IP address by the DHCP server. Here you can verify the lease and expiration date.

A screenshot of the Active Directory Users and Computers management console. The left pane shows a tree structure for 'mydomain.com' with 'Computers' selected. The right pane displays a table of objects:

Name	Type	Description
CLIENT1	Computer	

In the active directory users and computers, you can verify that the CLIENT1 has indeed been added to the domain computers and it is now a member of the domain. Now you can use the CLIENT1 computer to sign in using one of the accounts created by the PowerShell script from earlier.



```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19045.3803]
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C:\Windows\system32>whoami
mydomain\mosman
C:\Windows\system32>
```

This setup now simulates a corporate environment. A newly onboarded employee can be granted credentials and can use a computer connected to the domain such as CLIENT1. They can access any computer within the same domain they are a member of.

You can follow the same process to add CLIENT2. Once both clients are added, you can experiment with various configurations and settings to gain a deeper understanding of how Active Directory domain servers operate. This hands-on experience will help to learn more about user management, group policies, and other essential aspects of Active Directory administration.