



Information Technology University Department of Computer Engineering

System and Network Security Semester Project Report

Submitted by:

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BSCE19009

Submitted to:

Muhammad Zunnurain Hussain

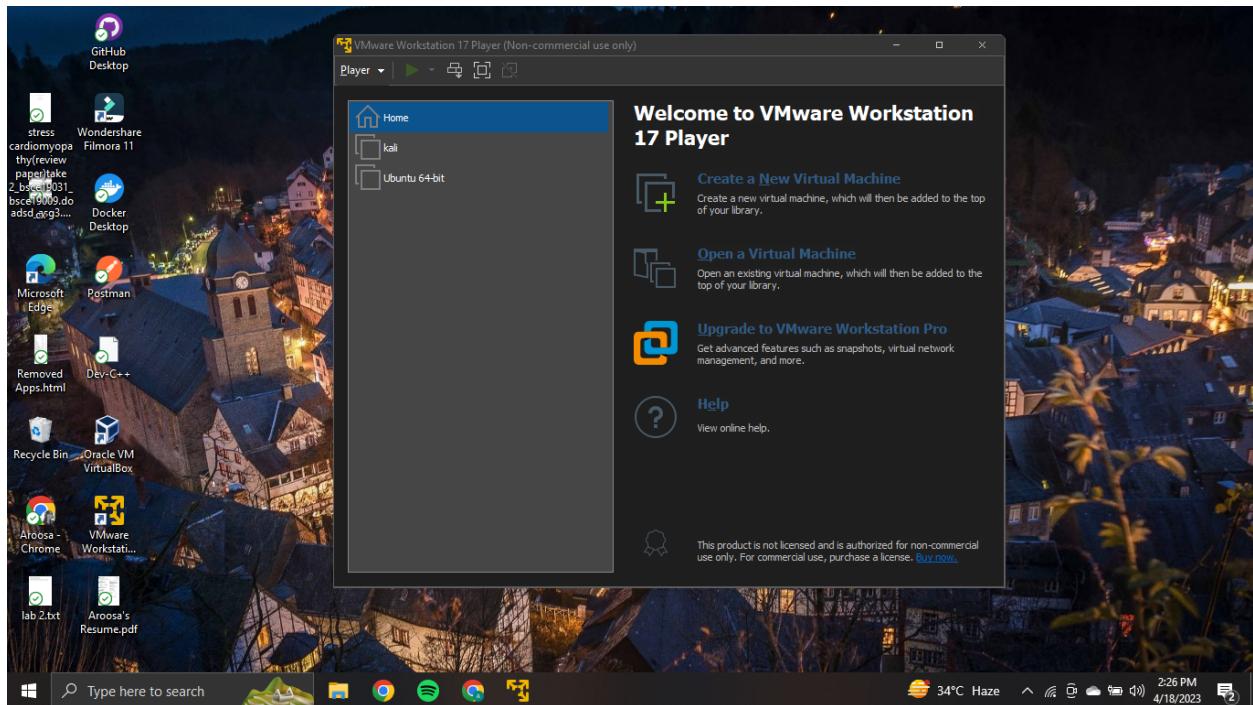
Dated:

19th April 2023

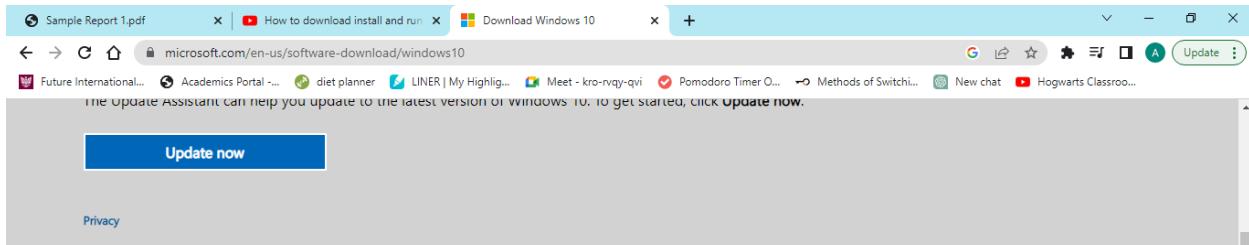
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Installation of VM ware workstation



Downloading Windows 10 iso



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.

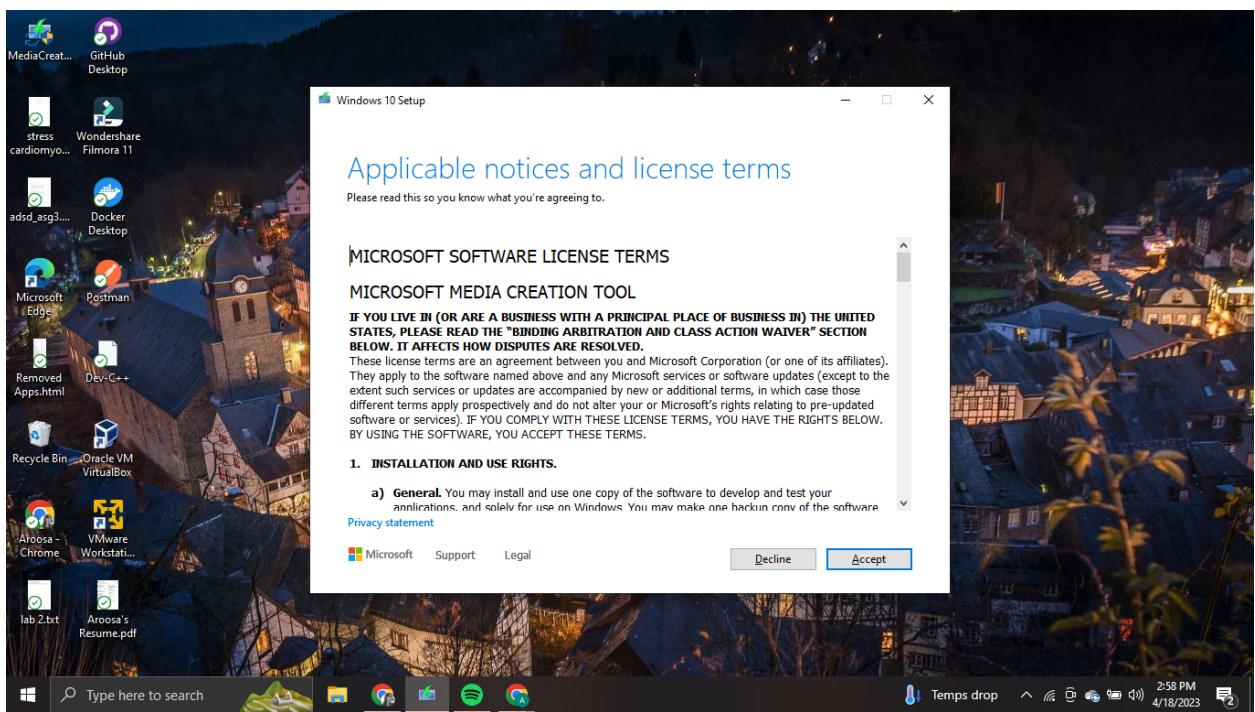
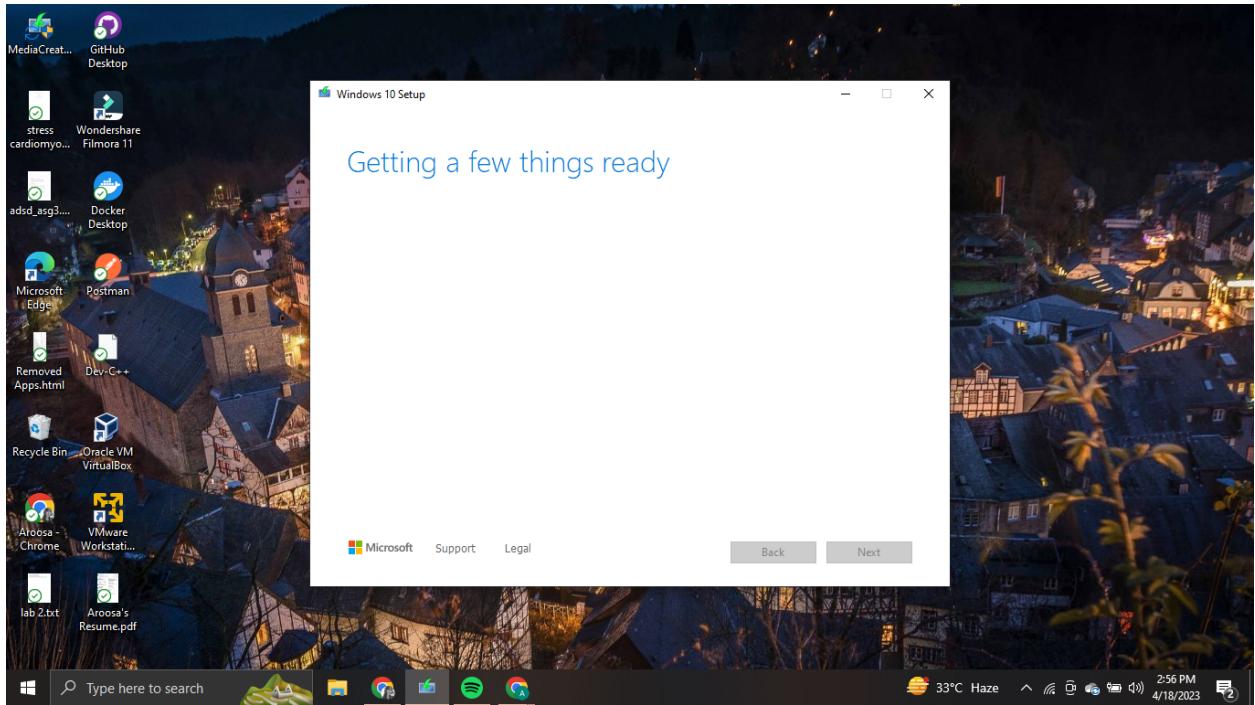
[Download Now](#)

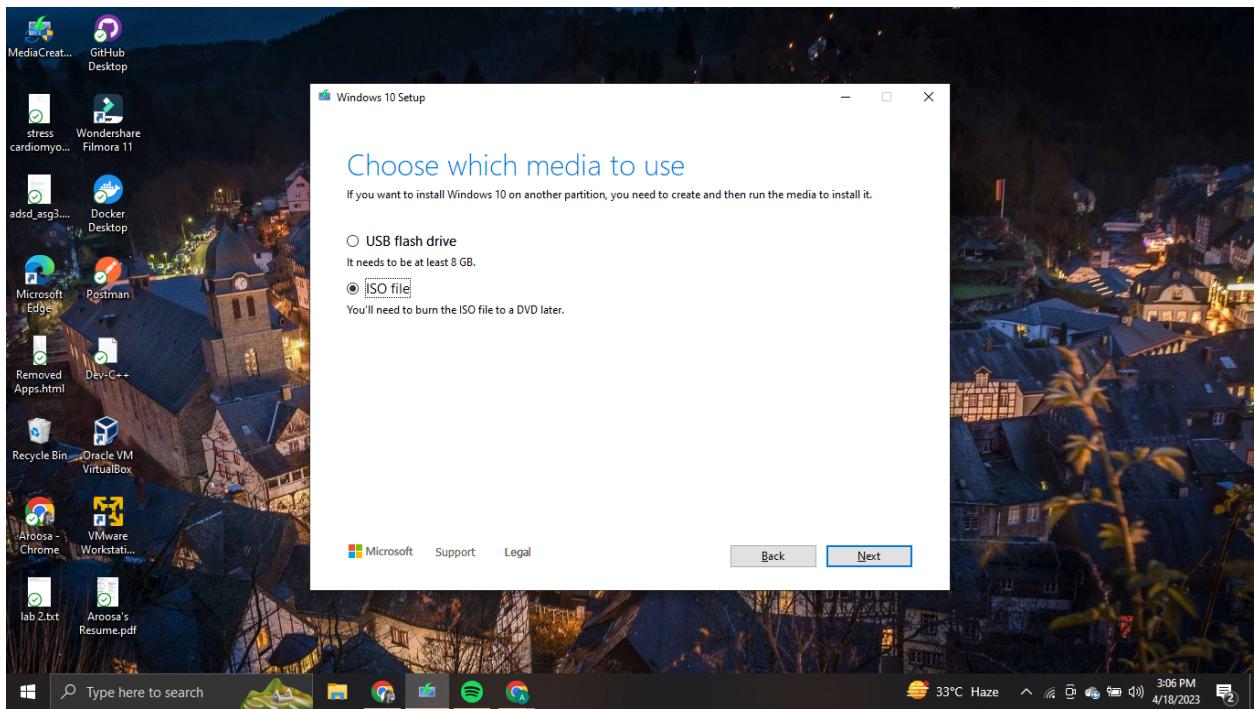
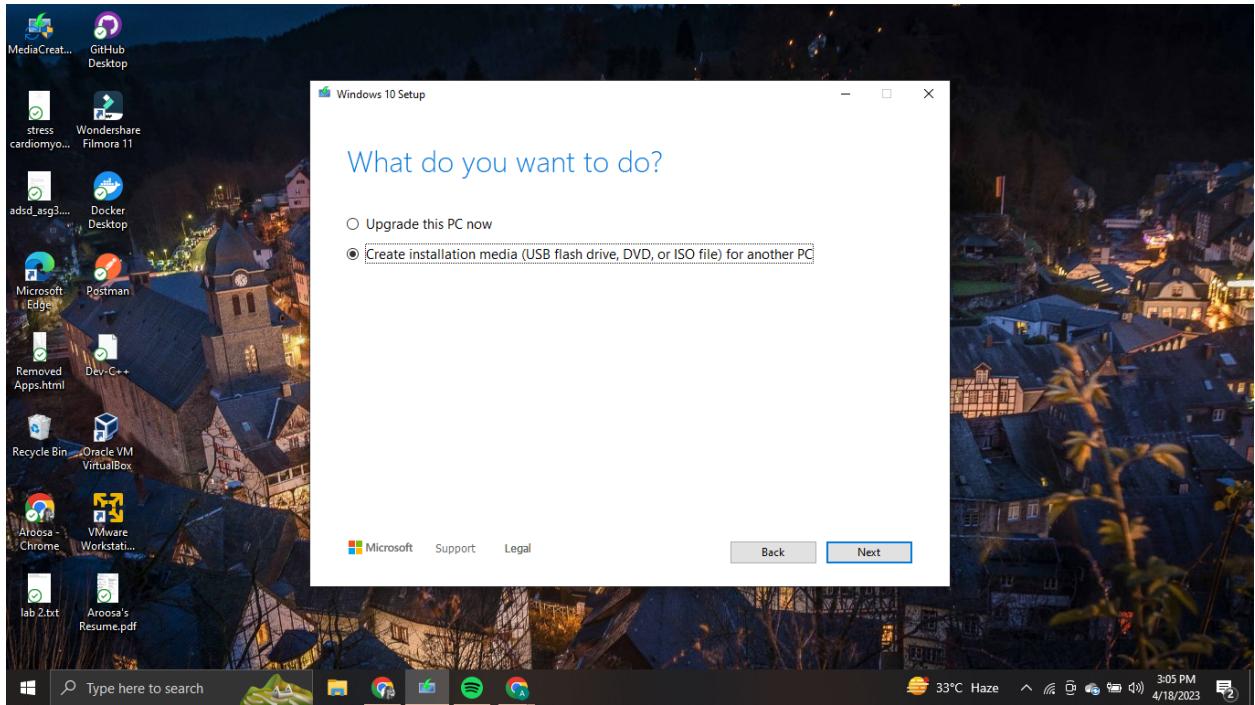


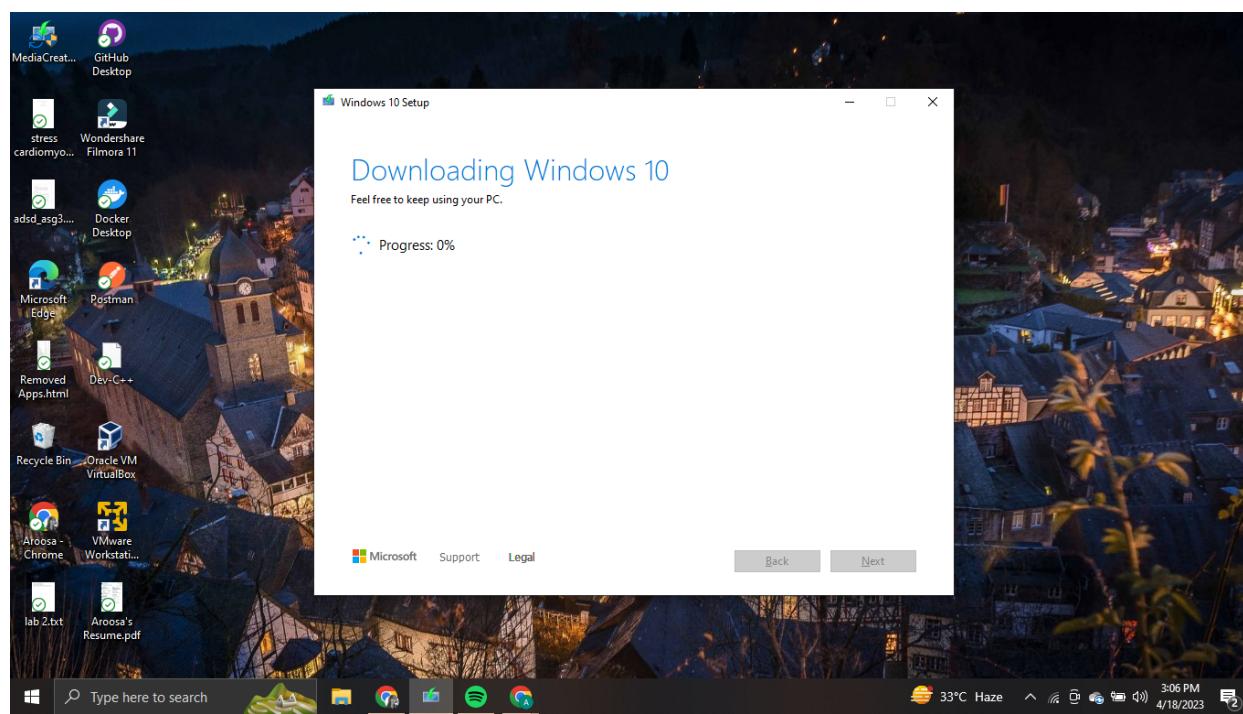
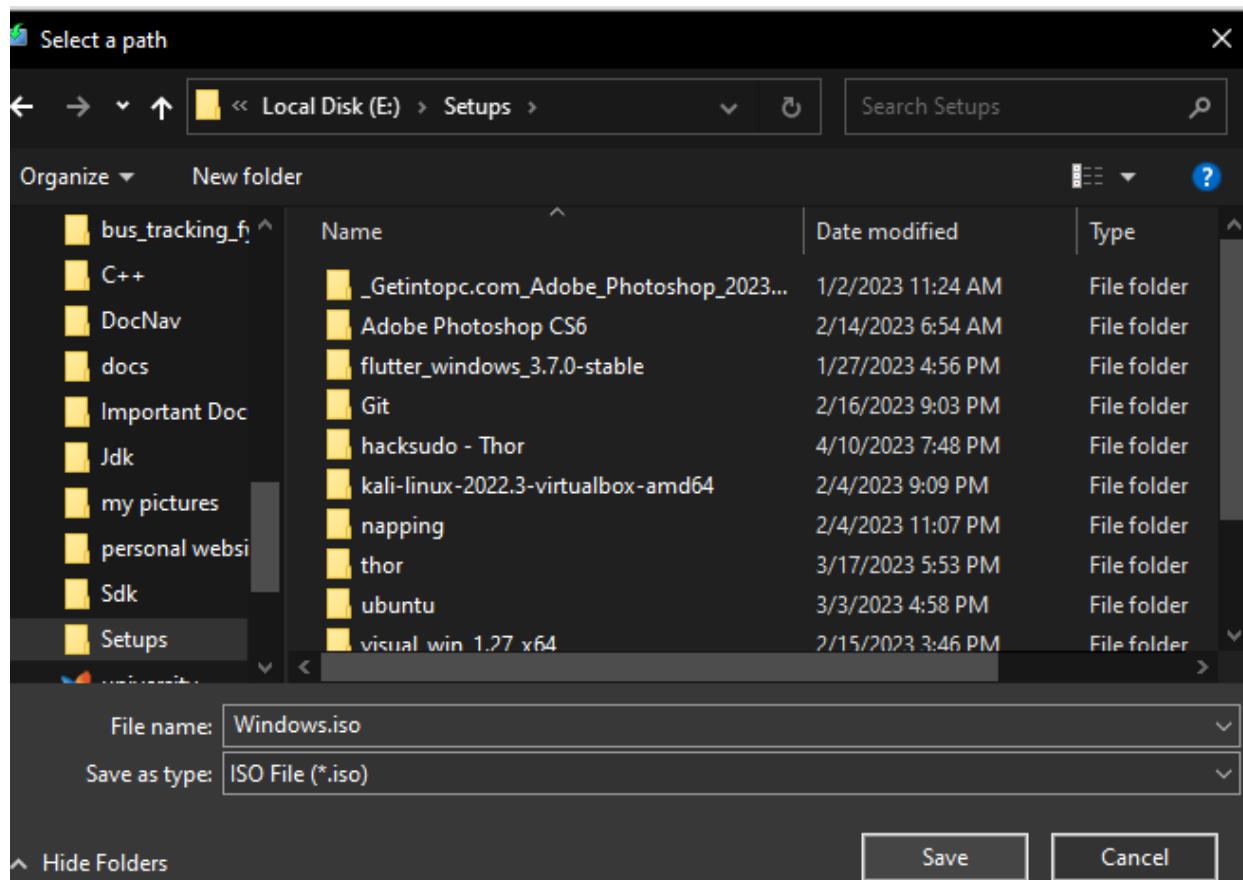
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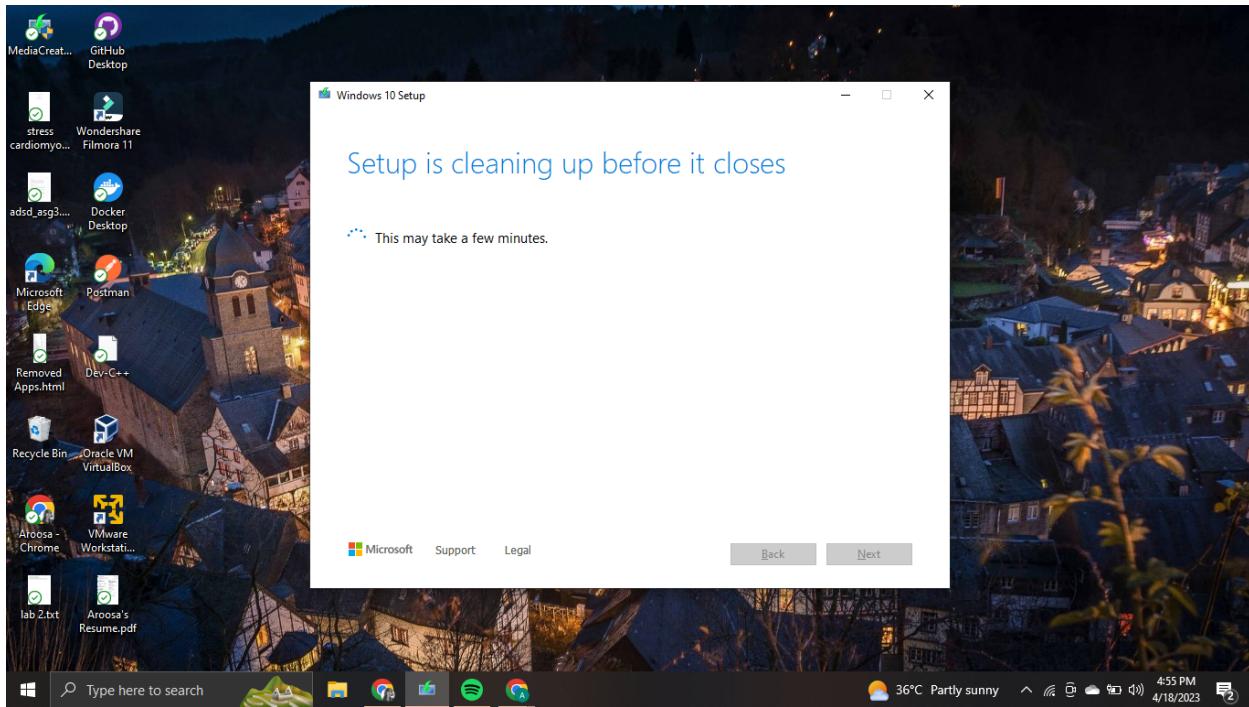
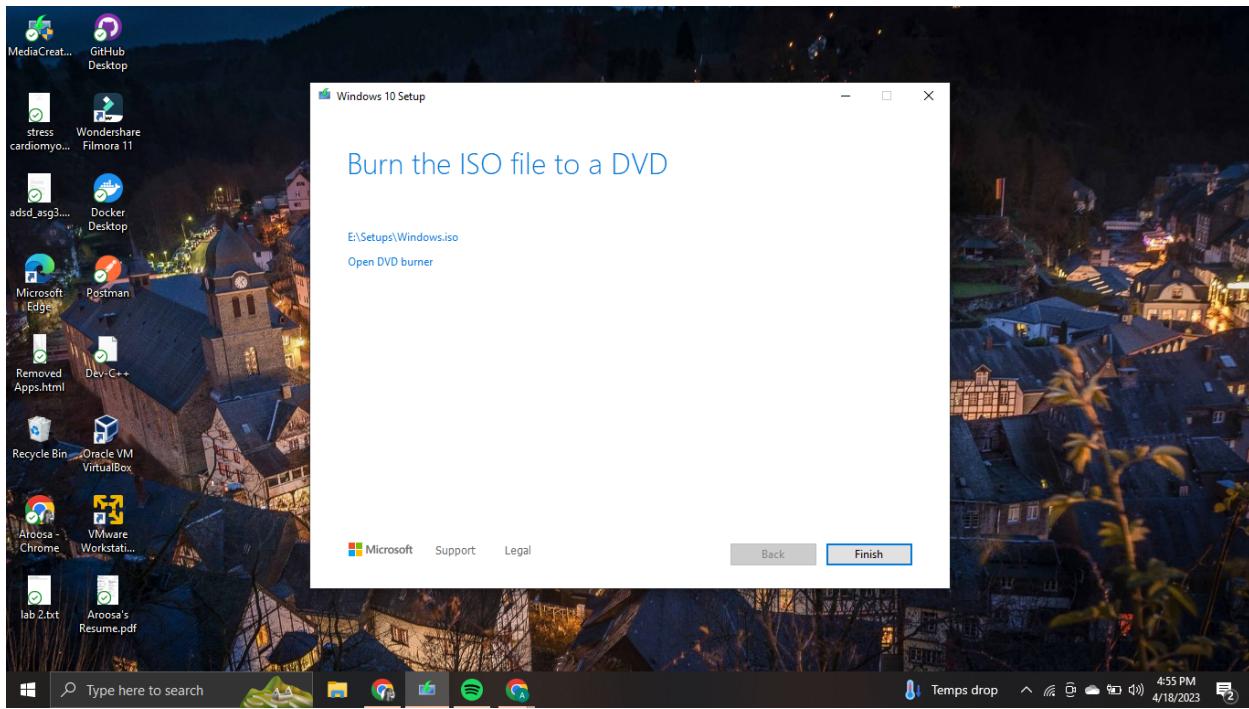
[Using the tool to upgrade this PC to Windows 10 \(click to show more or less information\)](#)

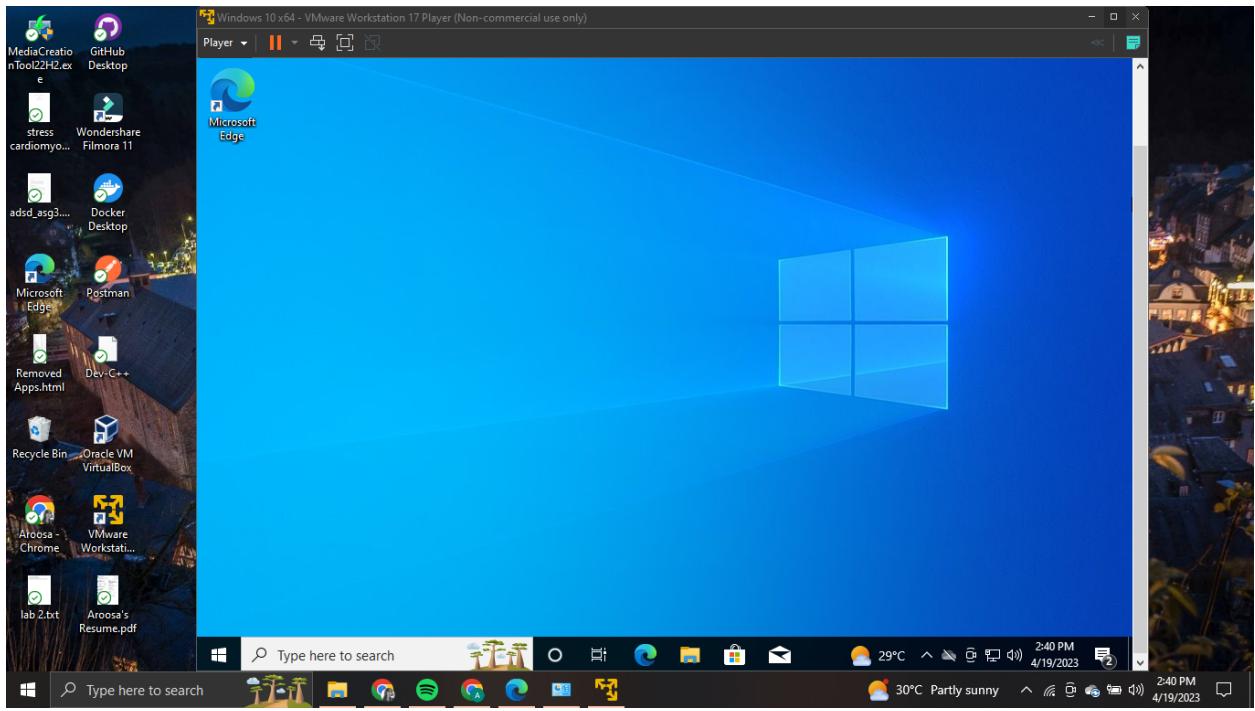




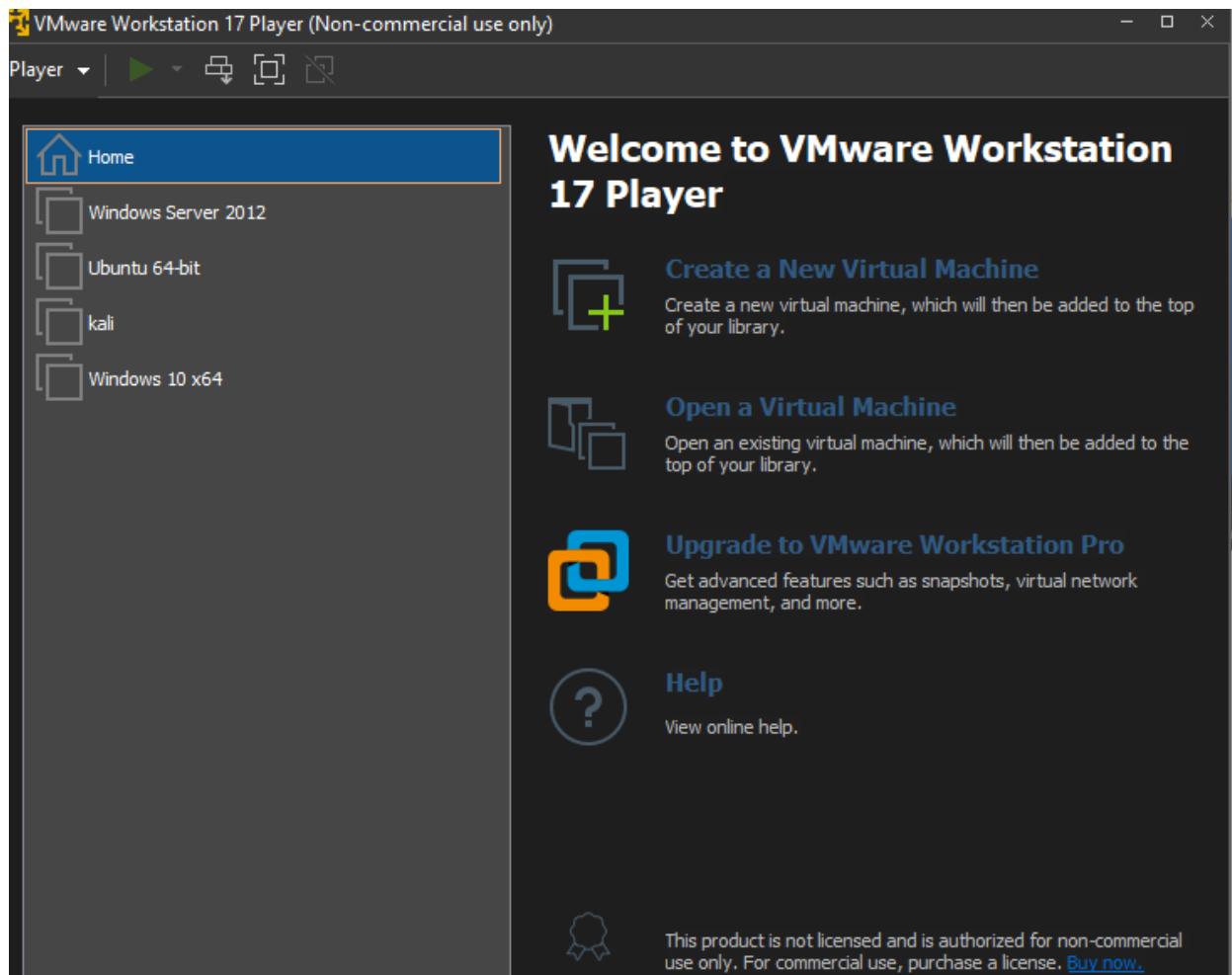


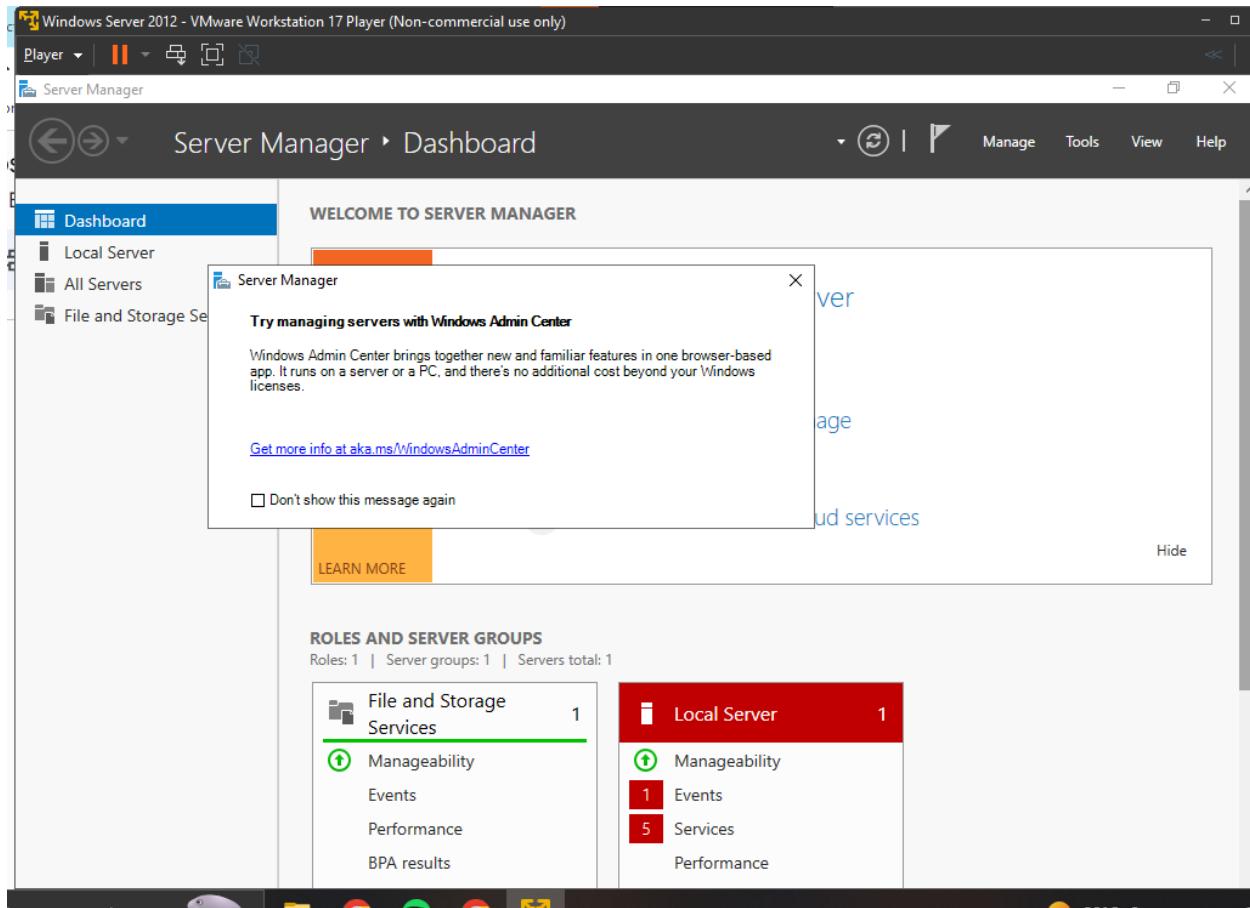




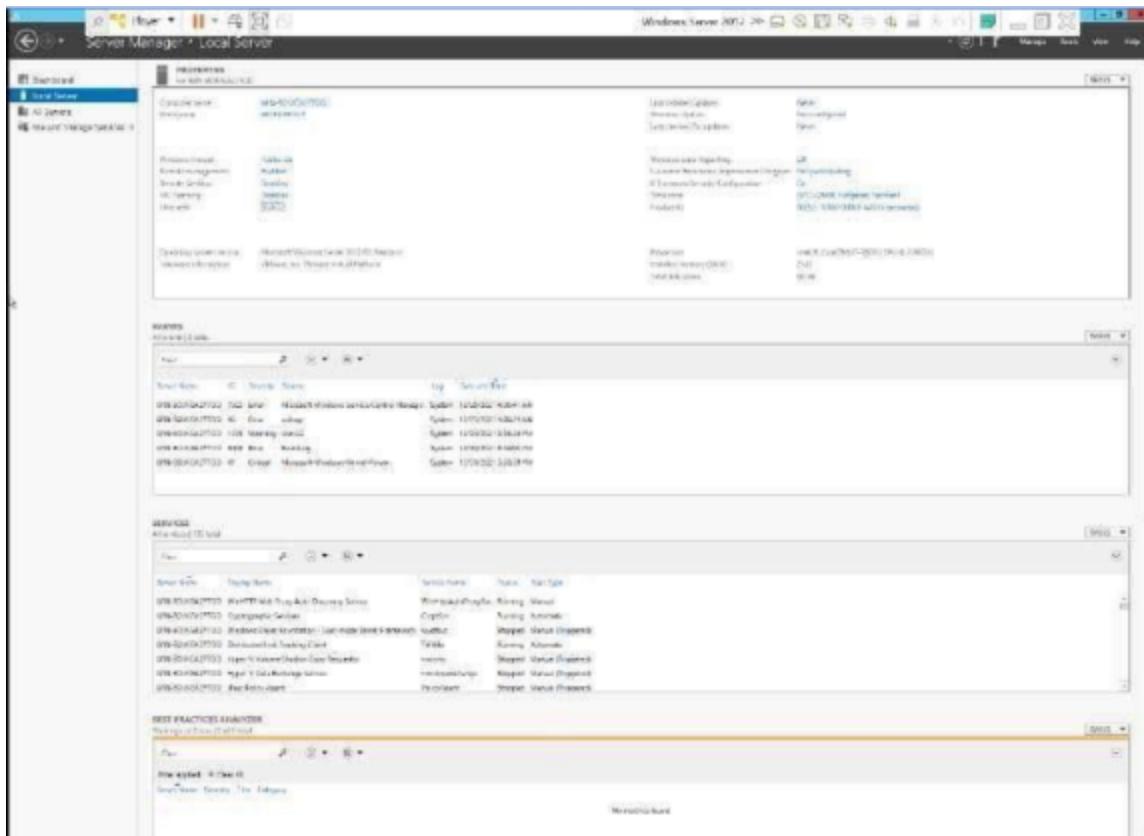


Windows Server is also downloaded

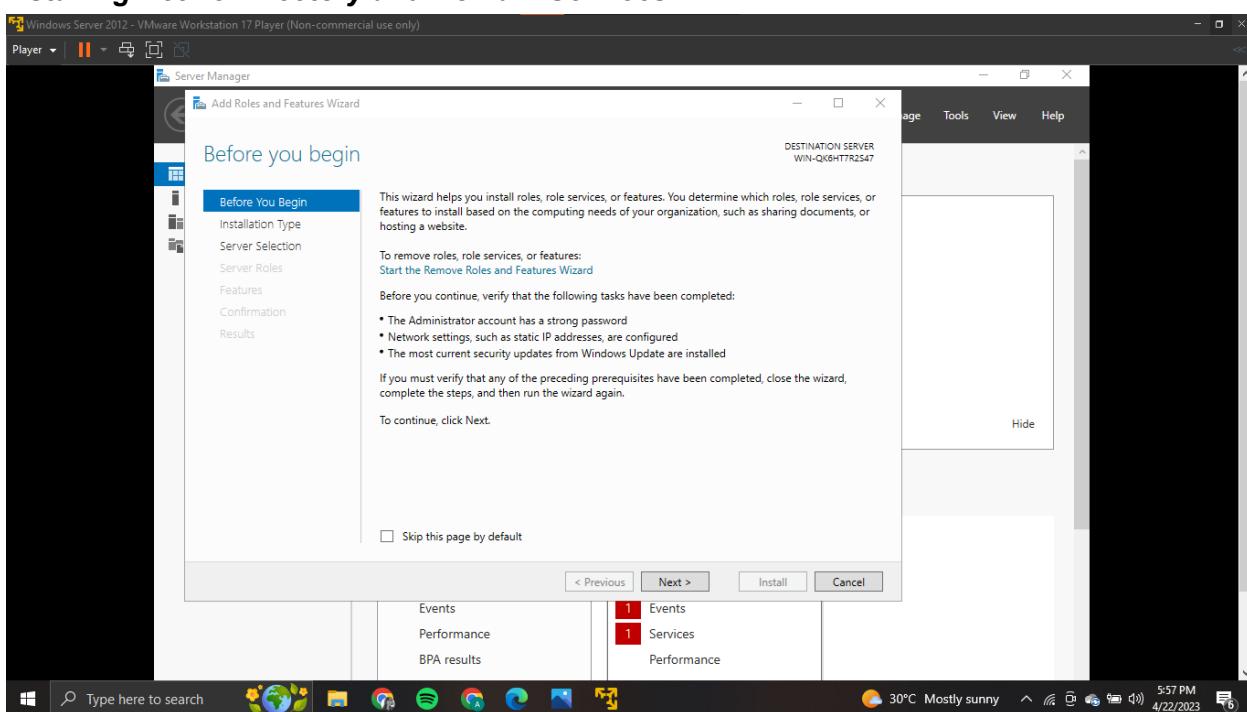


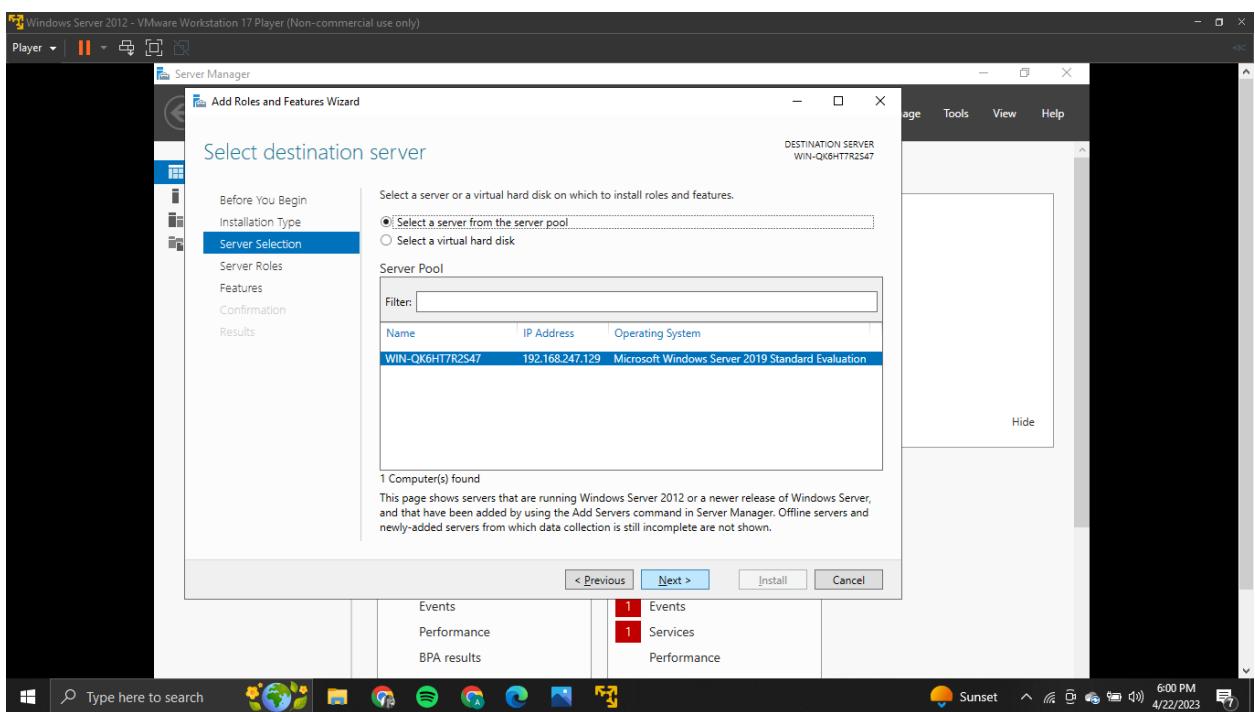
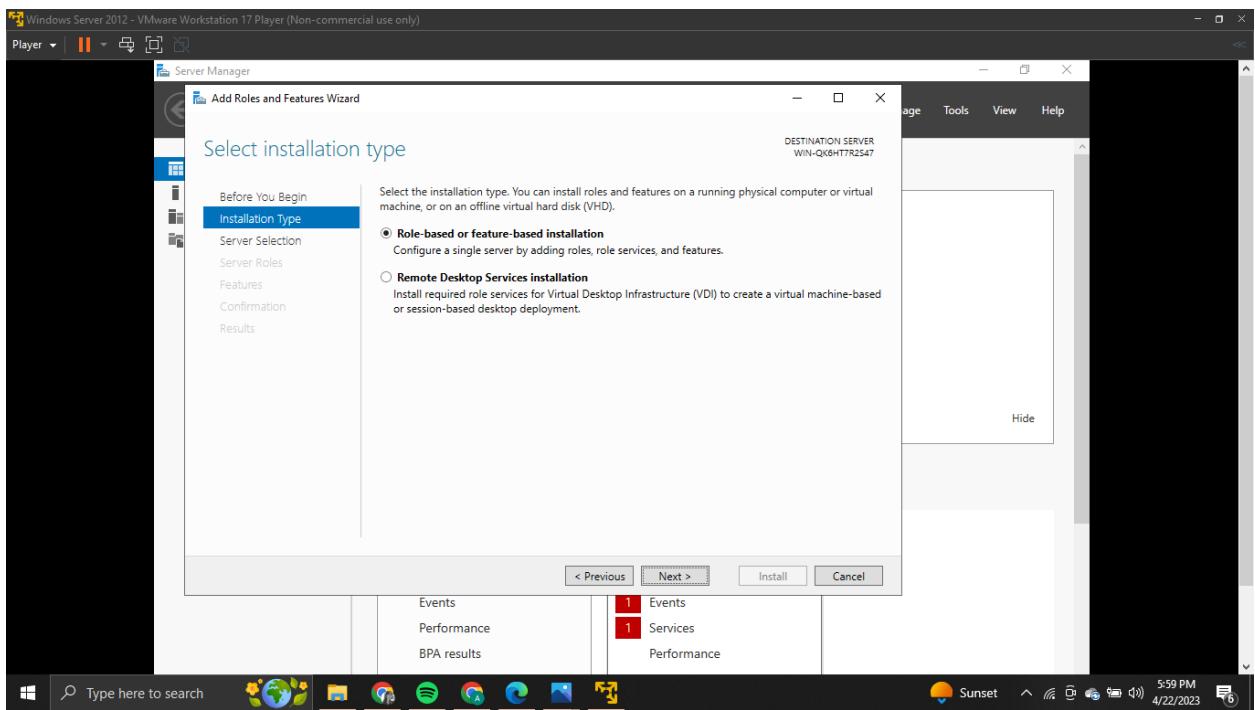


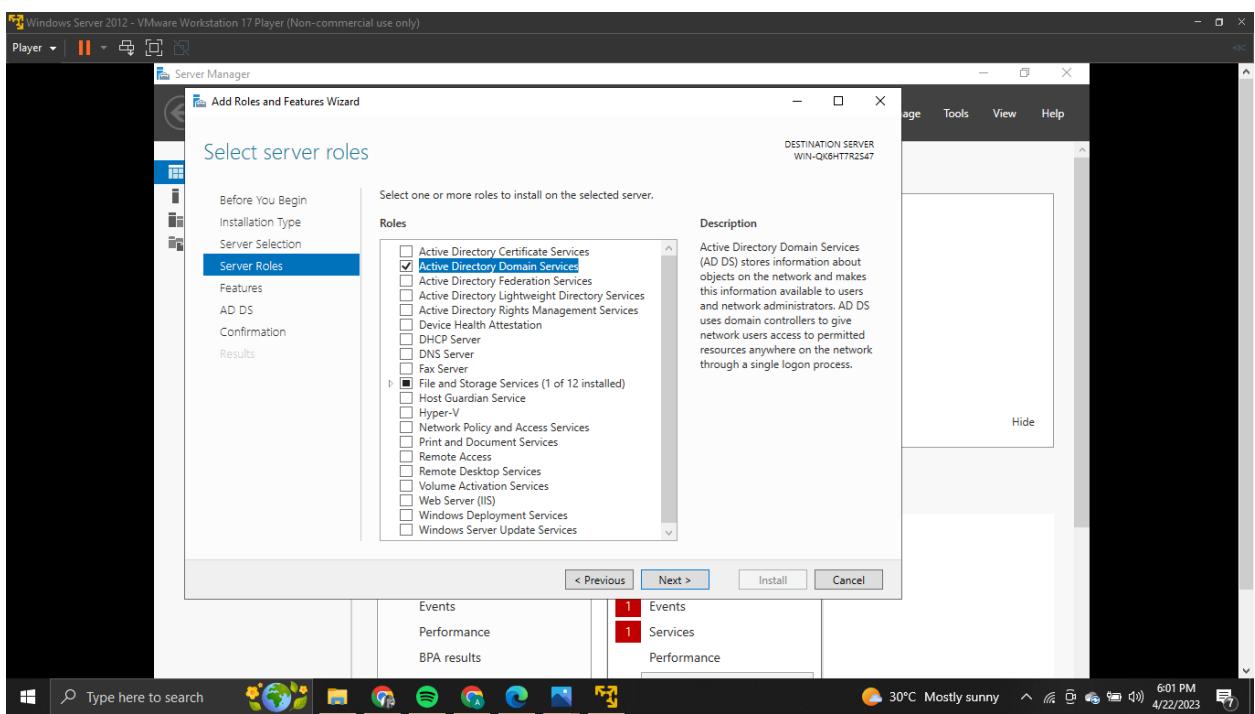
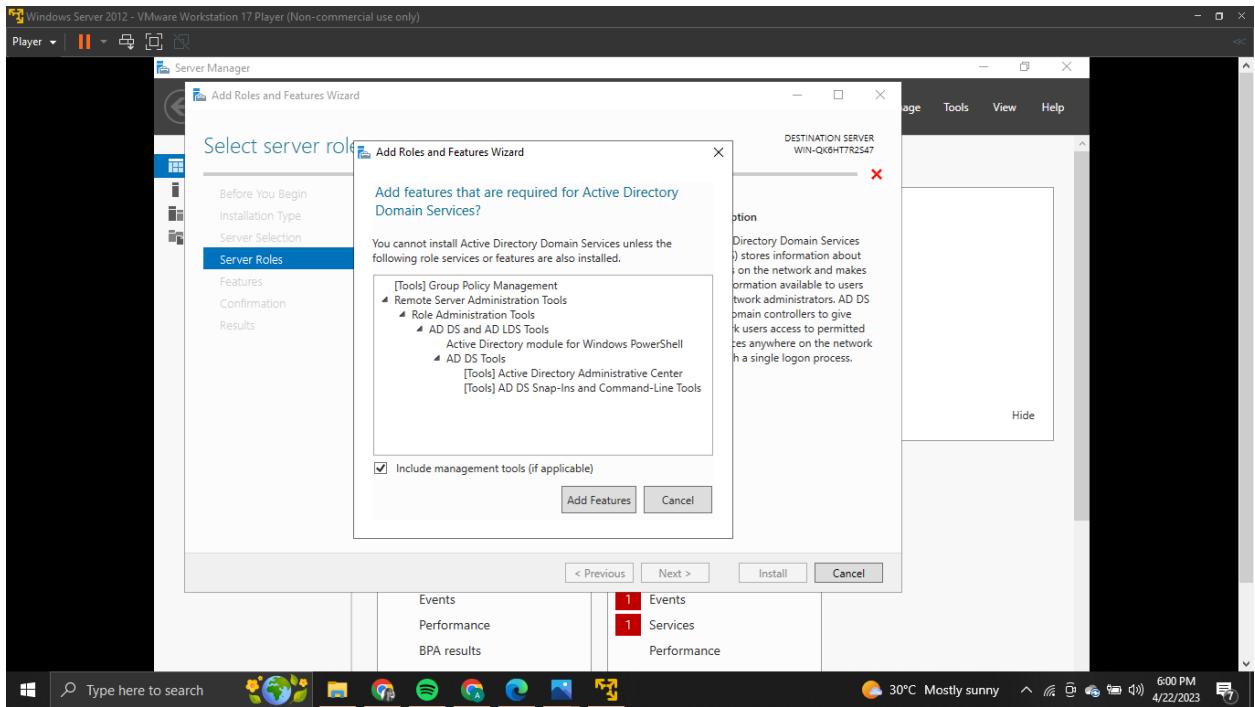
Assigning static IP to our server

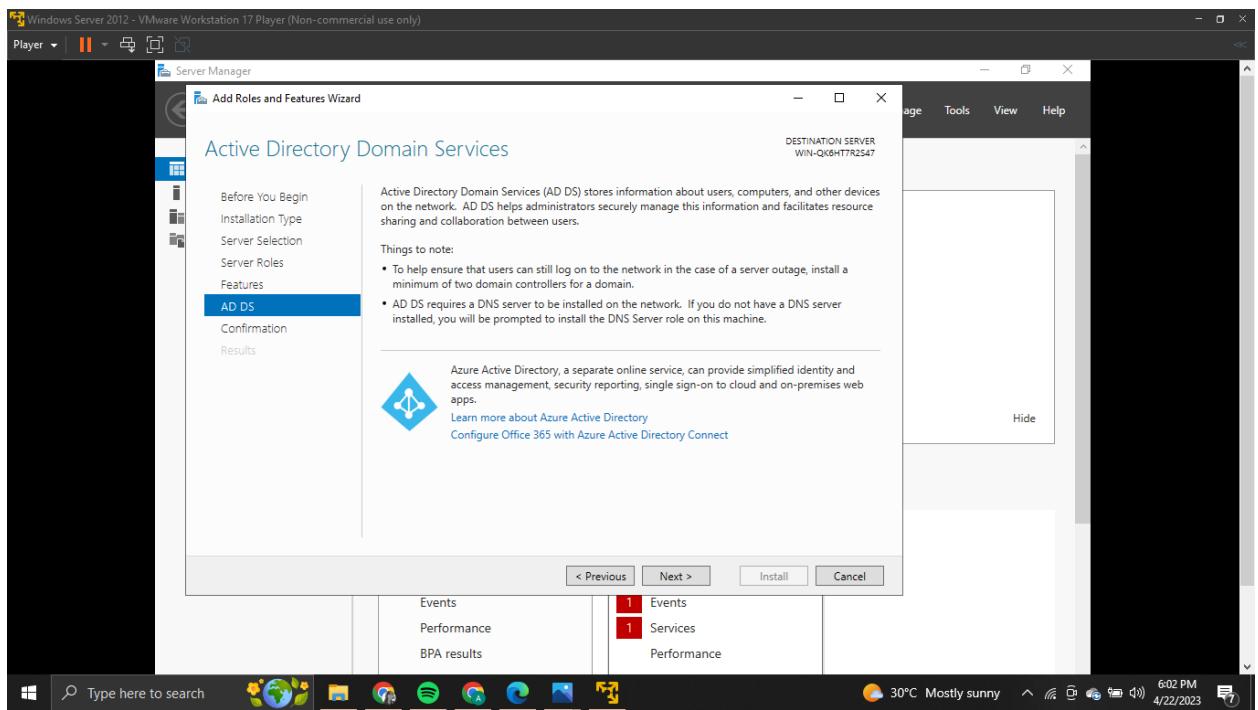


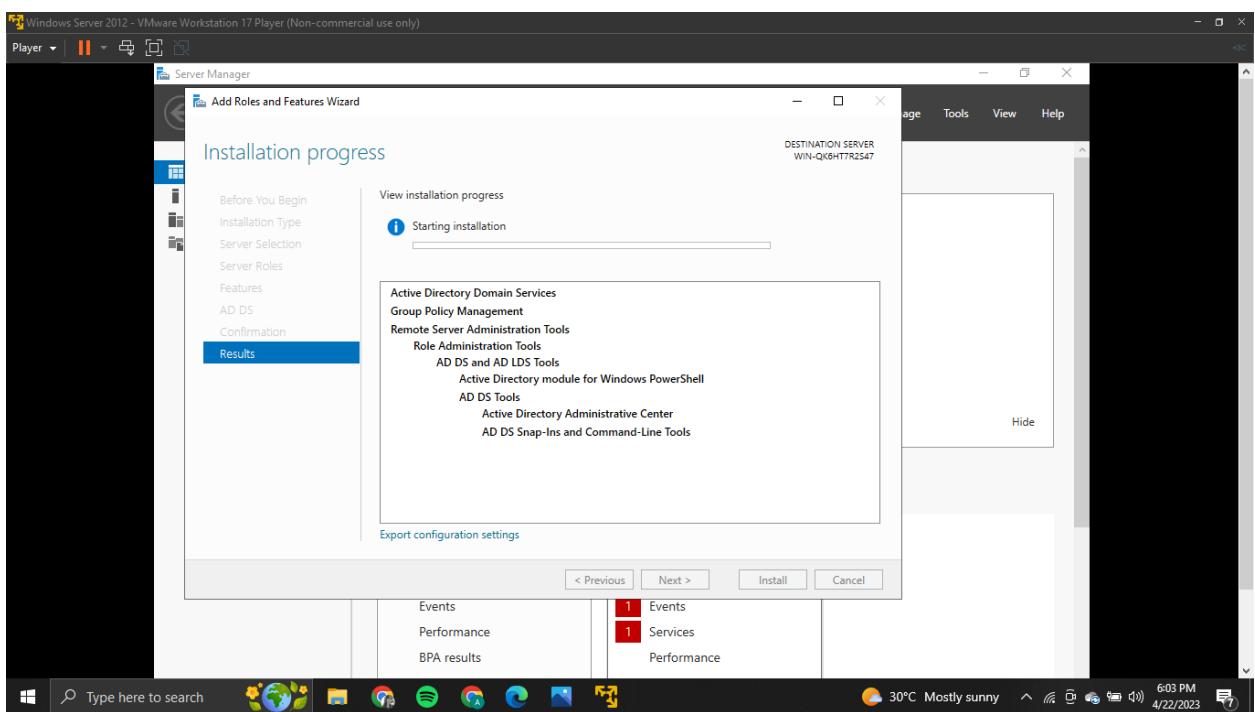
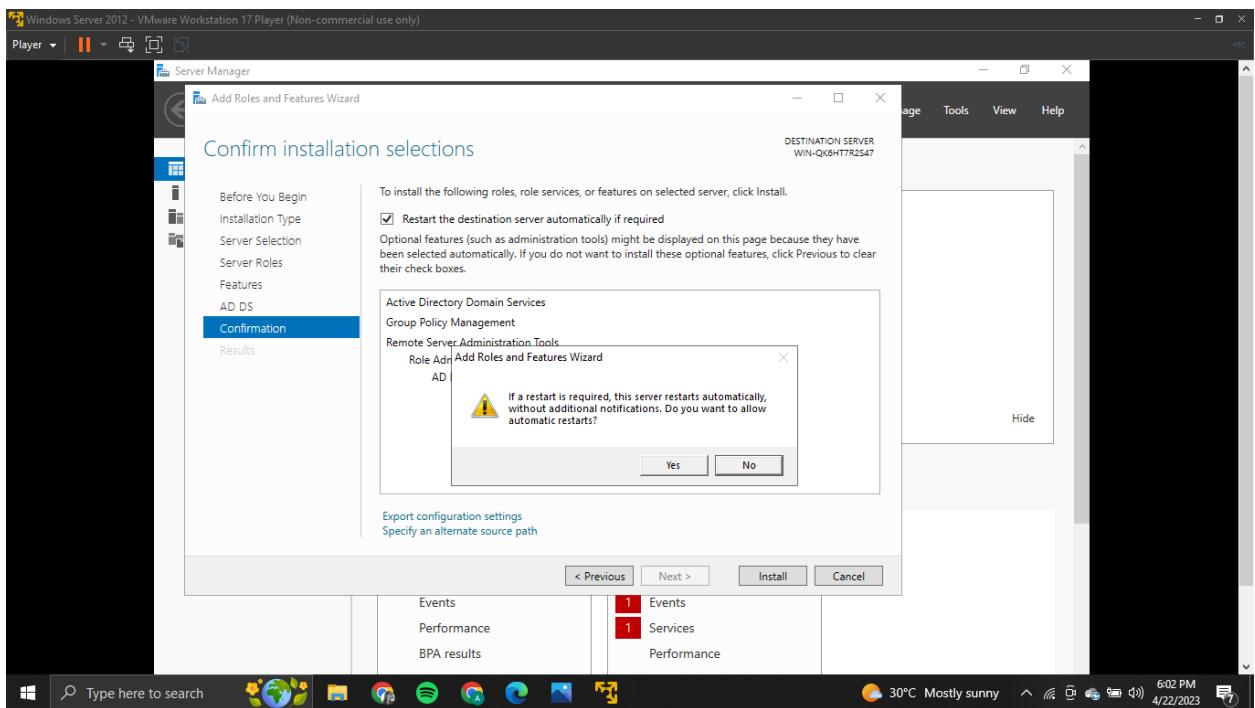
Installing Active Directory and Domain Services

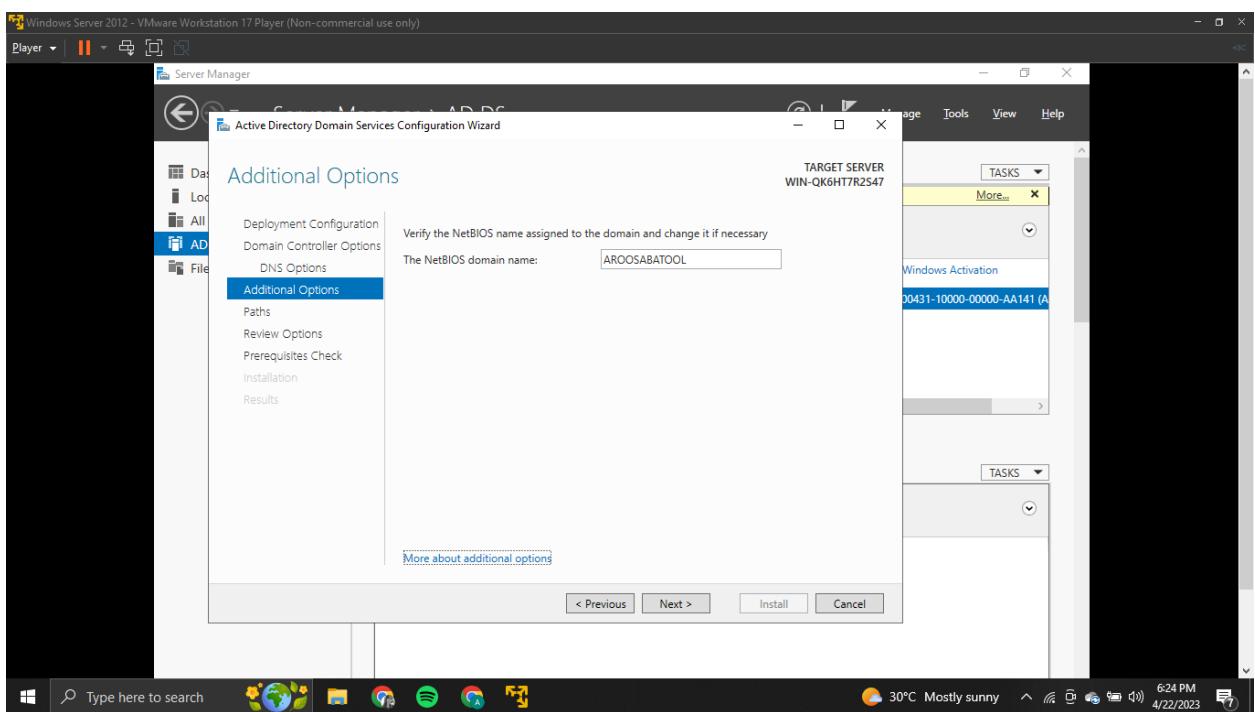
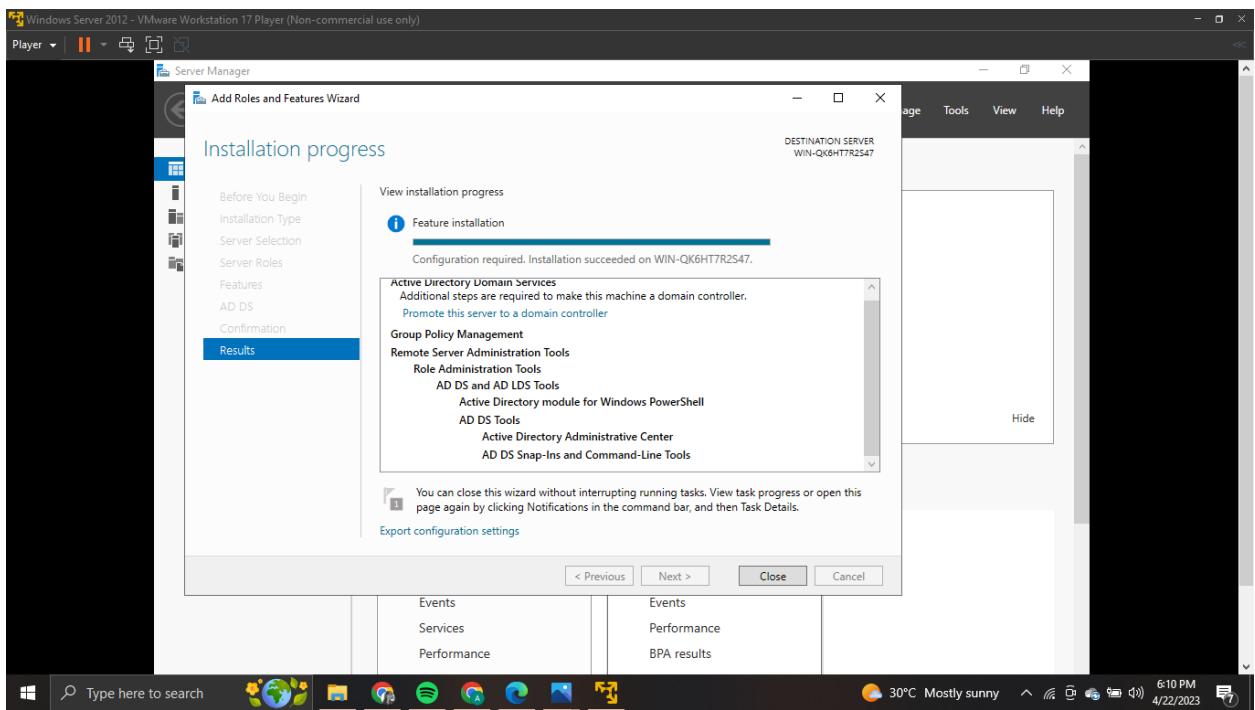


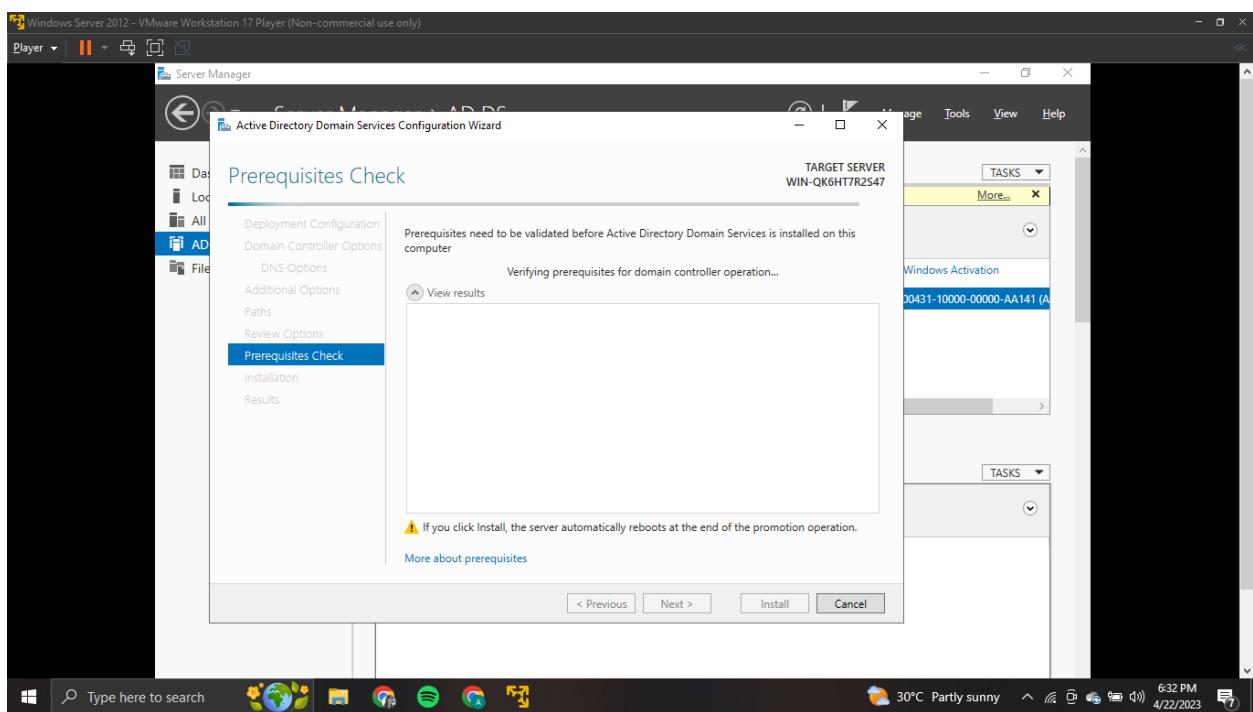
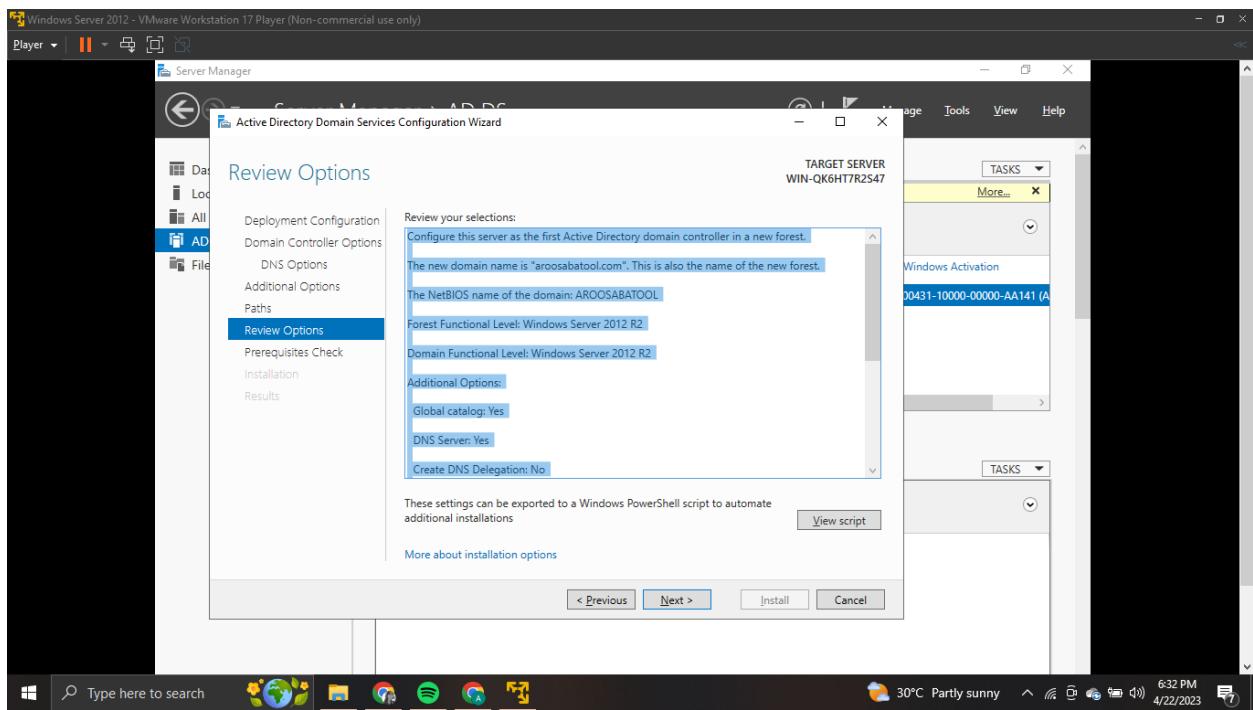


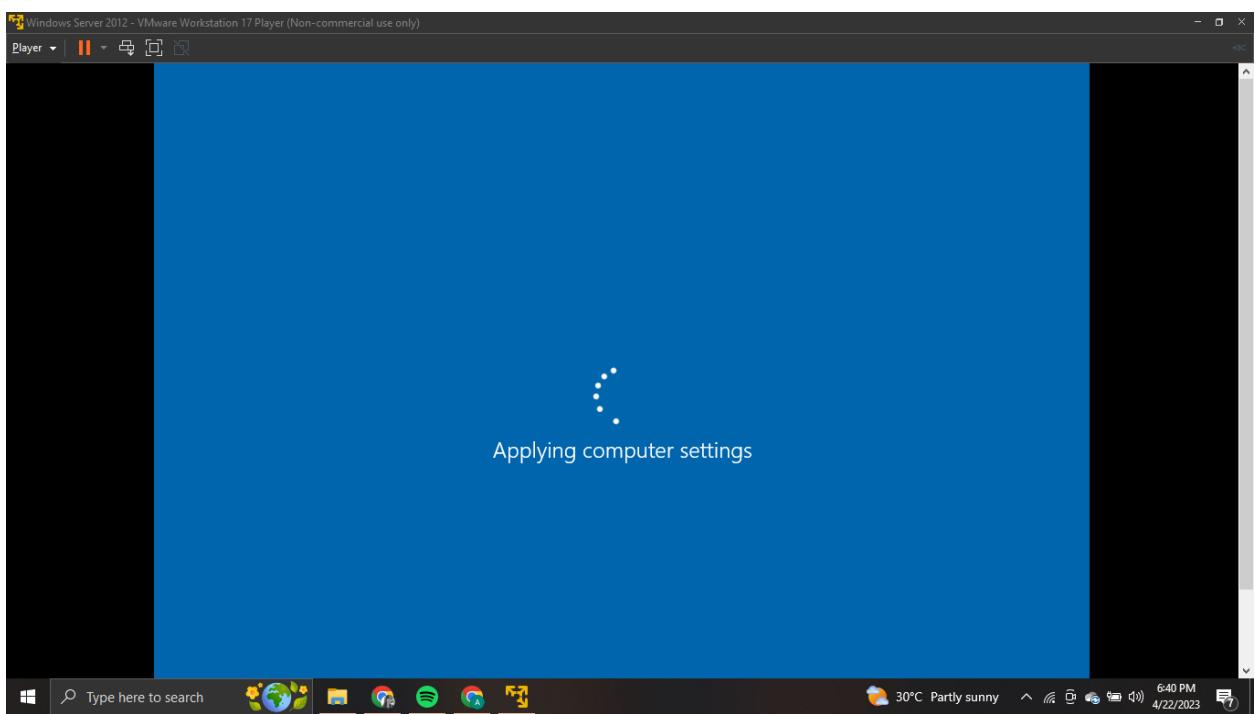
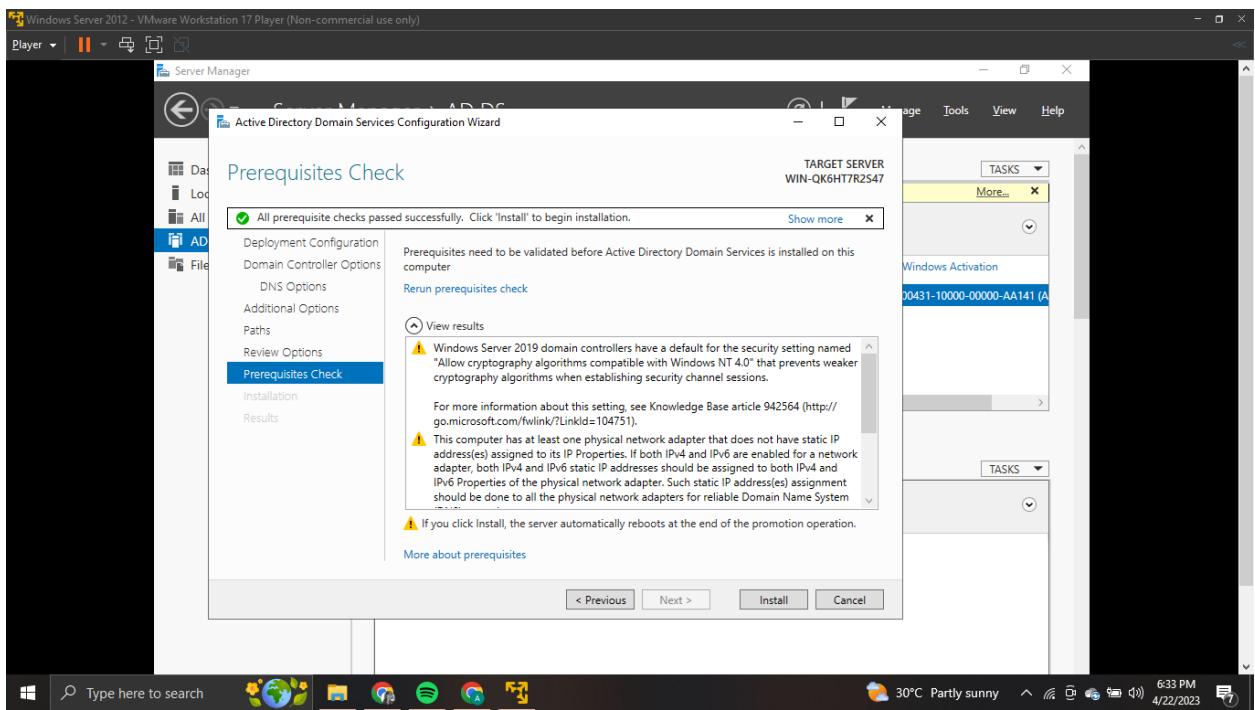


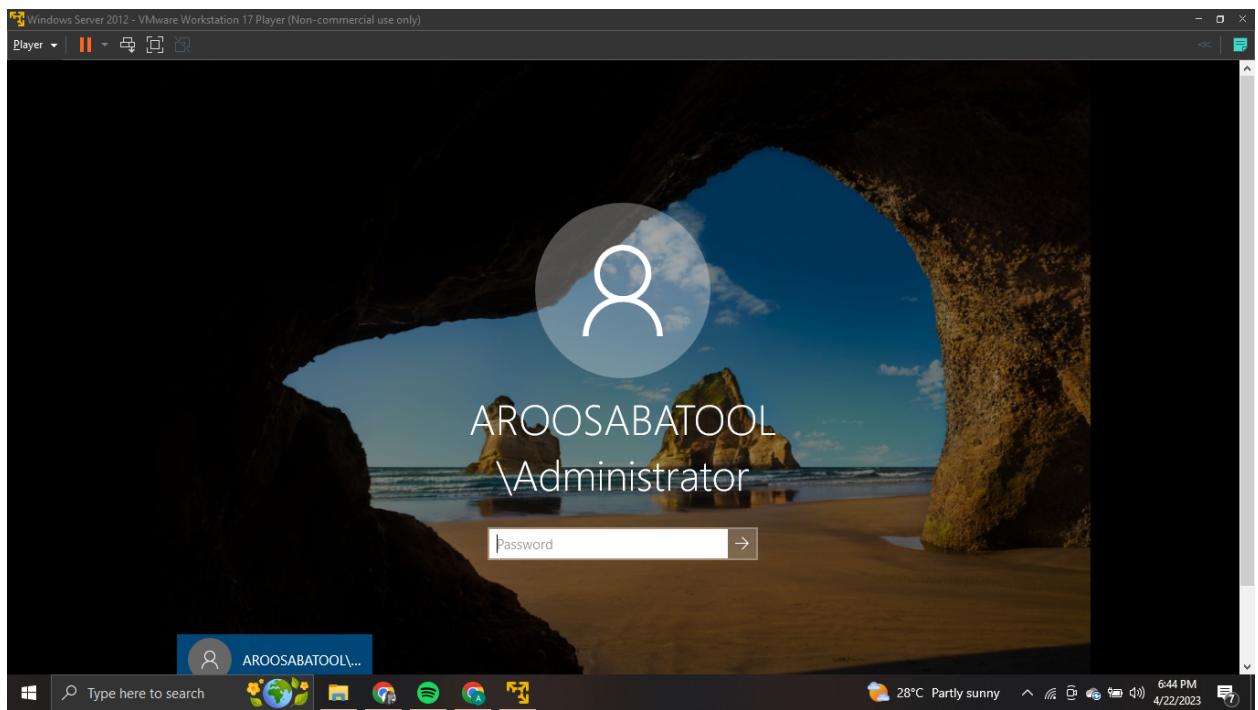


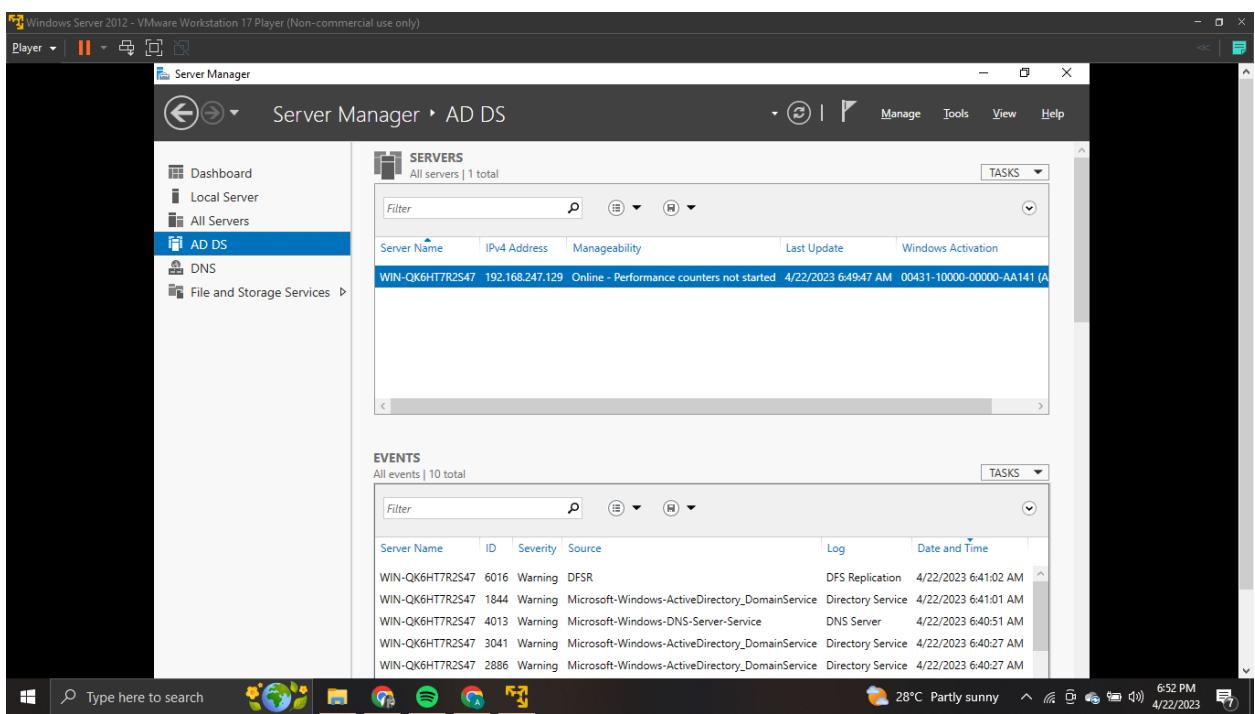
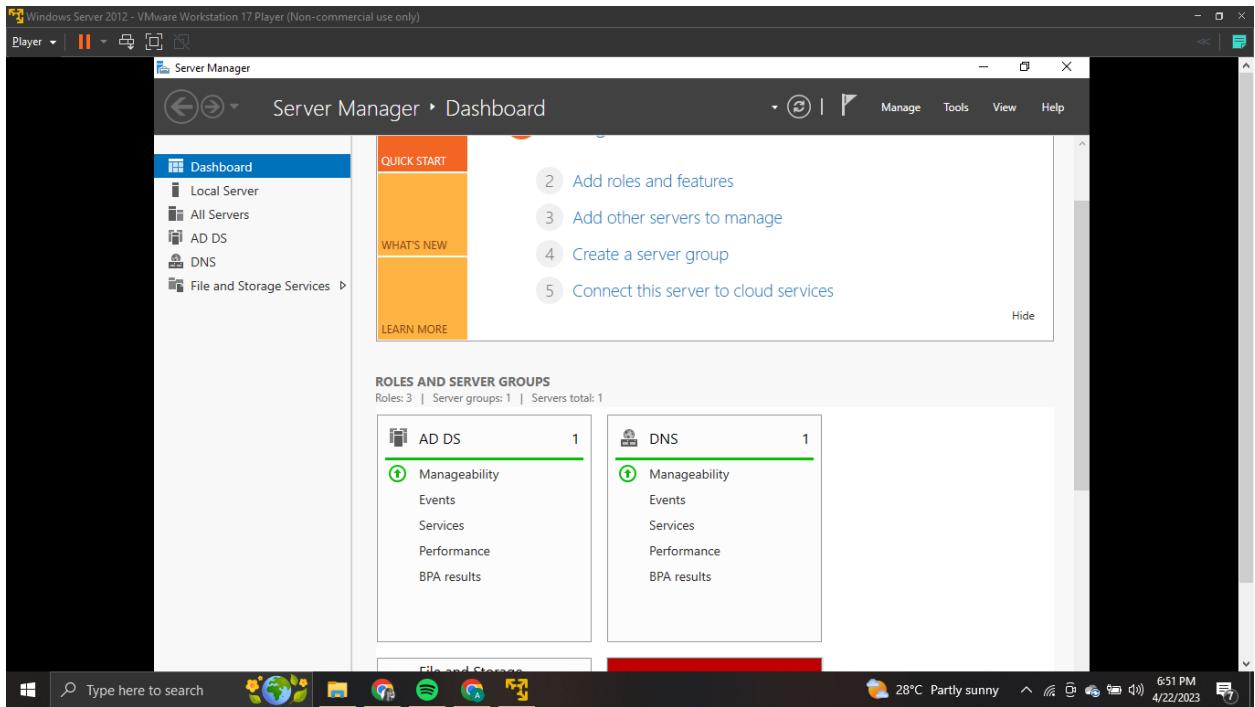


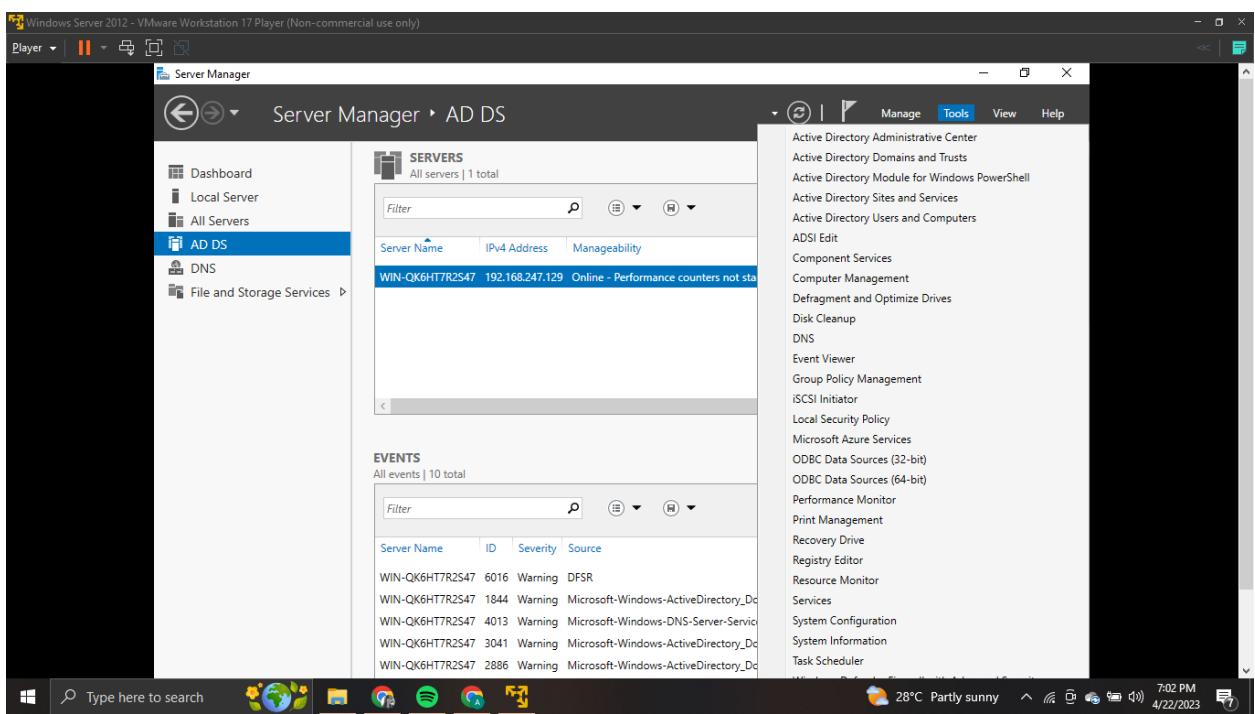
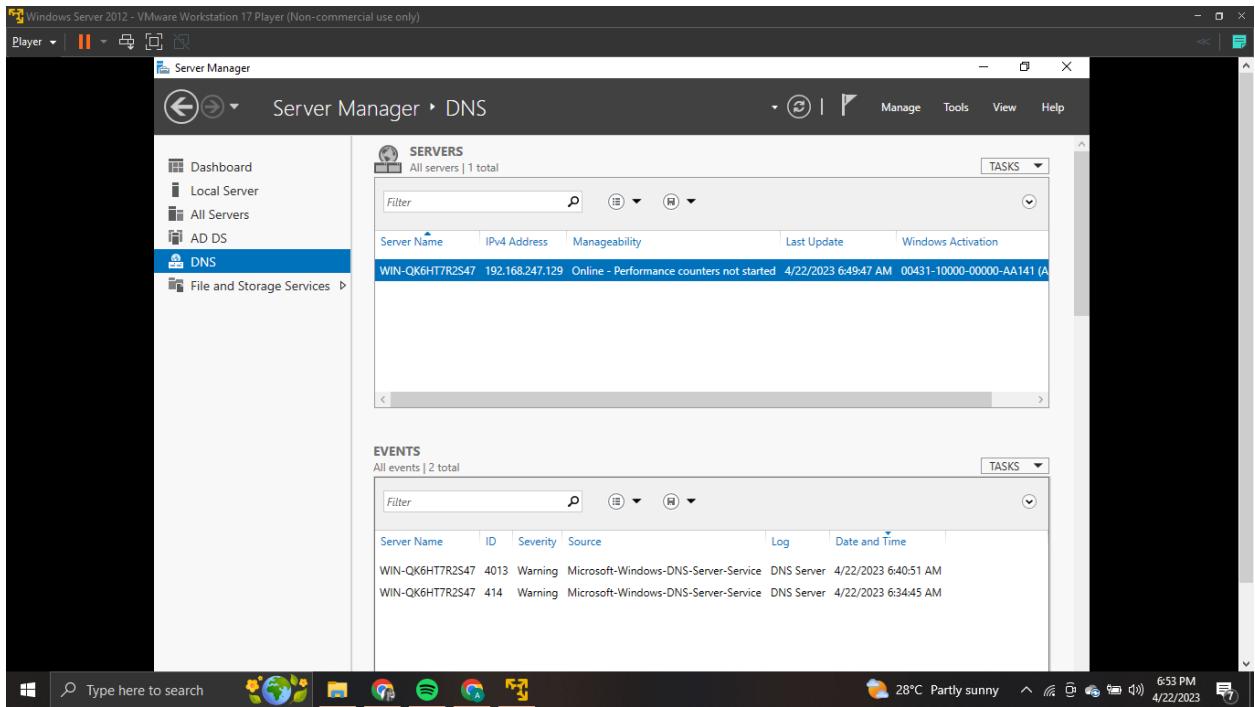




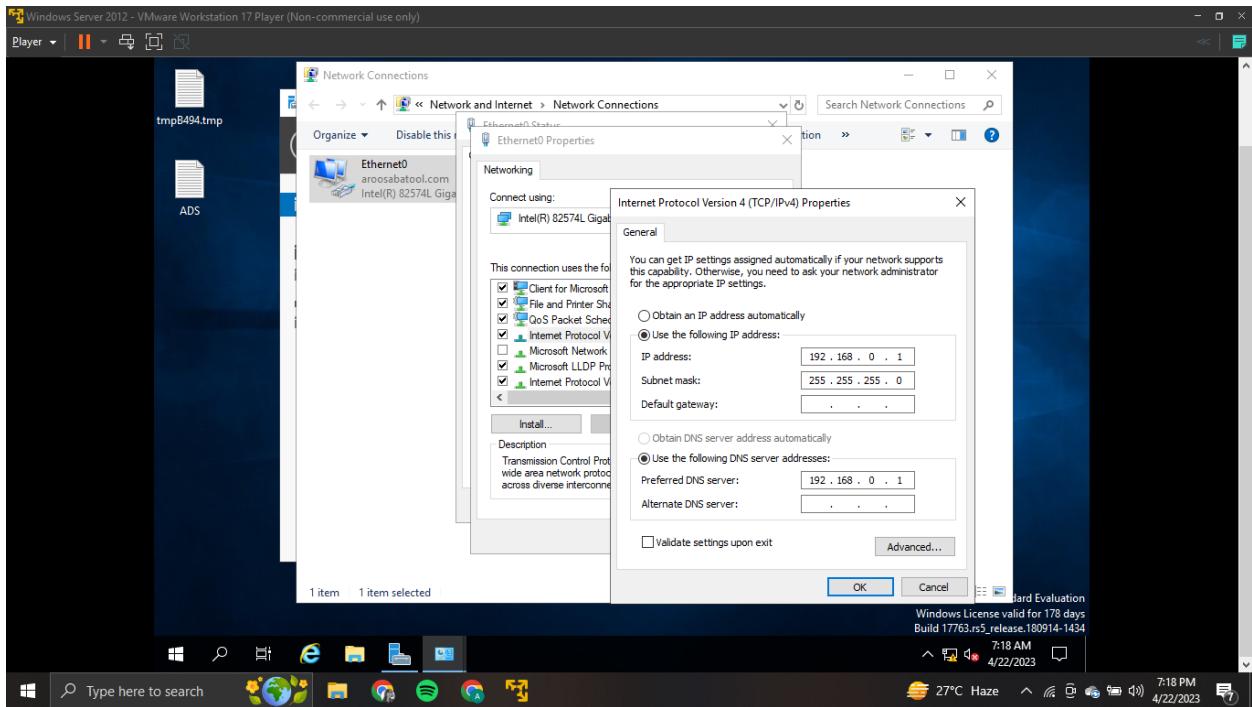




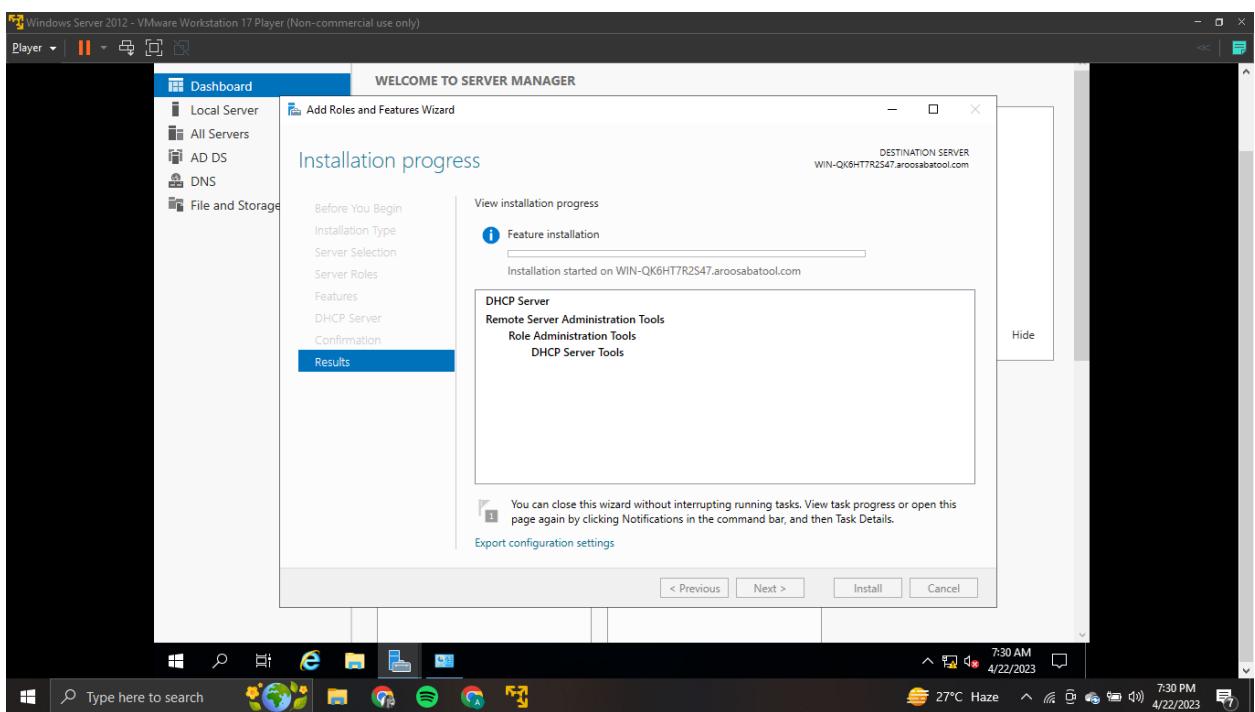
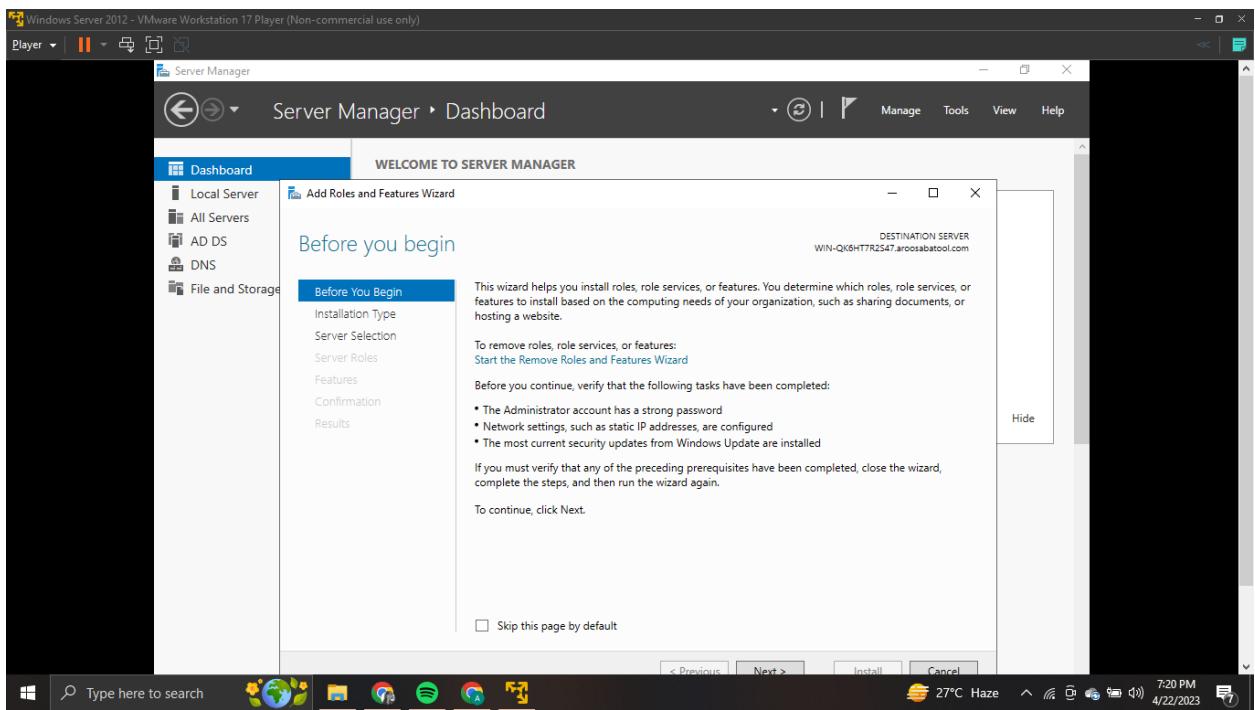


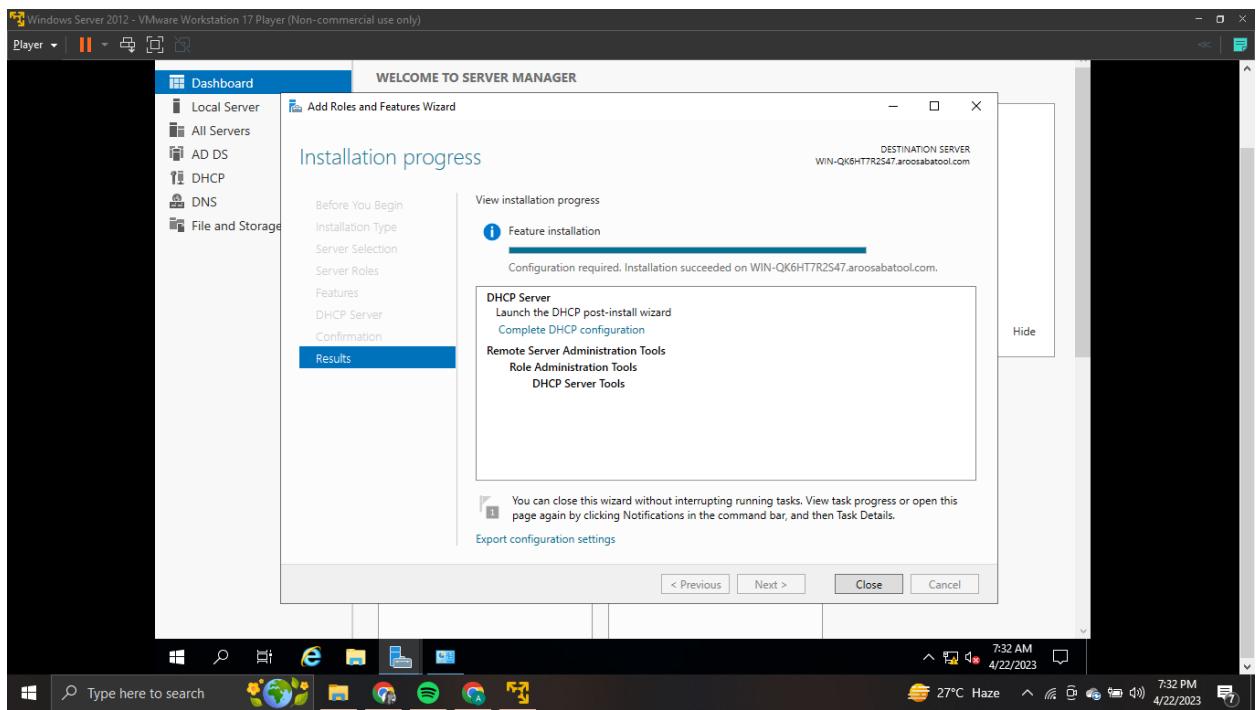


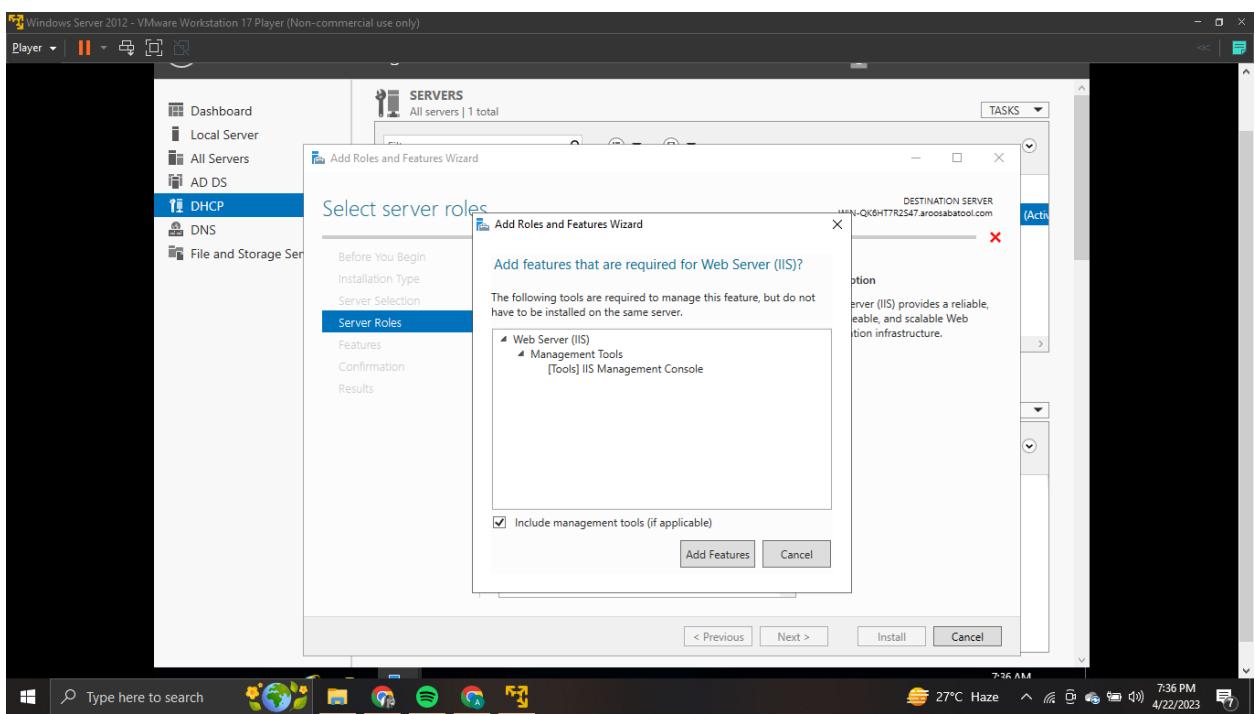
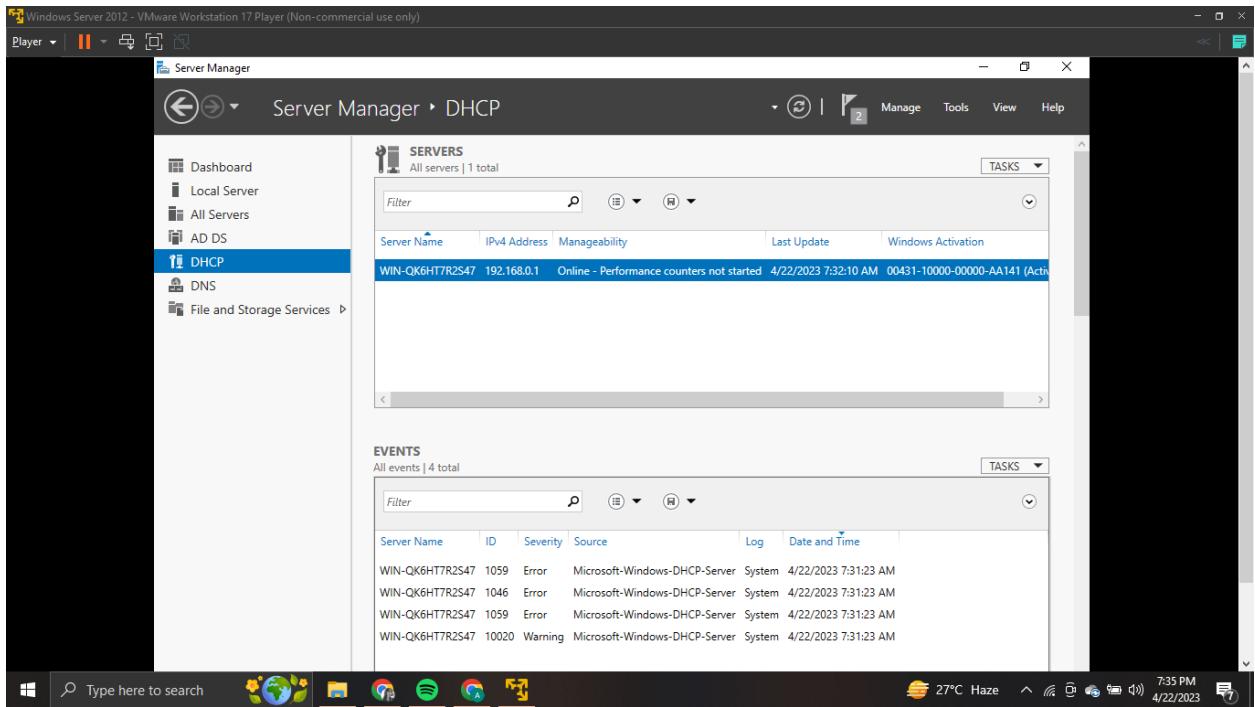
DHCP

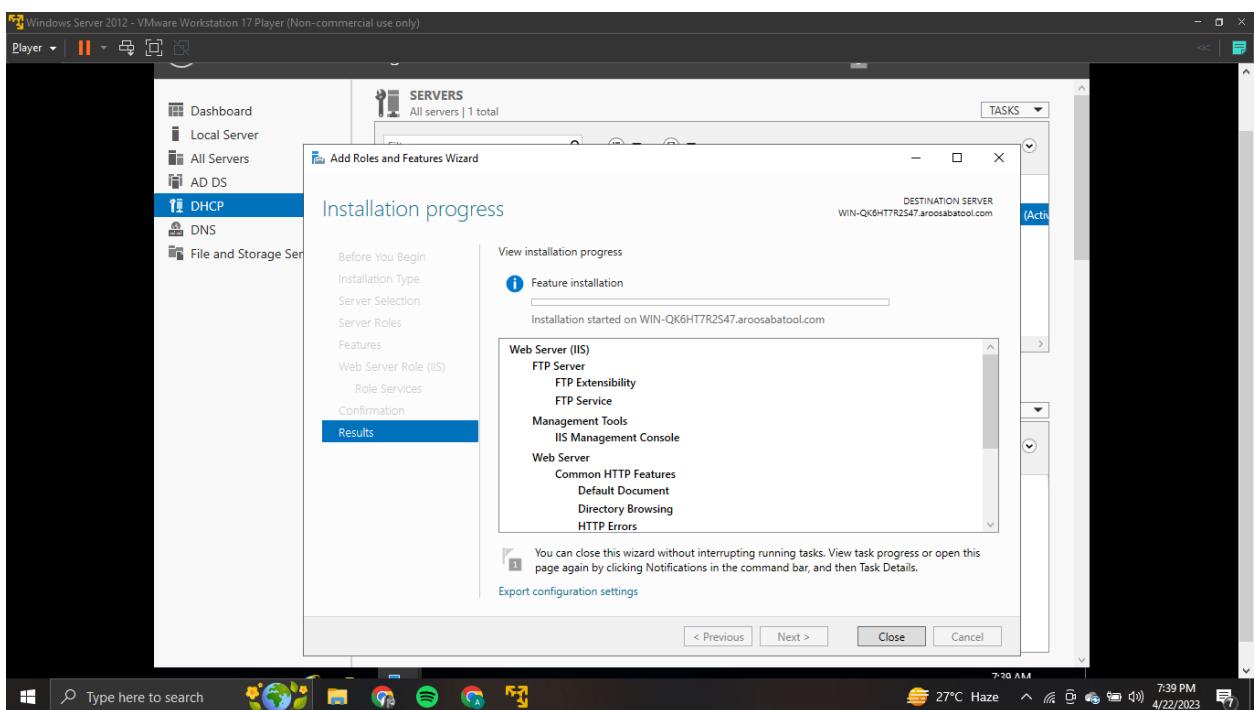
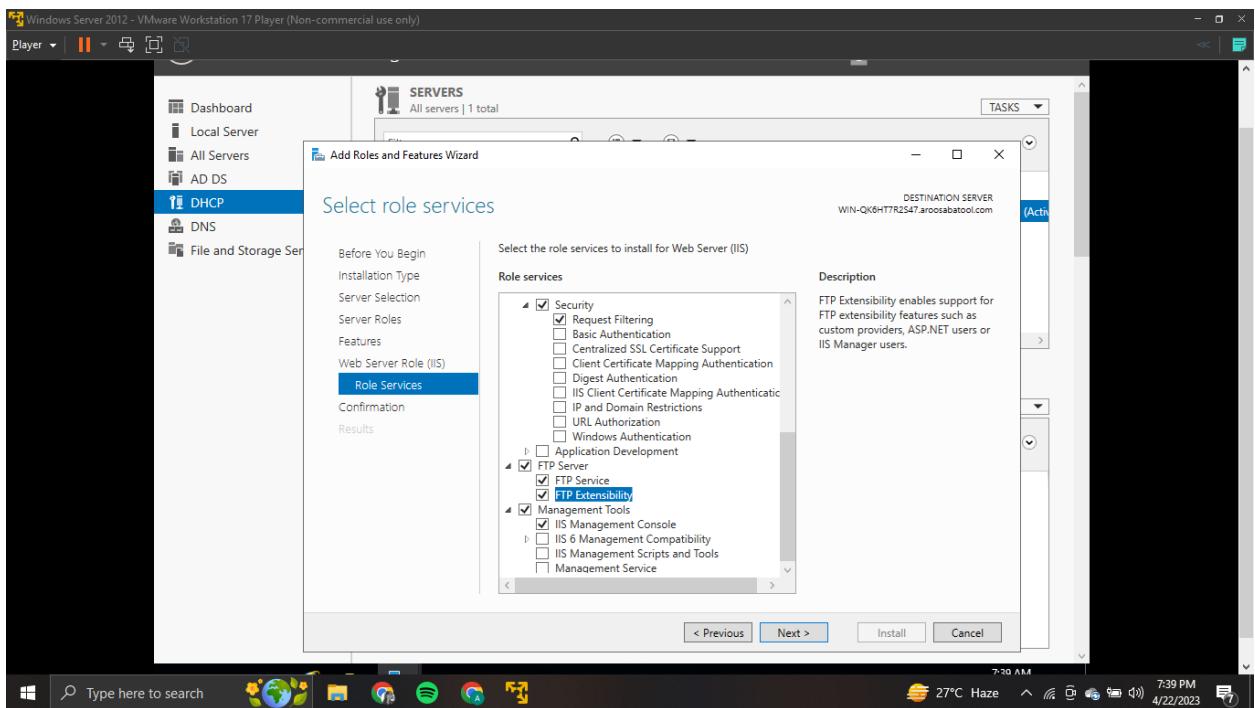


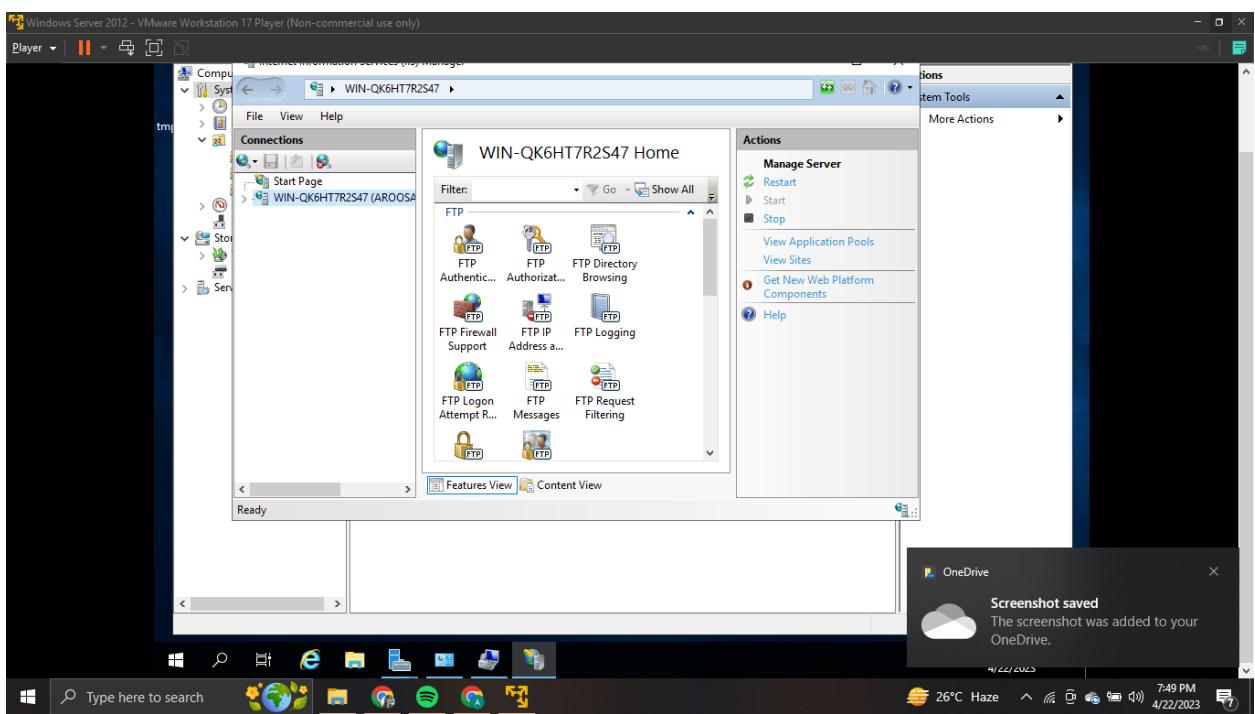
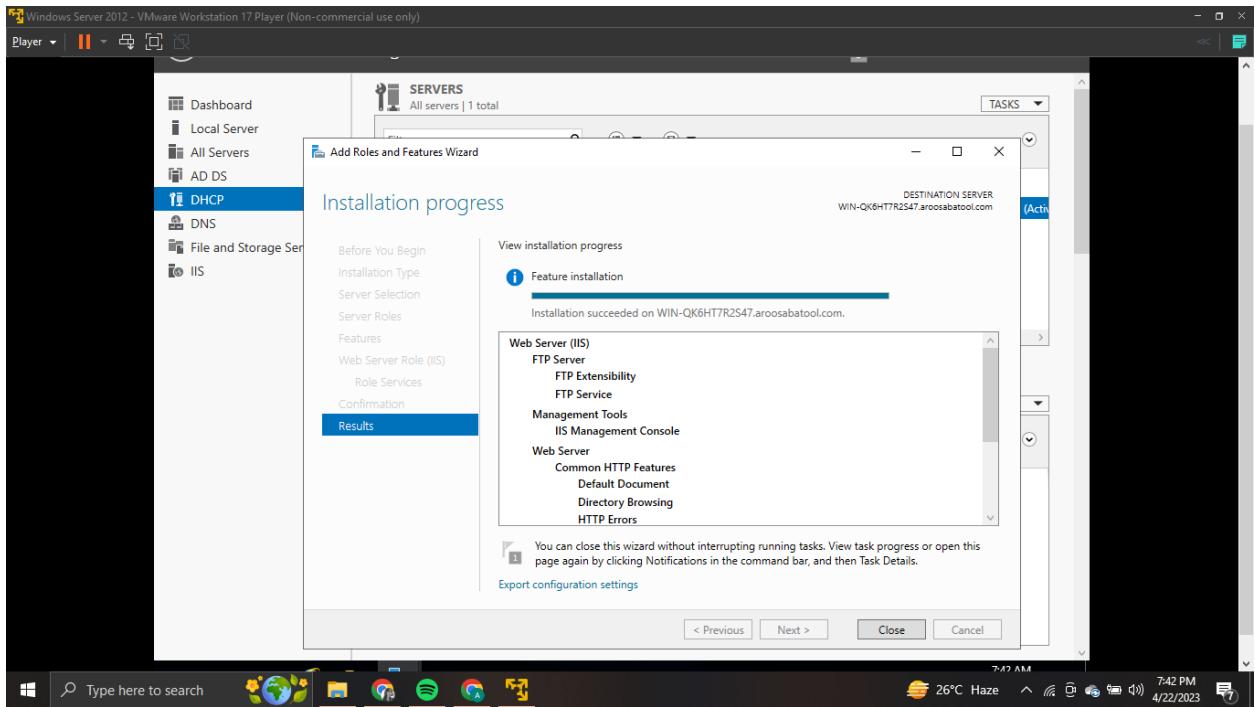
Setting static IP address

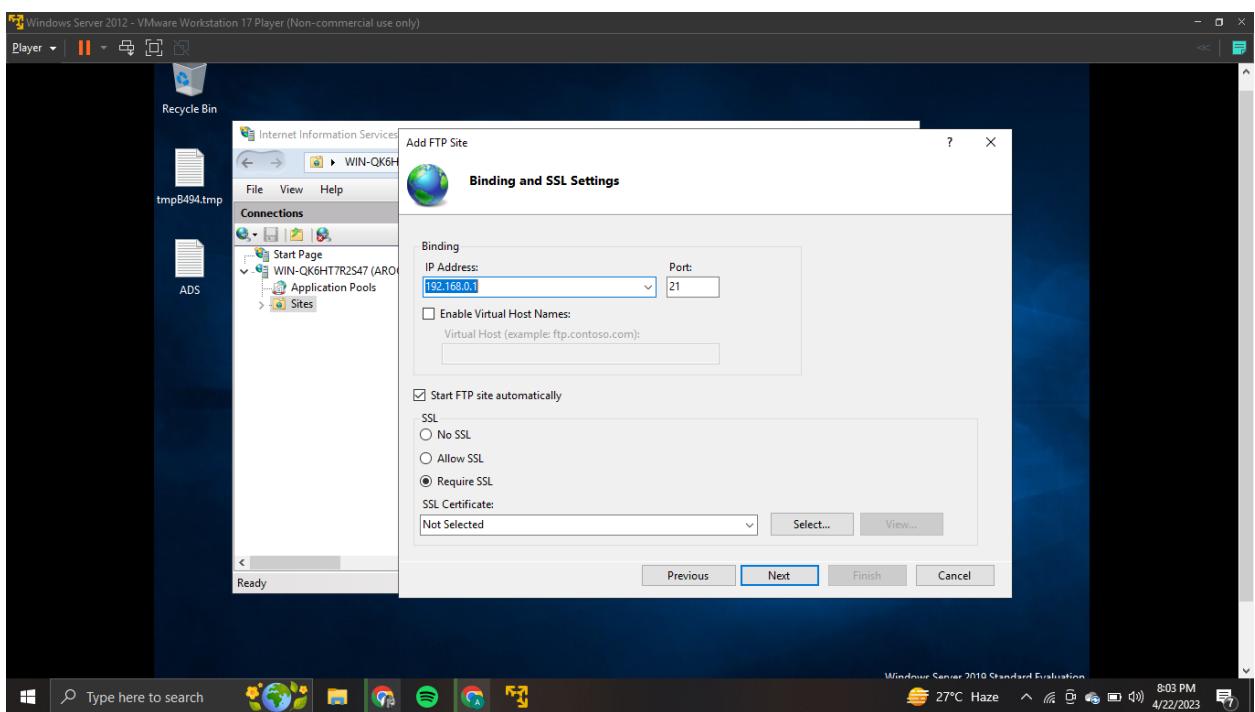
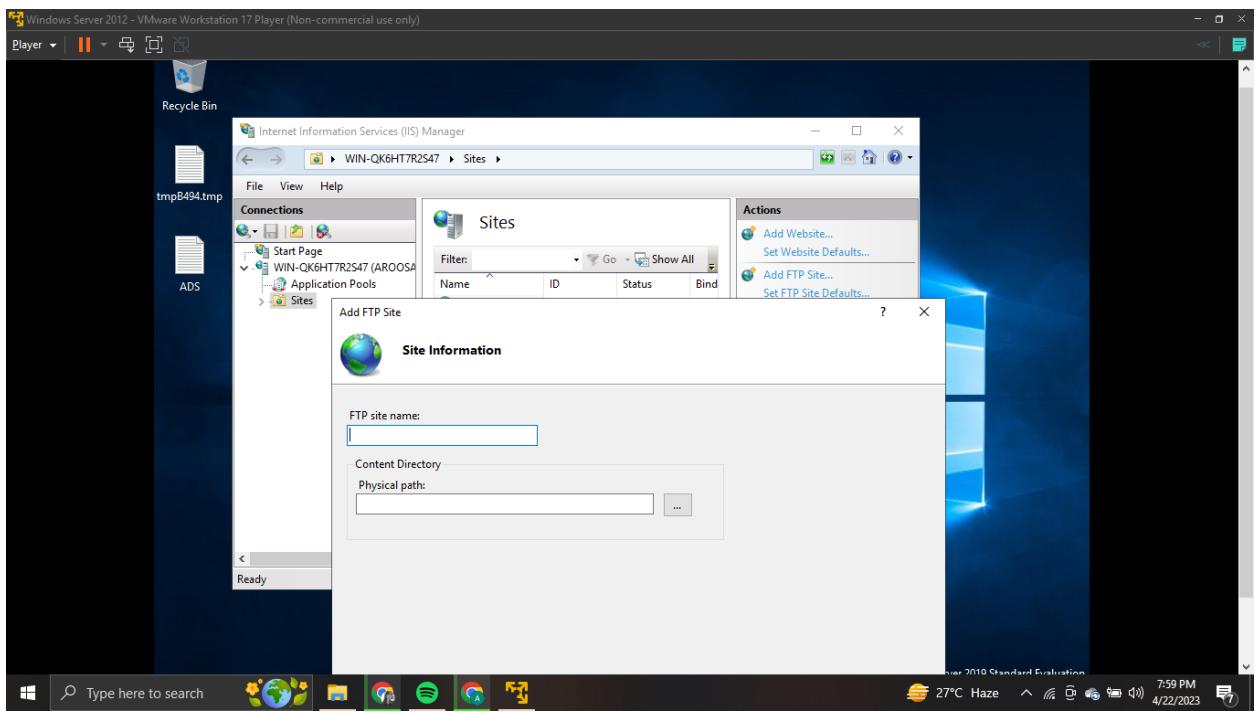


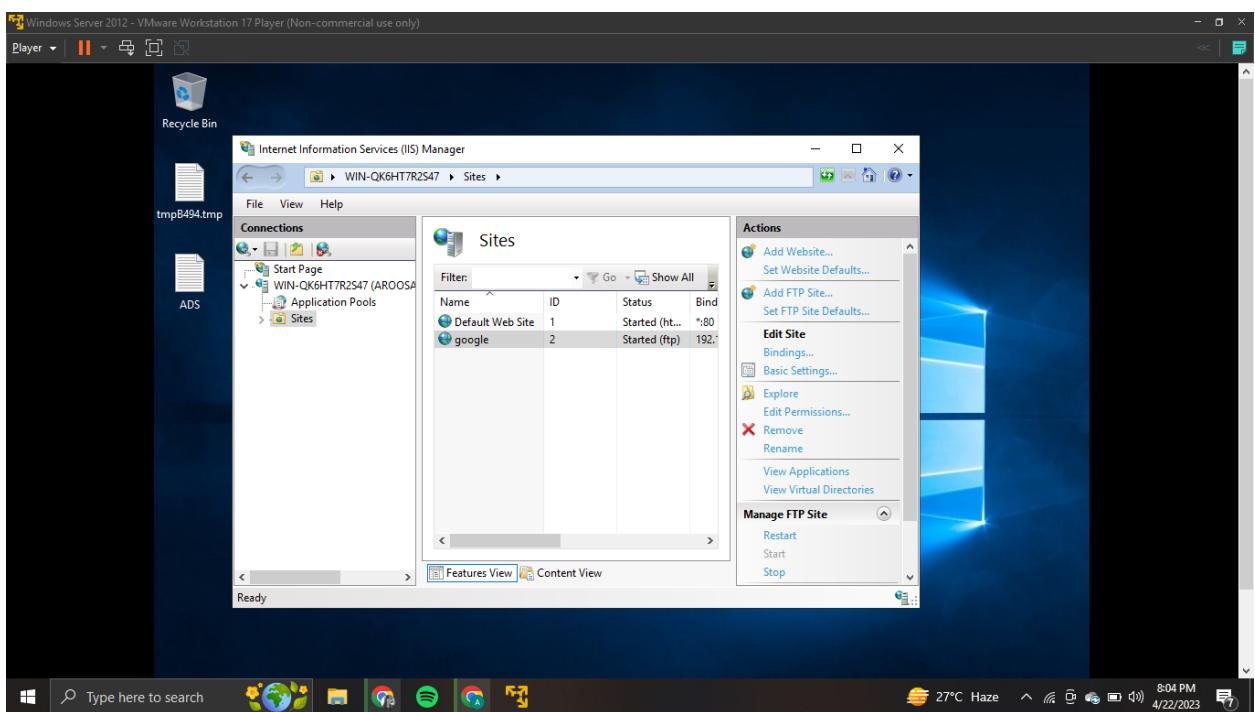
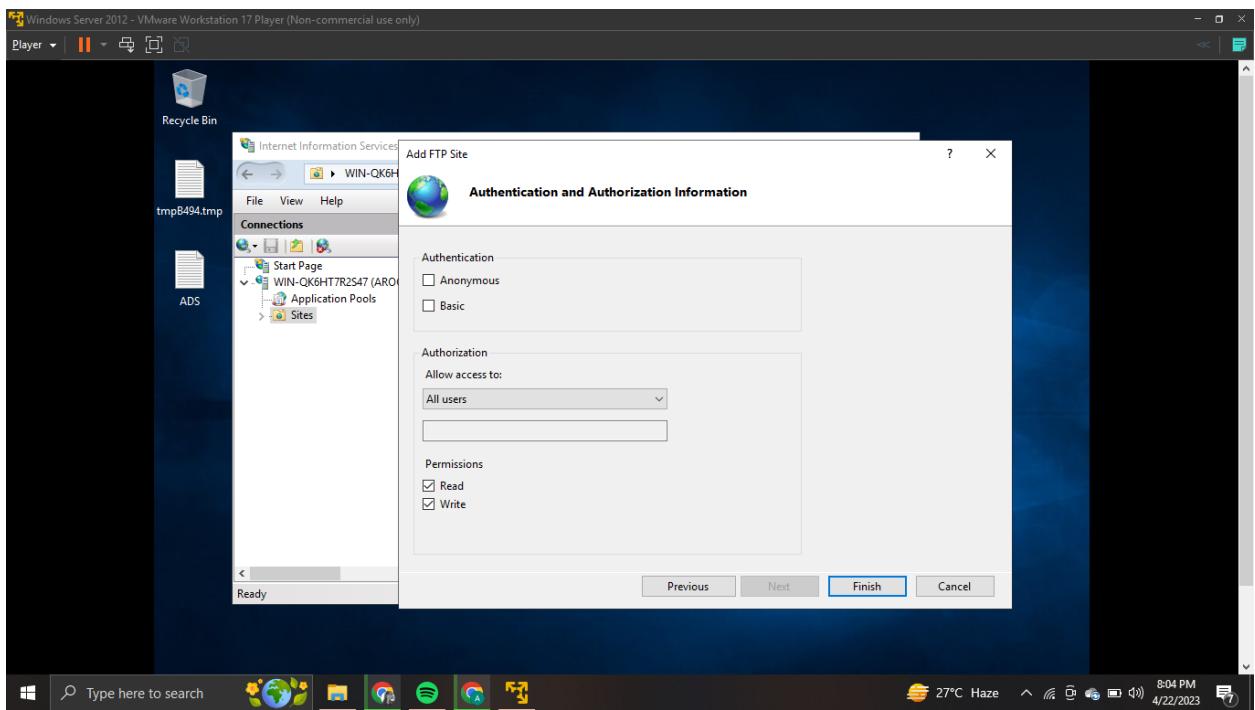












The screenshot shows a Windows 10 desktop environment. A Command Prompt window is open, displaying network diagnostic commands like ping and tracert. A OneDrive privacy update notification is visible in the bottom right corner. The taskbar at the bottom includes icons for File Explorer, Edge browser, Mail, Photos, and Task View, along with search and weather widgets.

```
Windows 10 x64 - VMware Workstation 17 Player (Non-commercial use only)
Player | < > < > < >
C:\> Command Prompt
Microsoft Windows [Version 10.0.19045.2006]
(c) Microsoft Corporation. All rights reserved.

C:\> ping 192.168.0.1

Pinging 192.168.0.1 with 32 bytes of data:
Reply from 192.168.0.1: bytes=32 time=35ms TTL=128
Reply from 192.168.0.1: bytes=32 time=73ms TTL=128
Reply from 192.168.0.1: bytes=32 time=13ms TTL=128
Reply from 192.168.0.1: bytes=32 time=92ms TTL=128

Ping statistics for 192.168.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
        Minimum = 13ms, Maximum = 92ms, Average = 53ms

C:\> ping google.com

Pinging google.com [142.250.181.174] with 32 bytes of data:
Reply from 142.250.181.174: bytes=32 time=33ms TTL=128
Reply from 142.250.181.174: bytes=32 time=52ms TTL=128
Reply from 142.250.181.174: bytes=32 time=129ms TTL=128
Reply from 142.250.181.174: bytes=32 time=95ms TTL=128

Ping statistics for 142.250.181.174:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
        Minimum = 33ms, Maximum = 129ms, Average = 77ms

C:\>
```

DHCP working

```
Windows 10 x64 - VMware Workstation 17 Player (Non-commercial use only)
Player | ||| Recycle Bin | x
Recycle Bin
Command Prompt
Microsoft Windows [Version 10.0.19045.2006]
(c) Microsoft Corporation. All rights reserved.

MicroC:\Users\batoo>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet0:

Connection-specific DNS Suffix . : localdomain
Link-local IPv6 Address . . . . . : fe80::8c91:c905:9837:d64e%2
Autoconfiguration IPv4 Address . . . . . : 169.254.214.78
Subnet Mask . . . . . : 255.255.0.0
Default Gateway . . . . . :

Ethernet adapter Ethernet1:

Connection-specific DNS Suffix . : localdomain
Link-local IPv6 Address . . . . . : fe80::3ccf:3c0:7c67:522a%4
IPv4 Address . . . . . : 192.168.247.132
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.247.2

Ethernet adapter Bluetooth Network Connection:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . : C:\Users\batoo>

Activate Windows
Go to Settings to activate Windows.

3:15 PM 4/24/2023
```

DNS working

```
Windows 10 x64 - VMware Workstation 17 Player (Non-commercial use only)
Player | ||| Recycle Bin | x
Recycle Bin
Command Prompt
Microsoft Windows [Version 10.0.19045.2006]
(c) Microsoft Corporation. All rights reserved.

MicroC:\Users\batoo>nslookup www.google.com

Server: Unknown
Address: 192.168.247.2

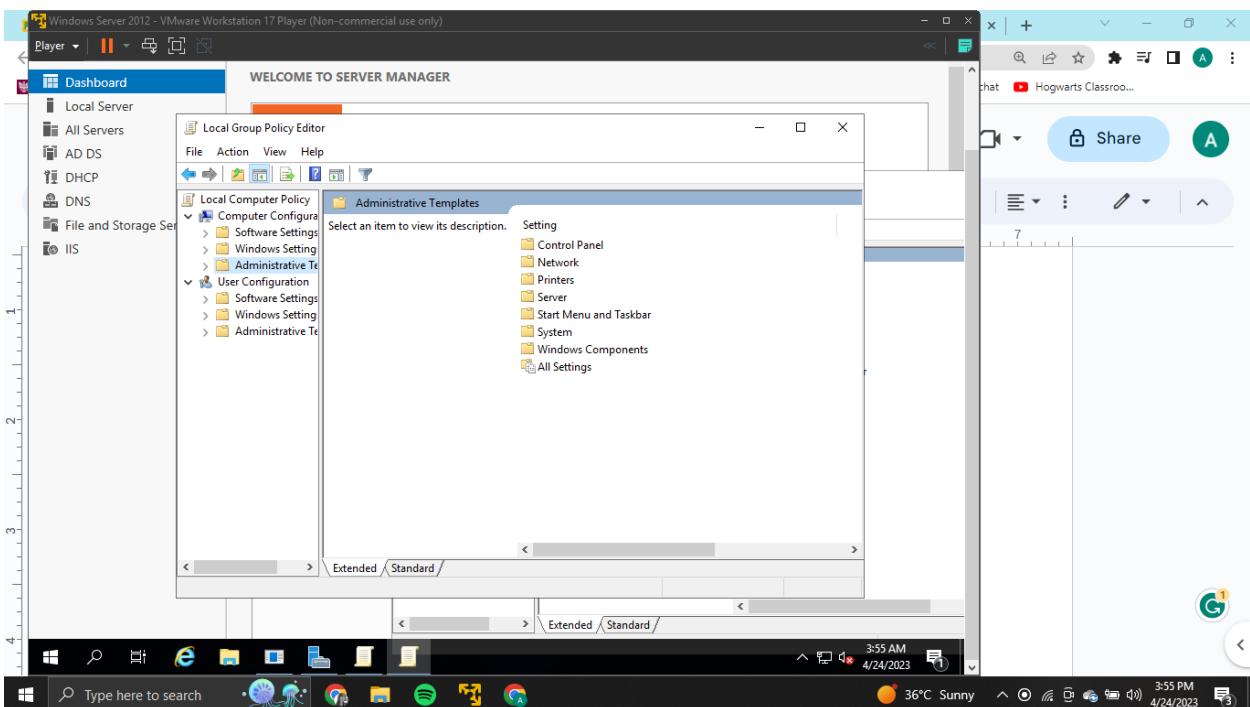
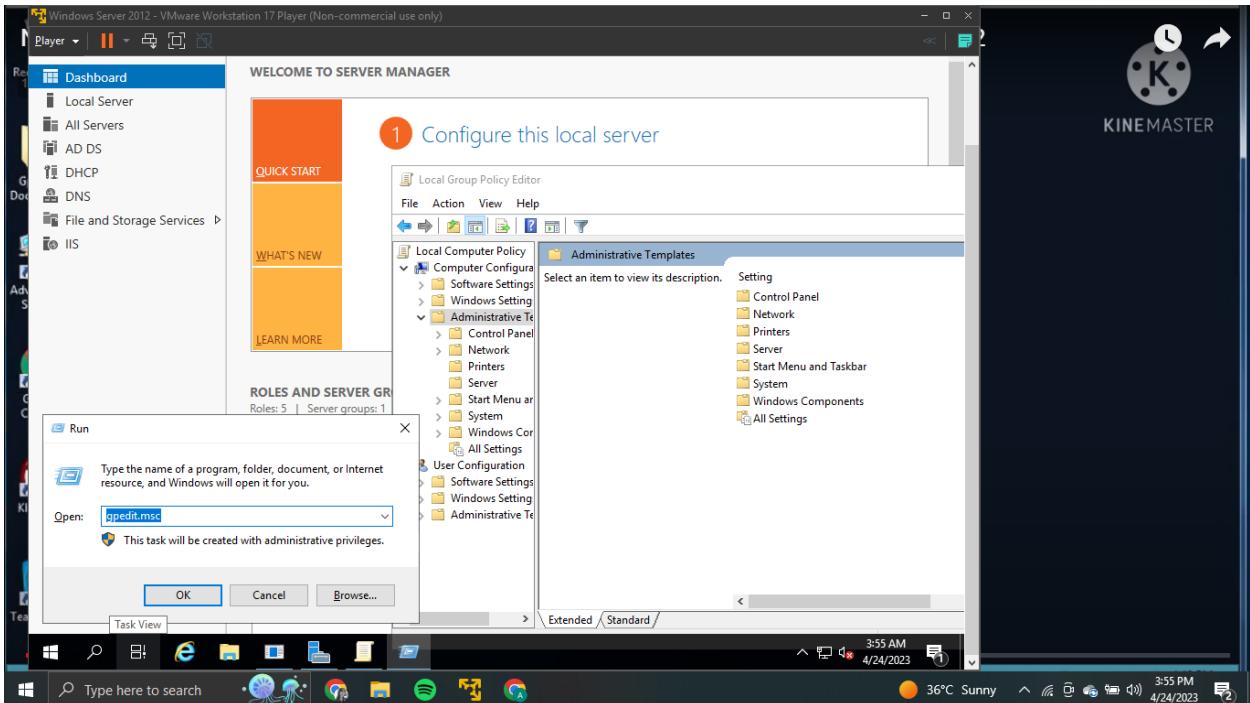
Non-authoritative answer:
Name: www.google.com
Addresses: 2a00:1450:4018:806::2004
142.250.181.164

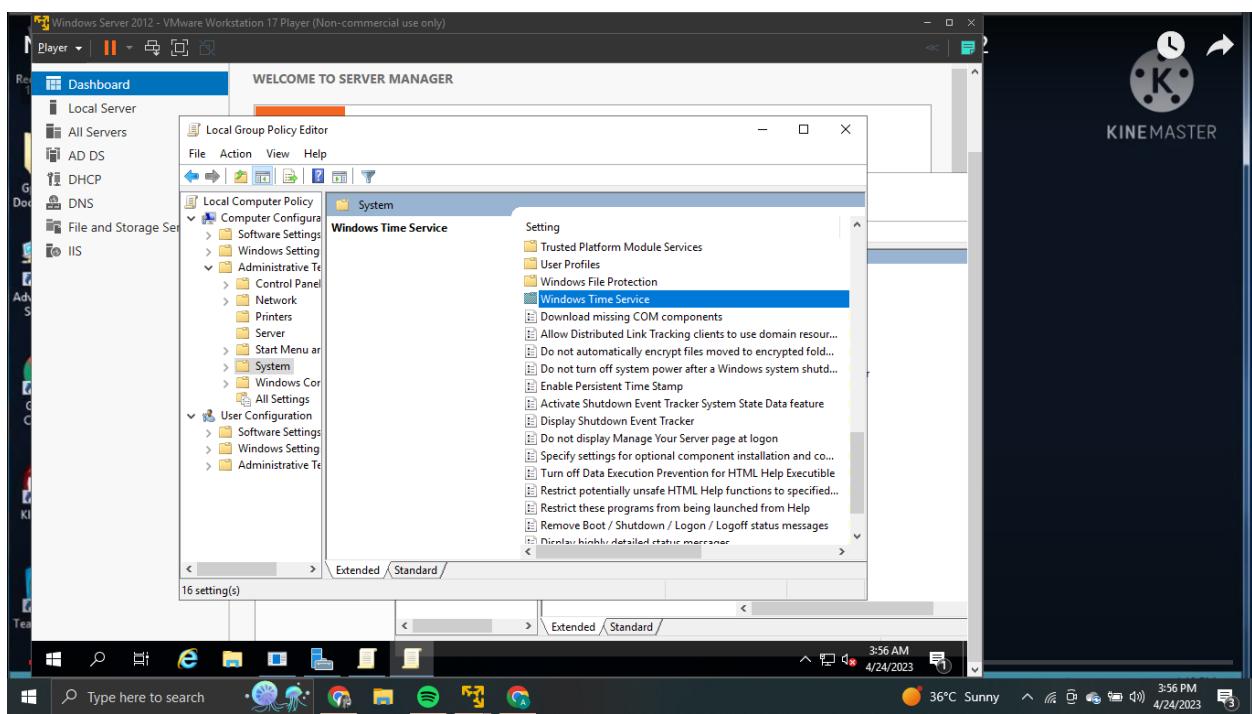
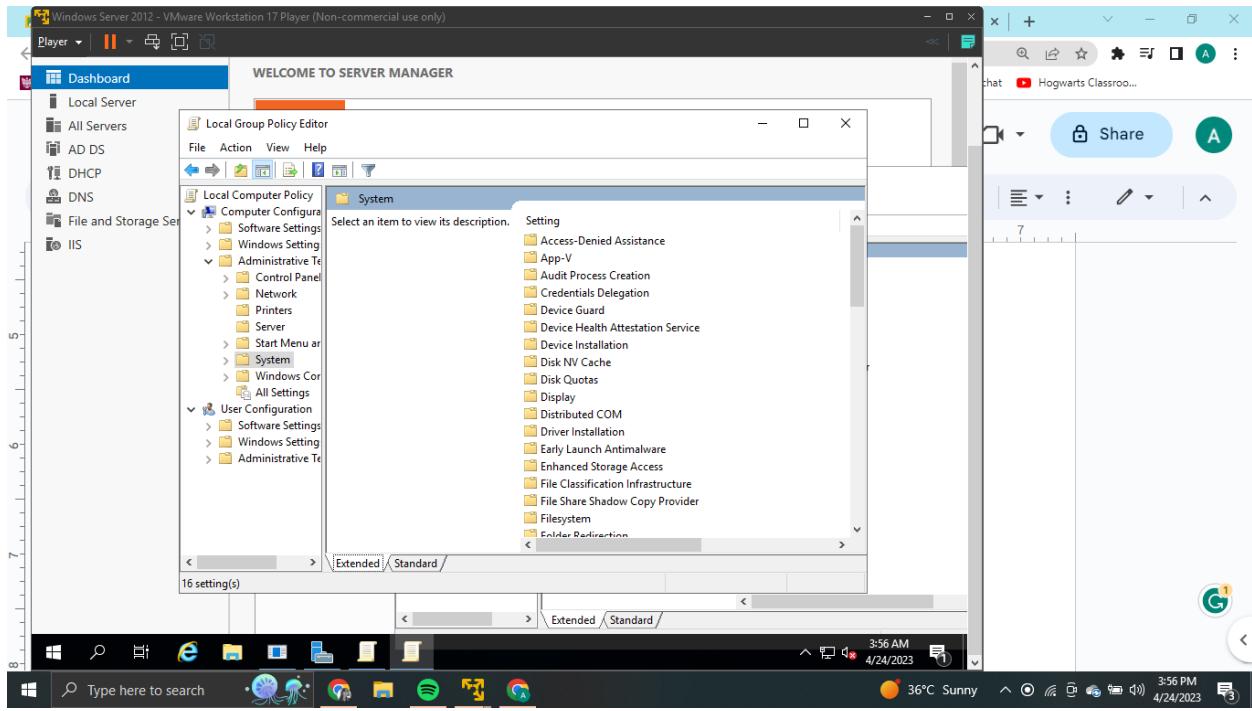
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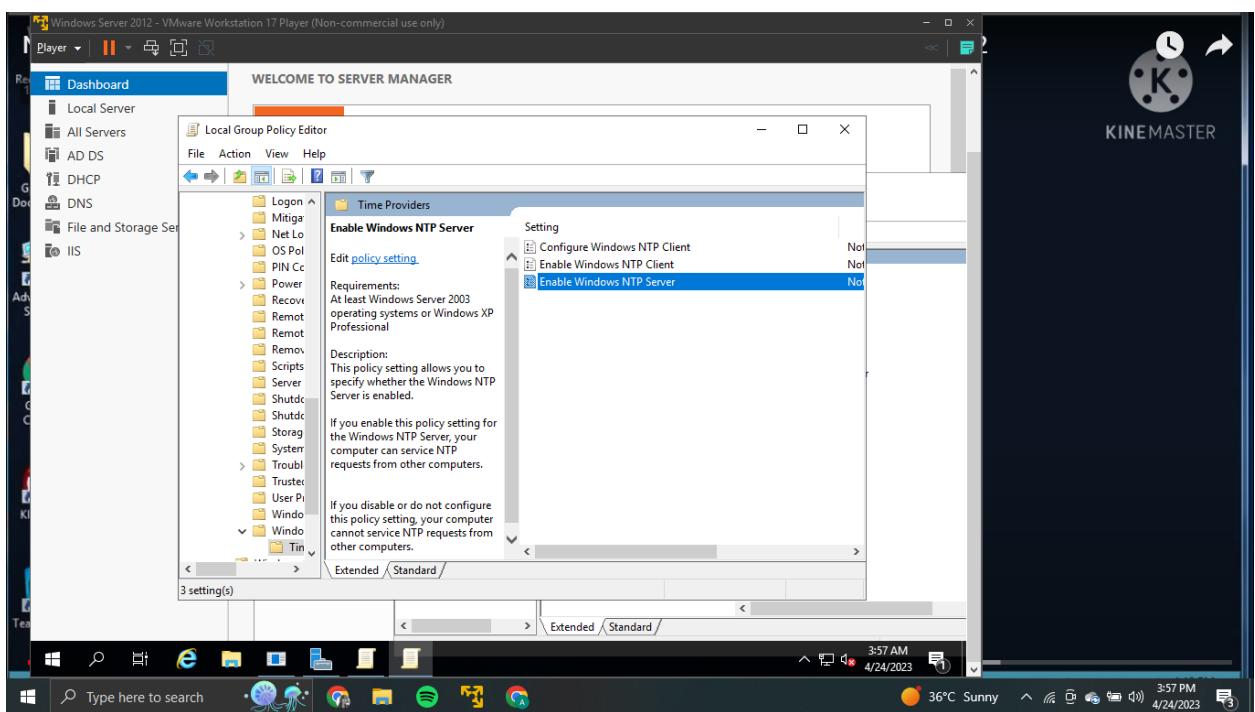
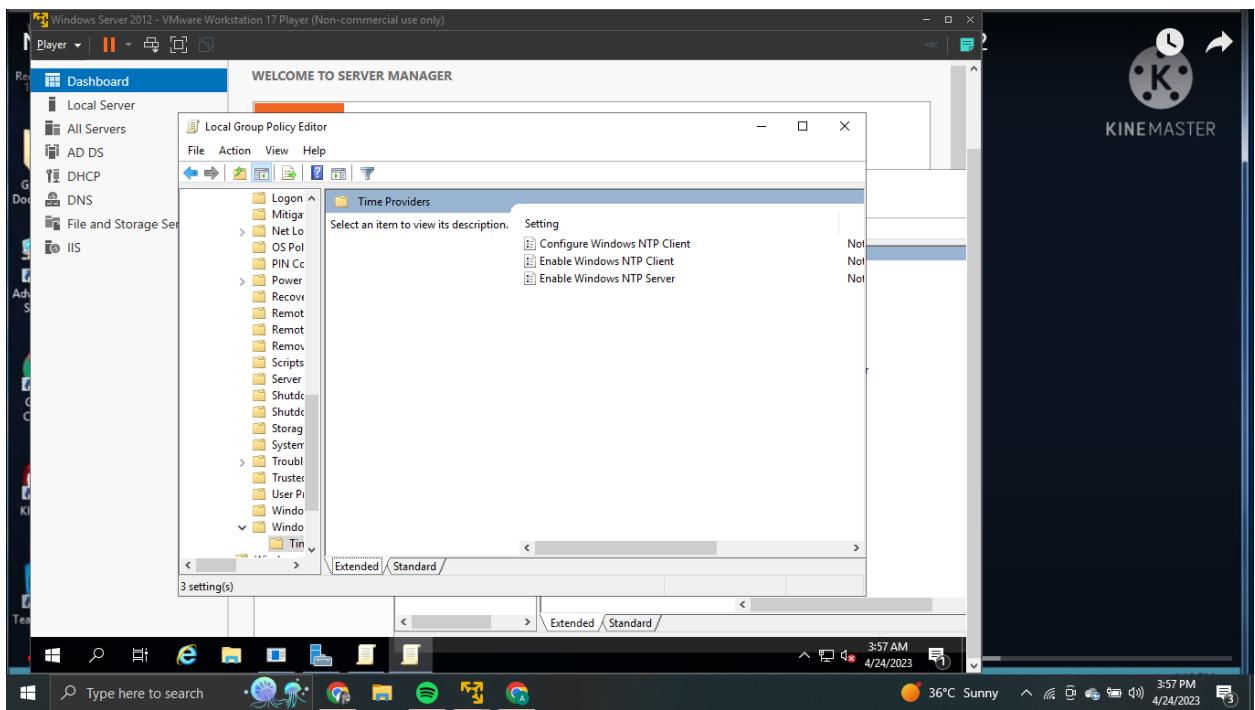
Activate Windows
Go to Settings to activate Windows.

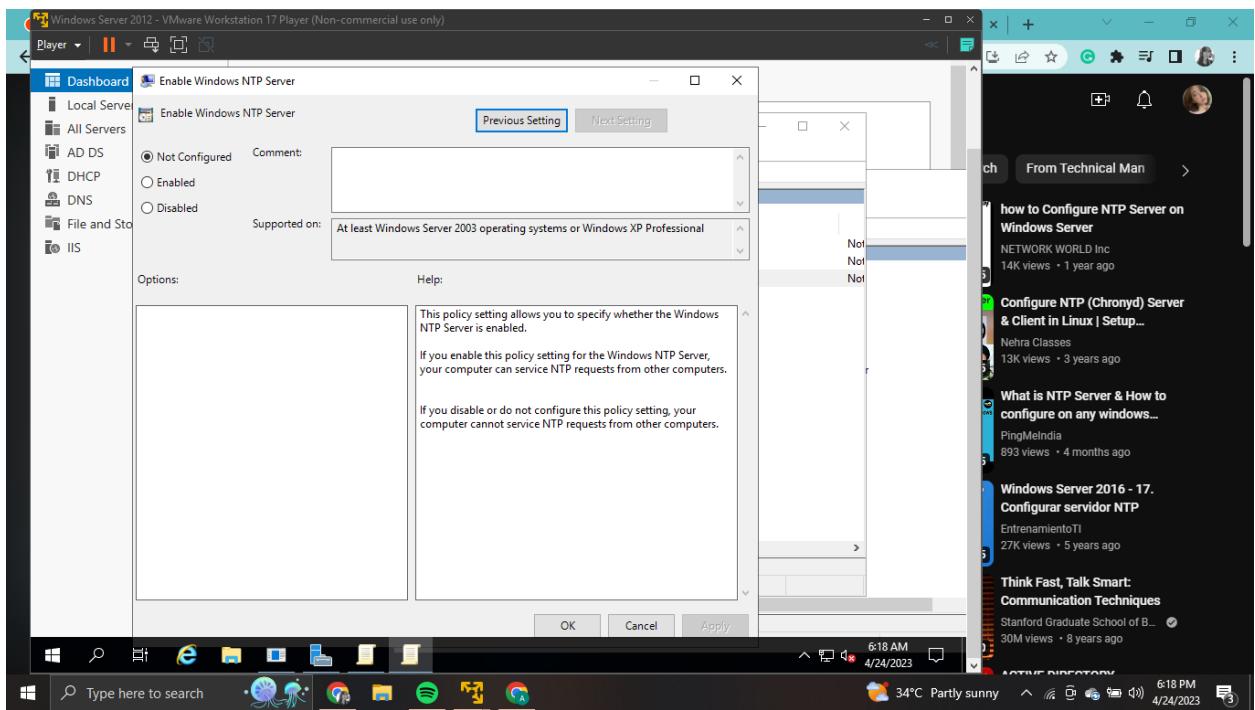
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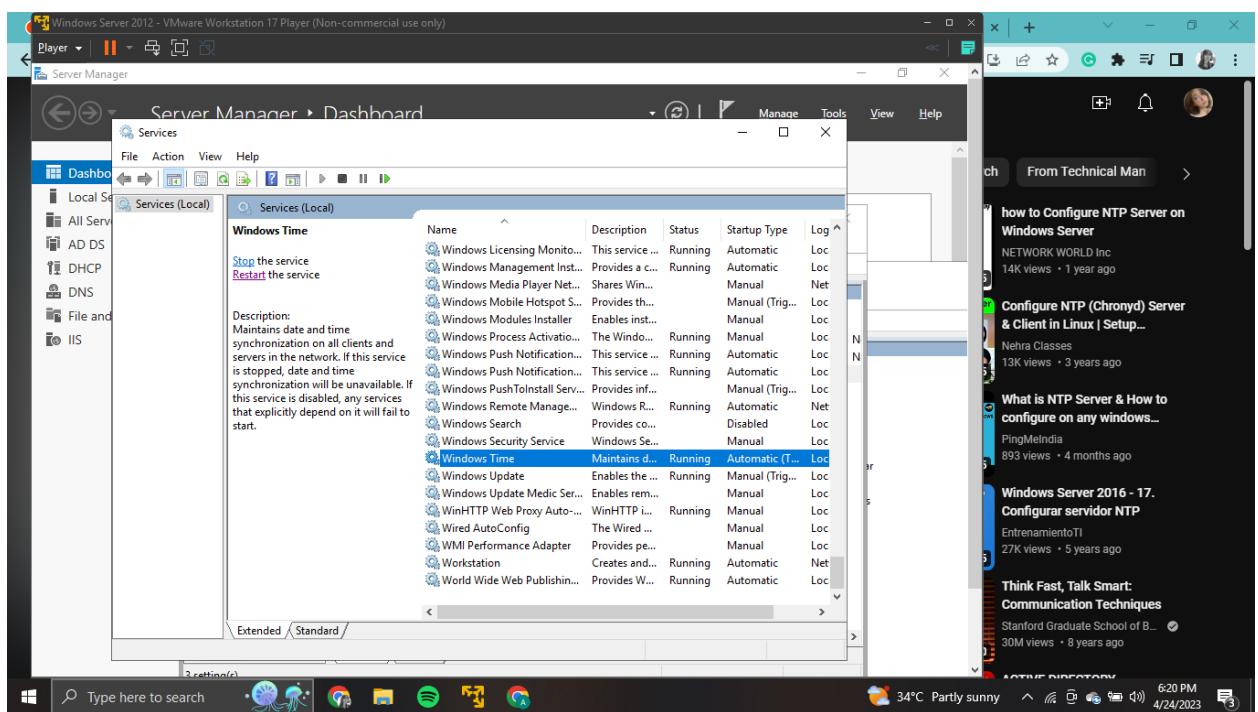
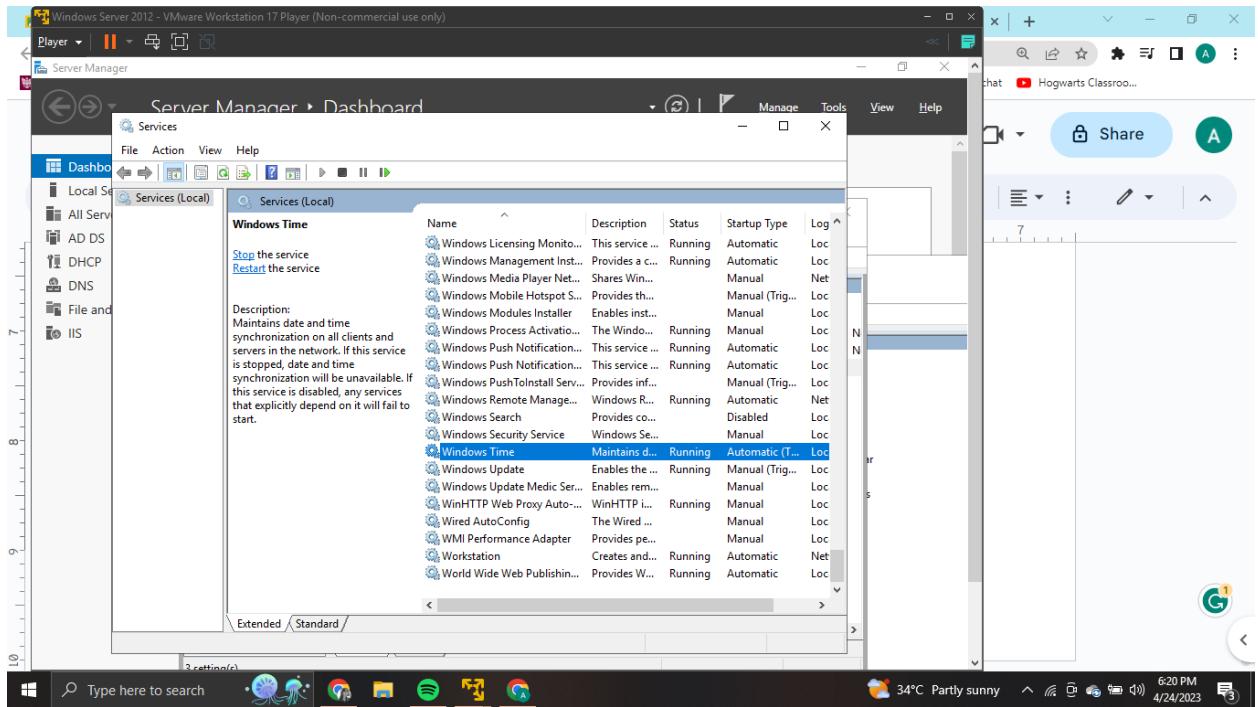
NTP

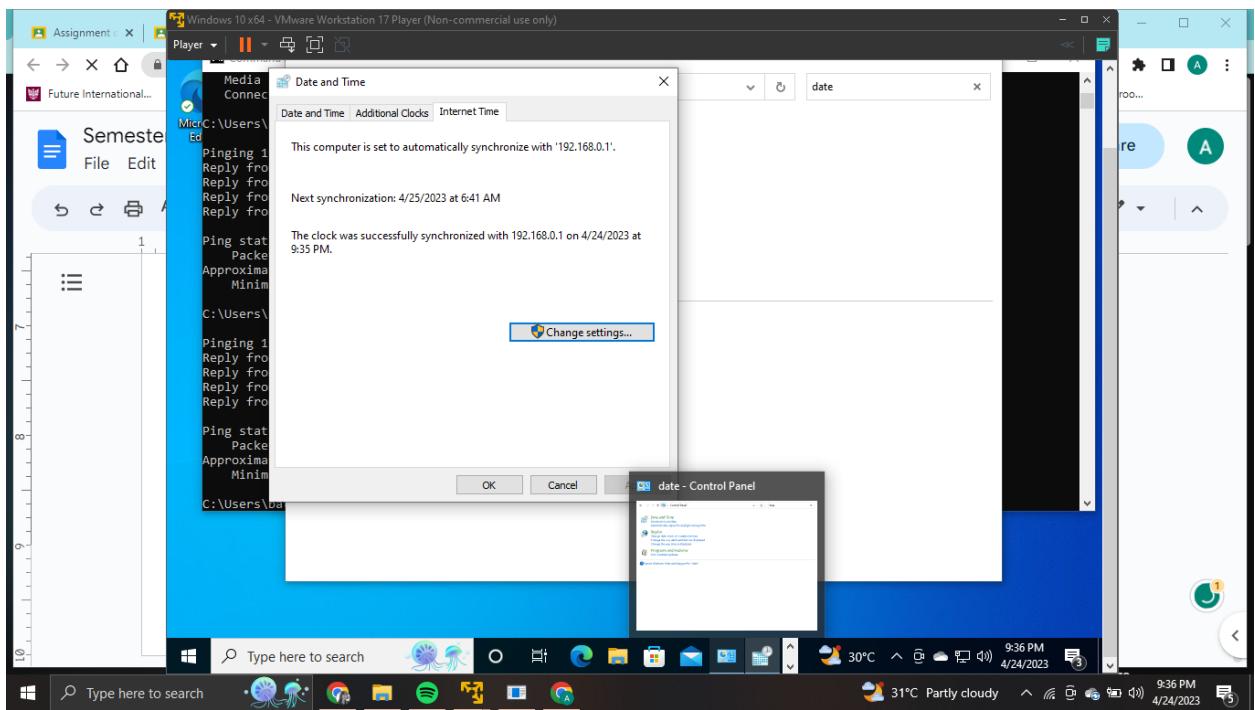




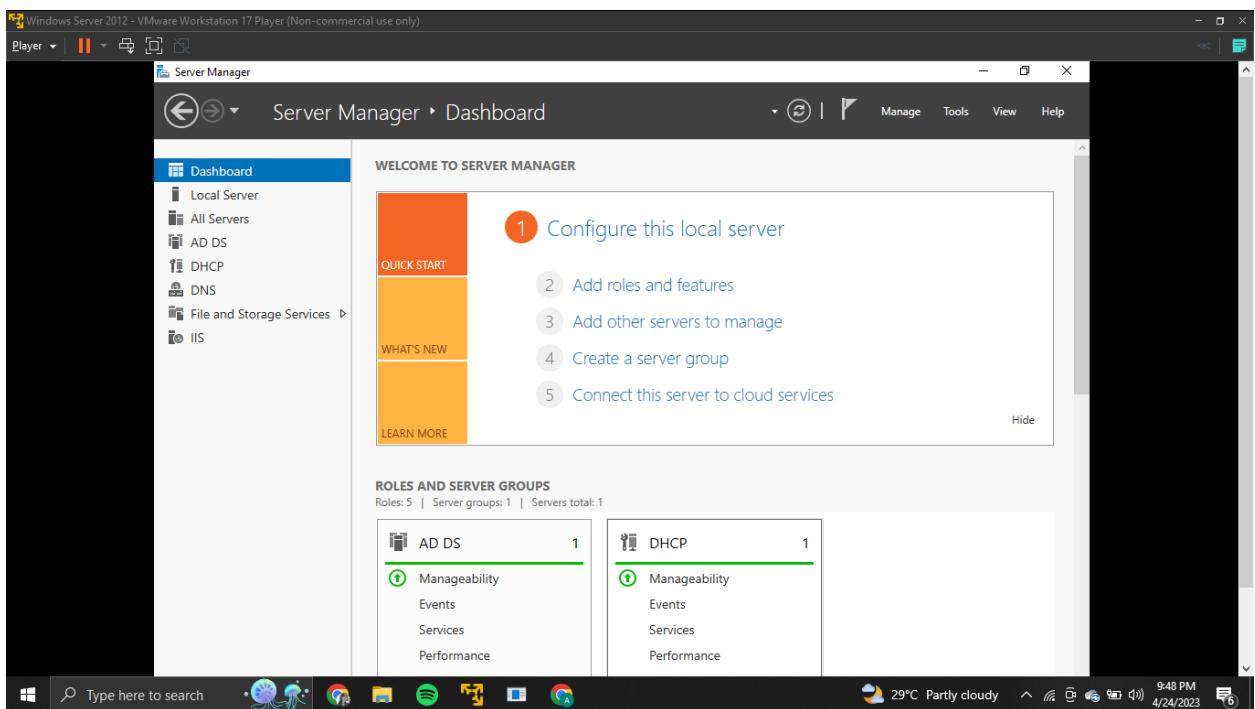


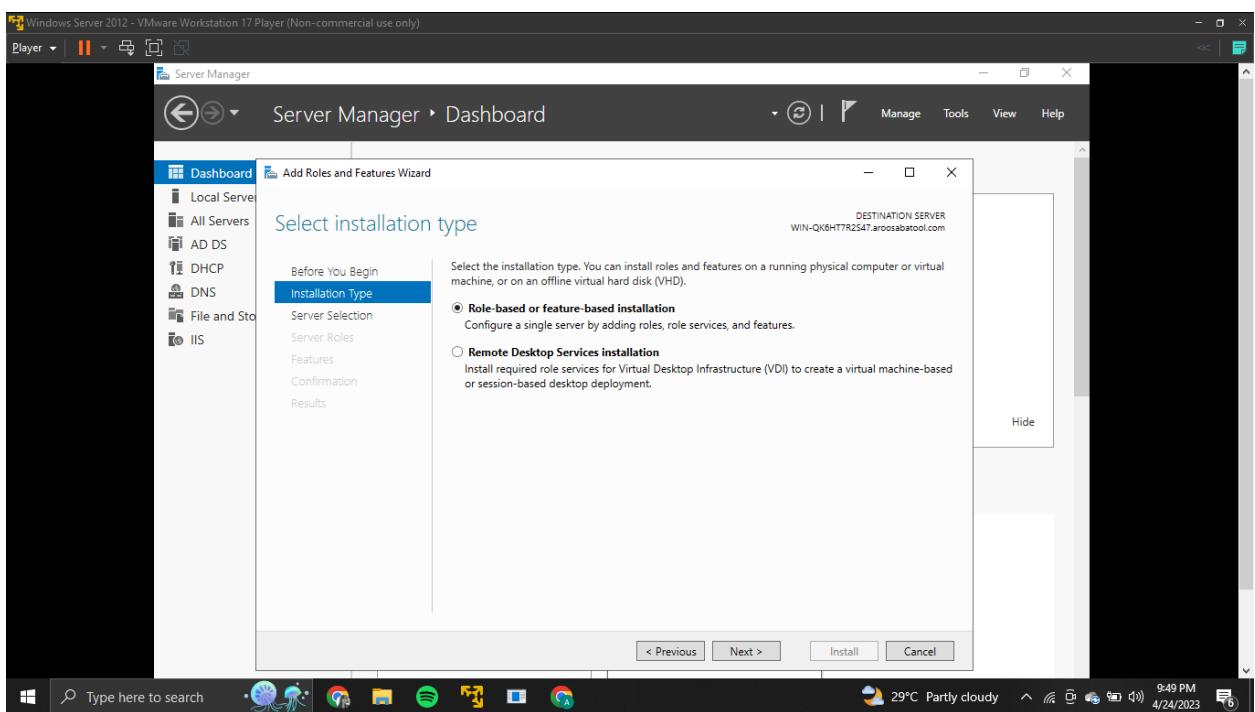
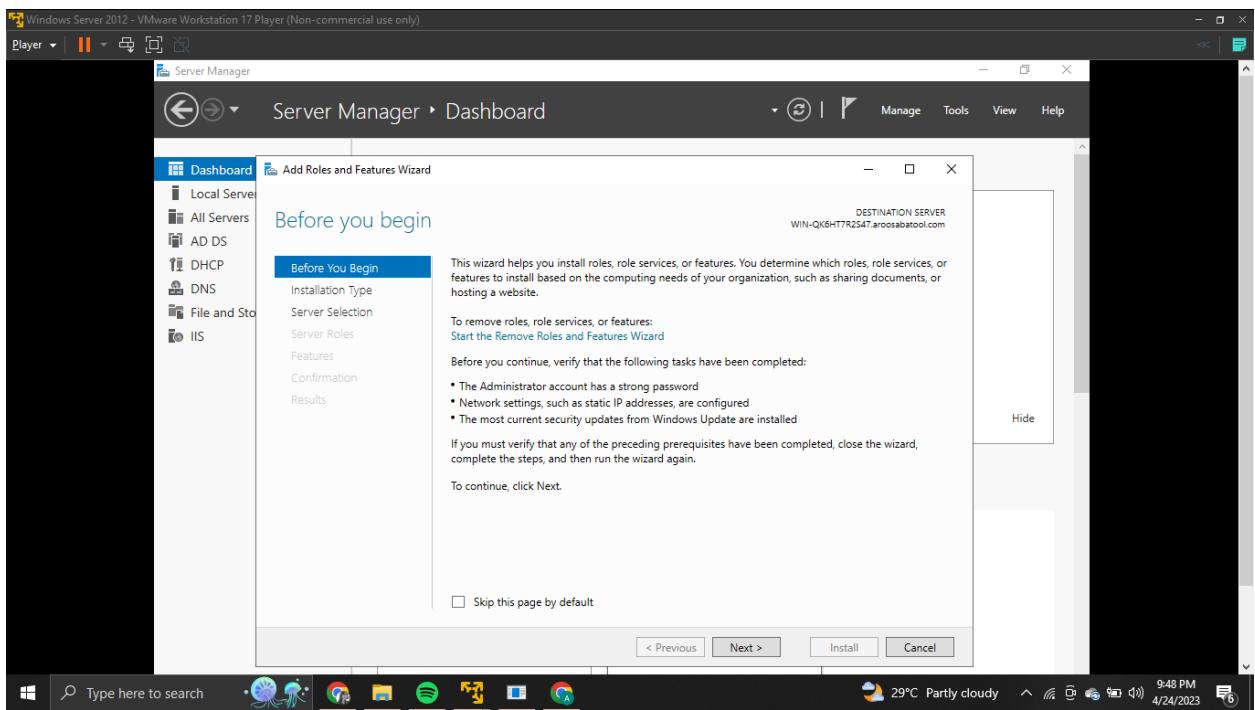


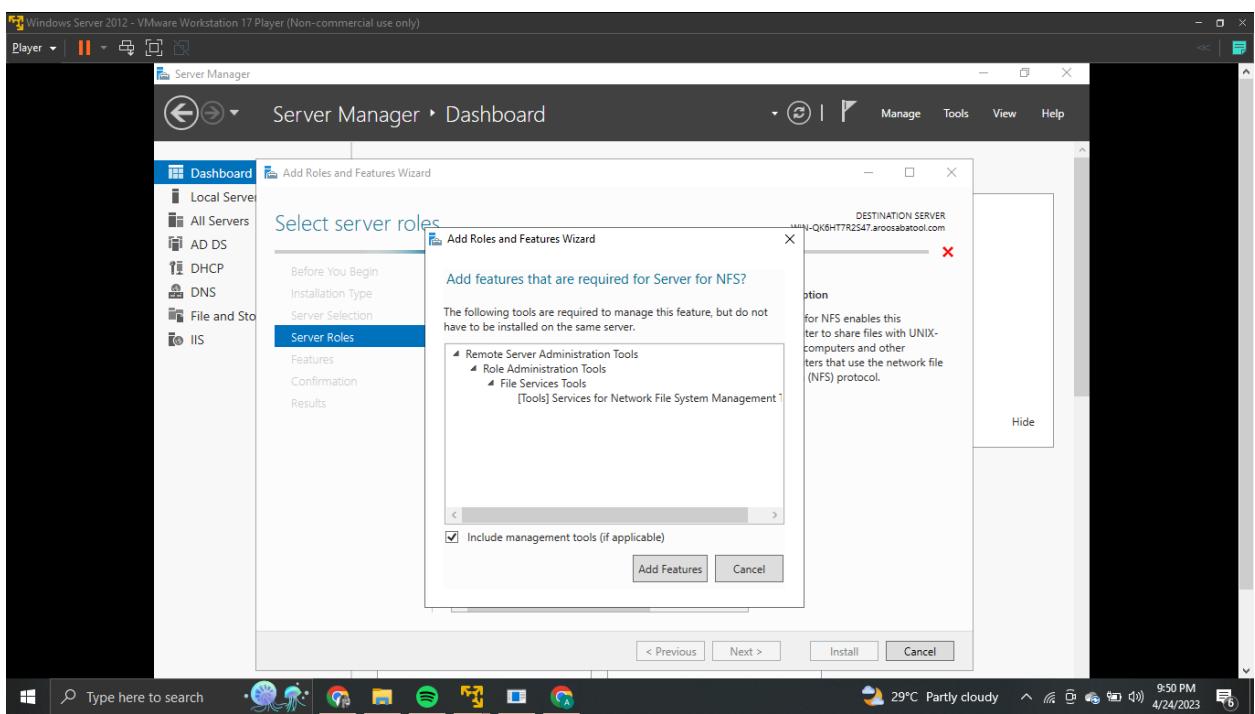
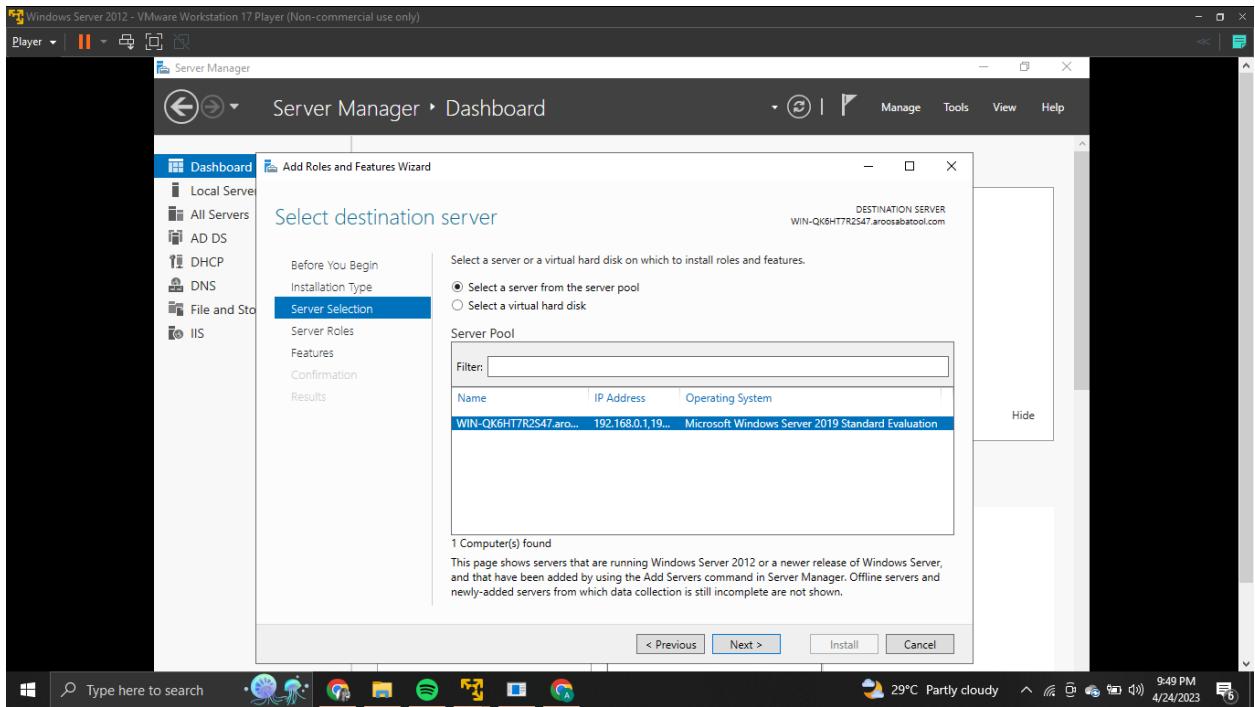


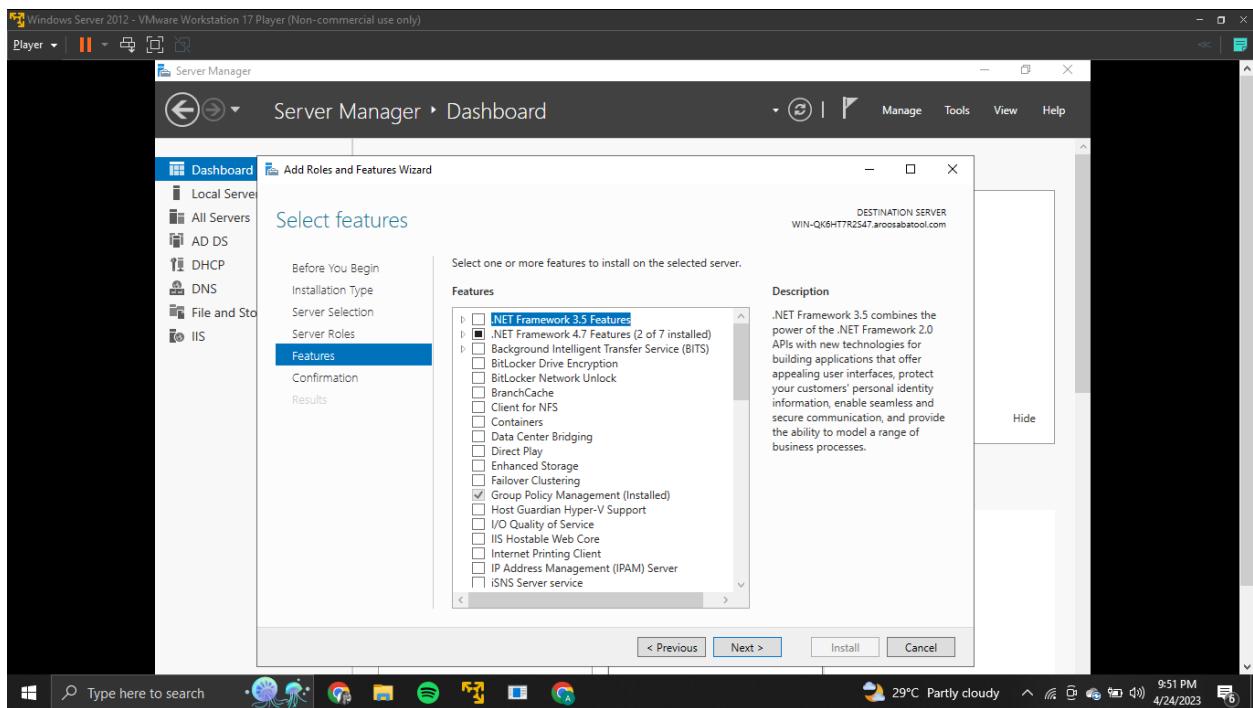


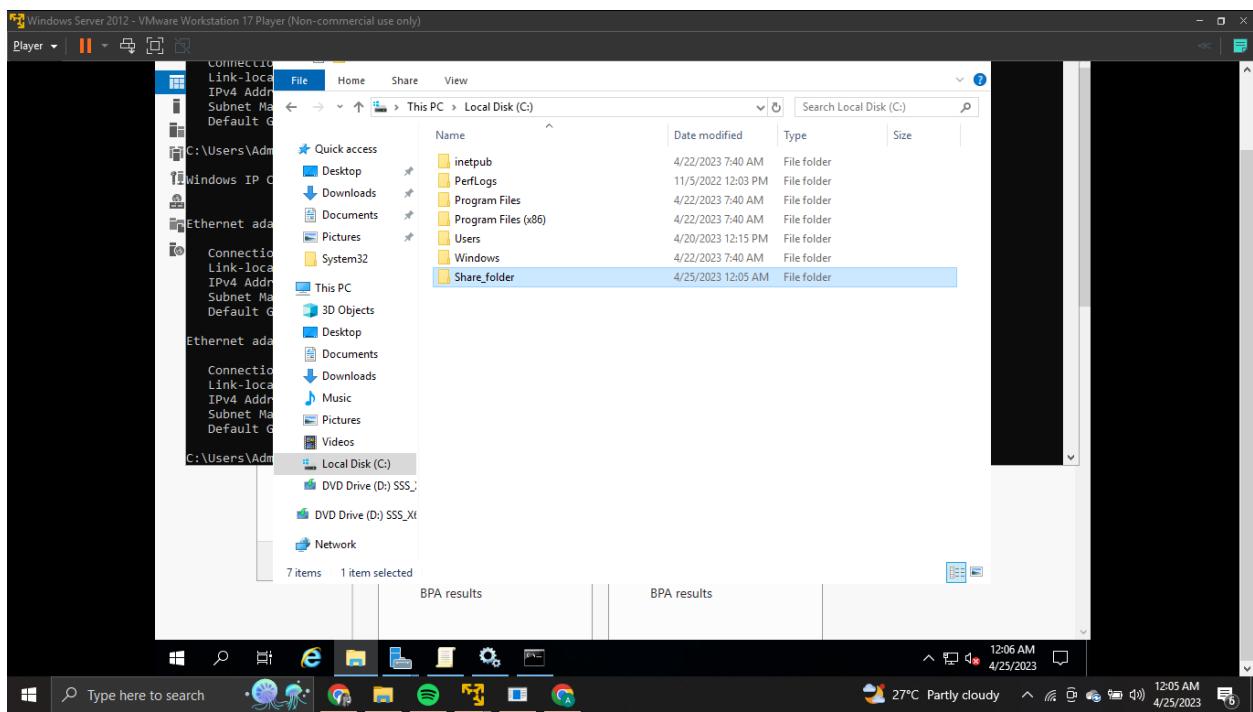
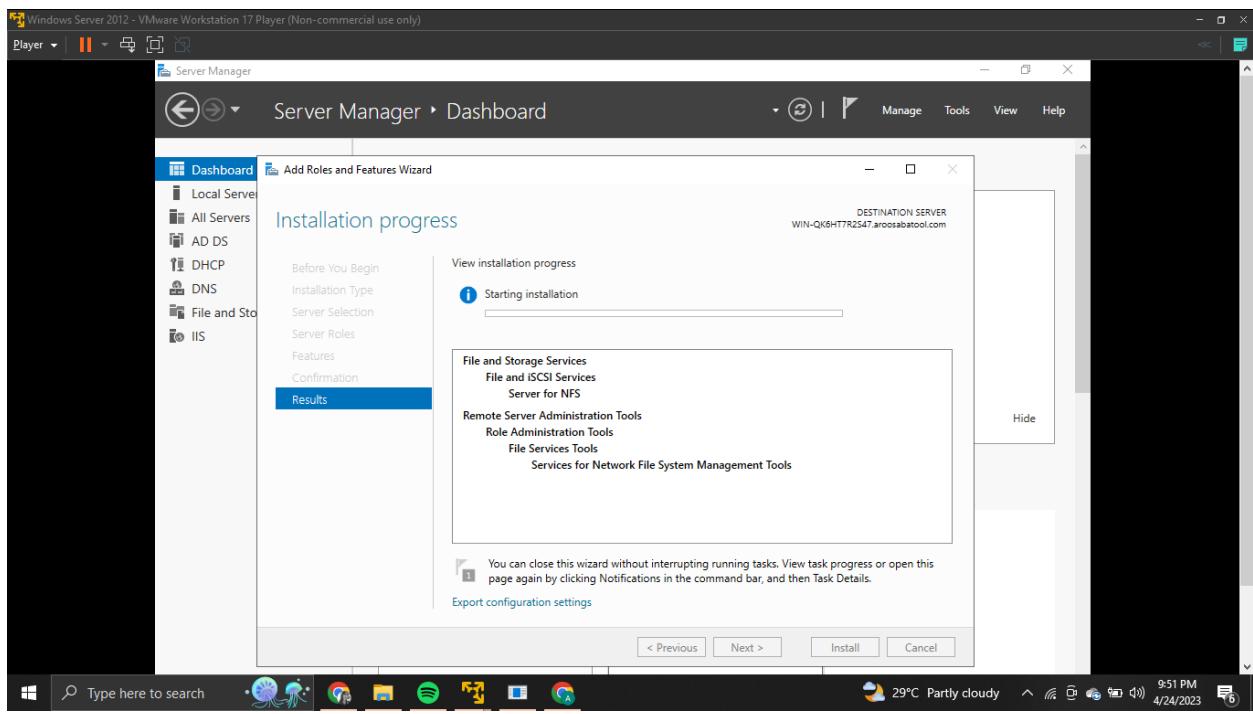
NFS

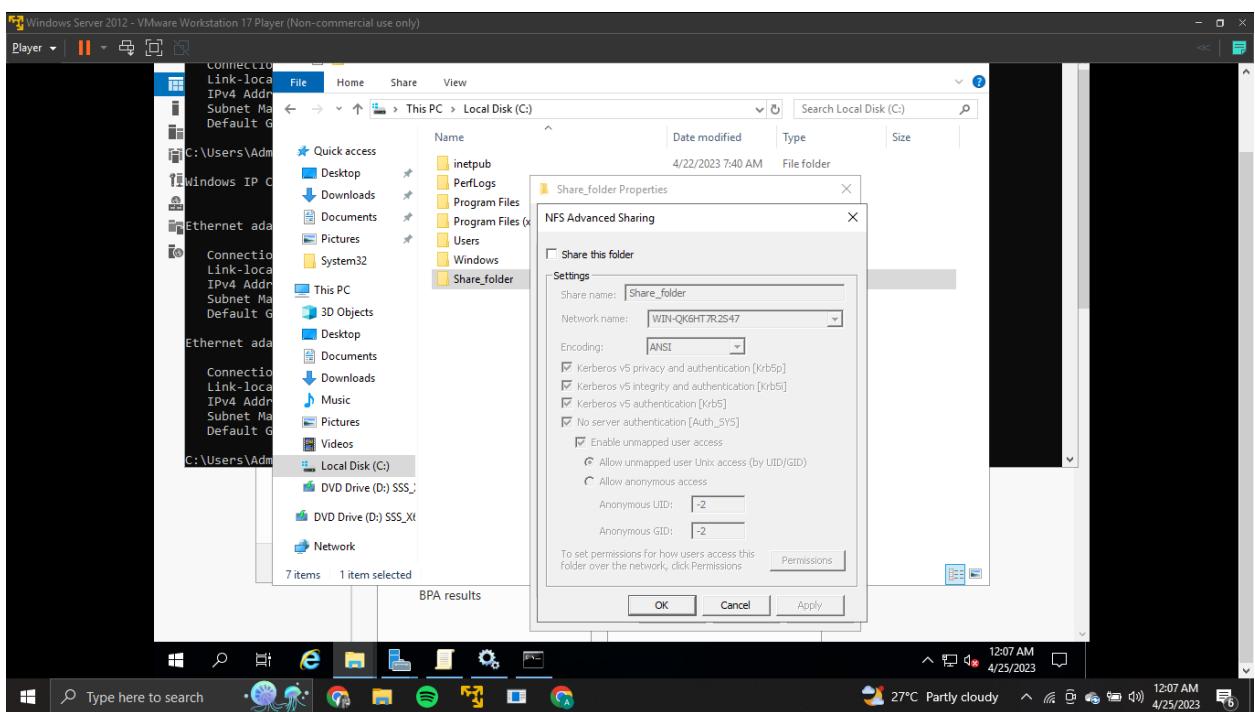
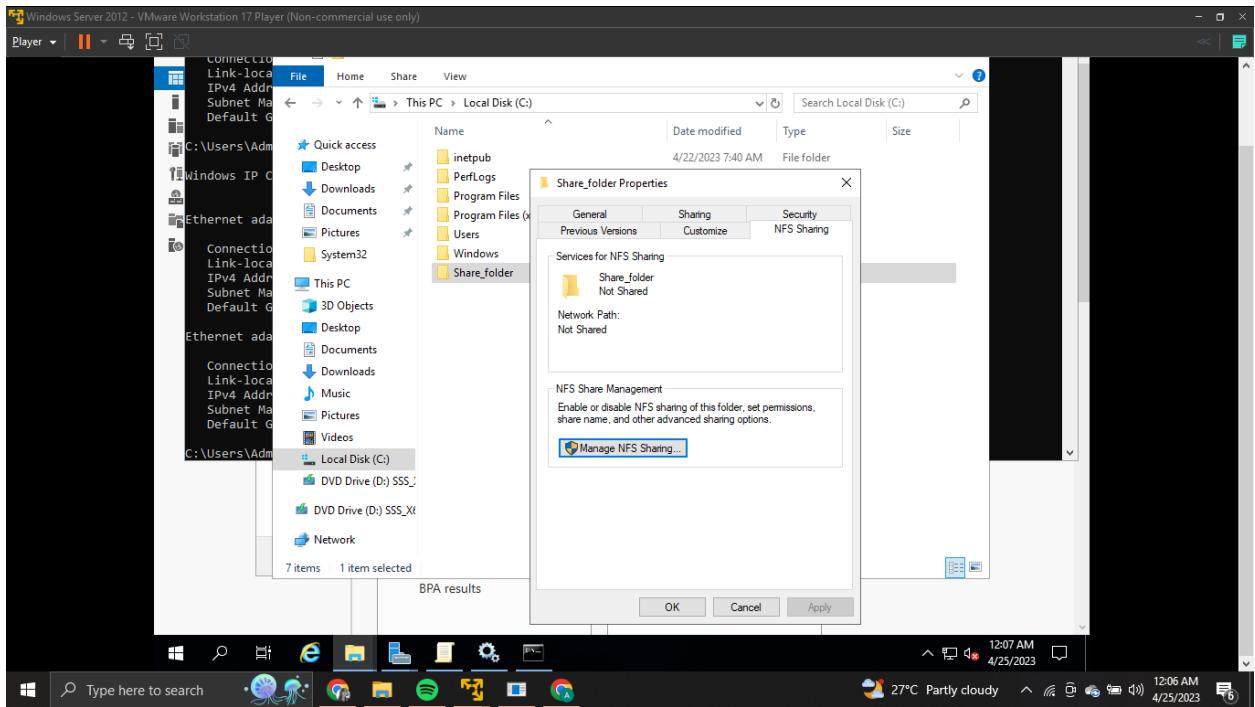


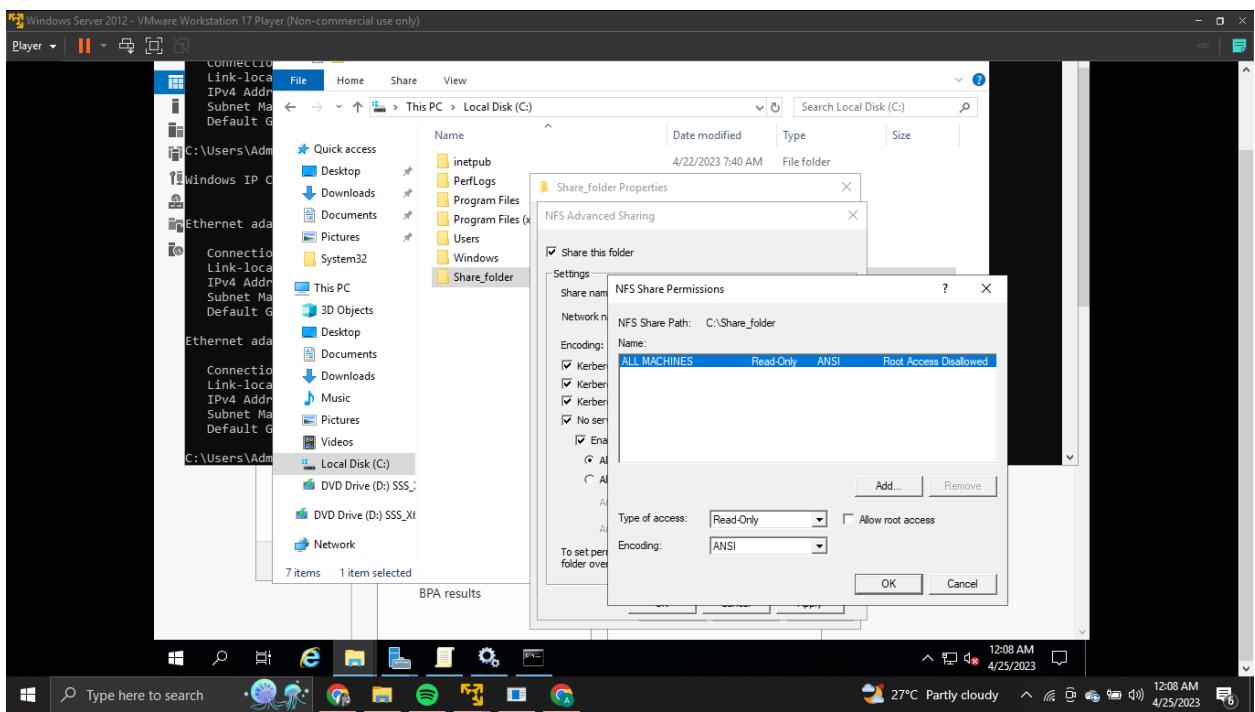
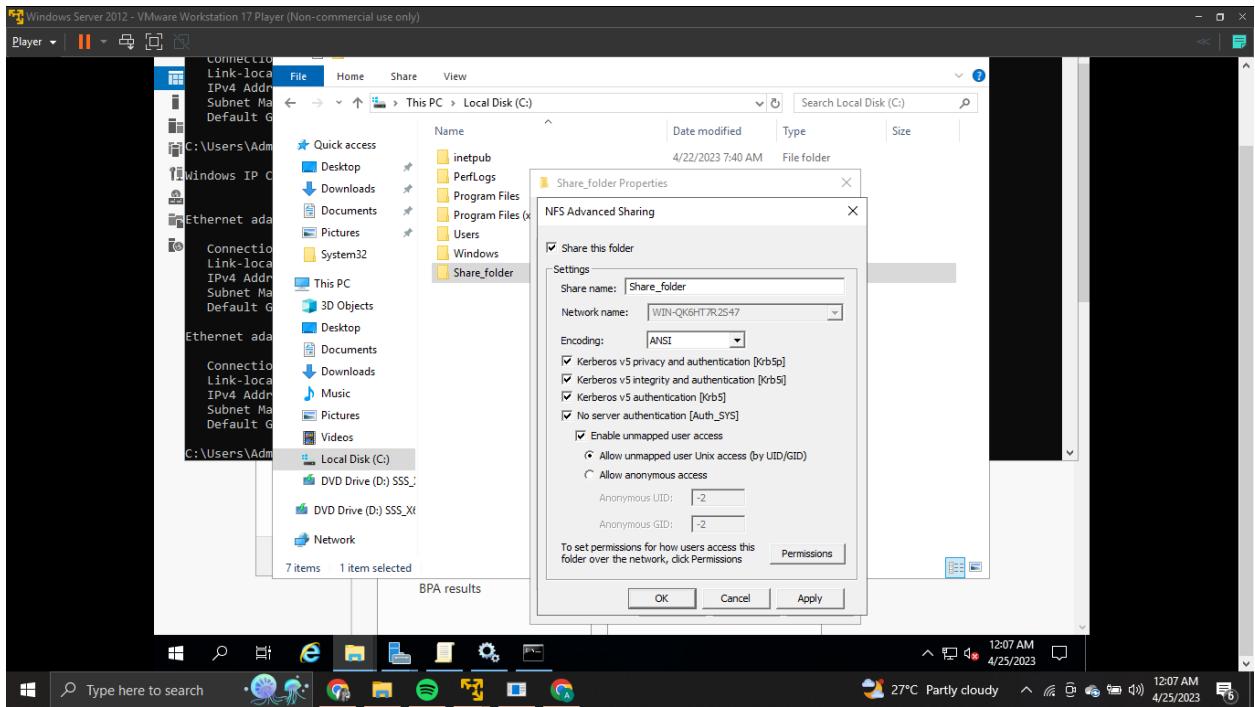


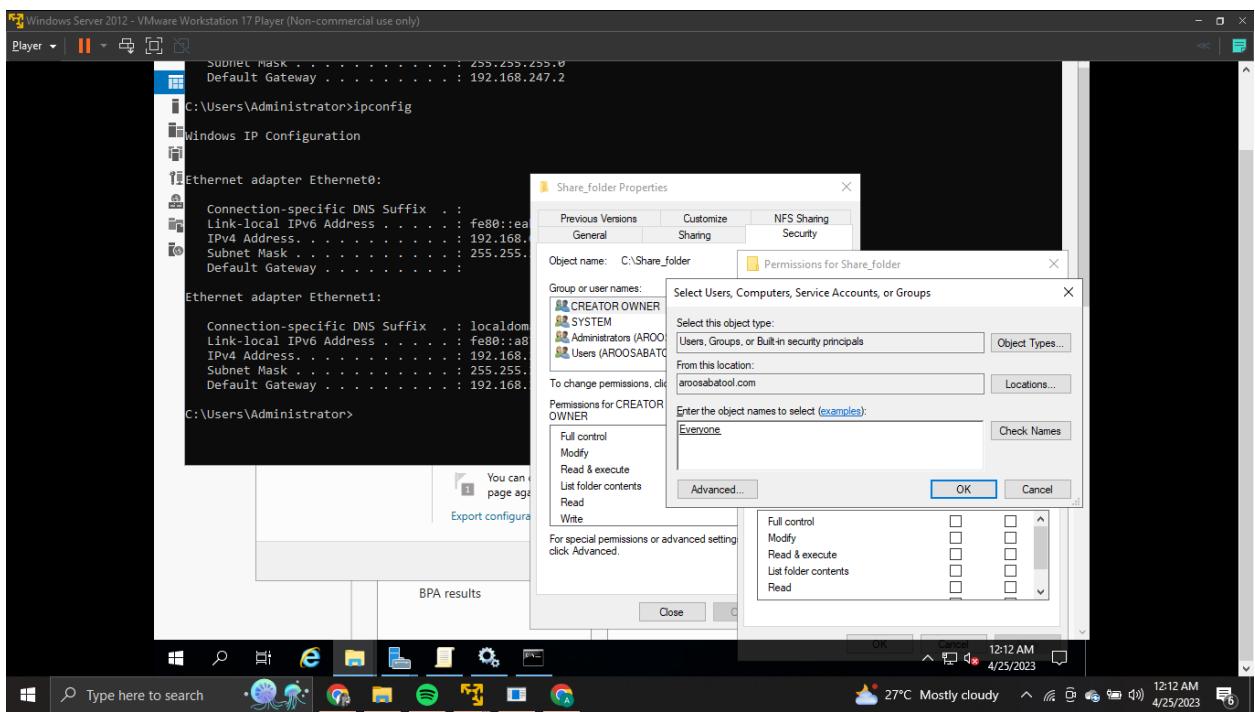
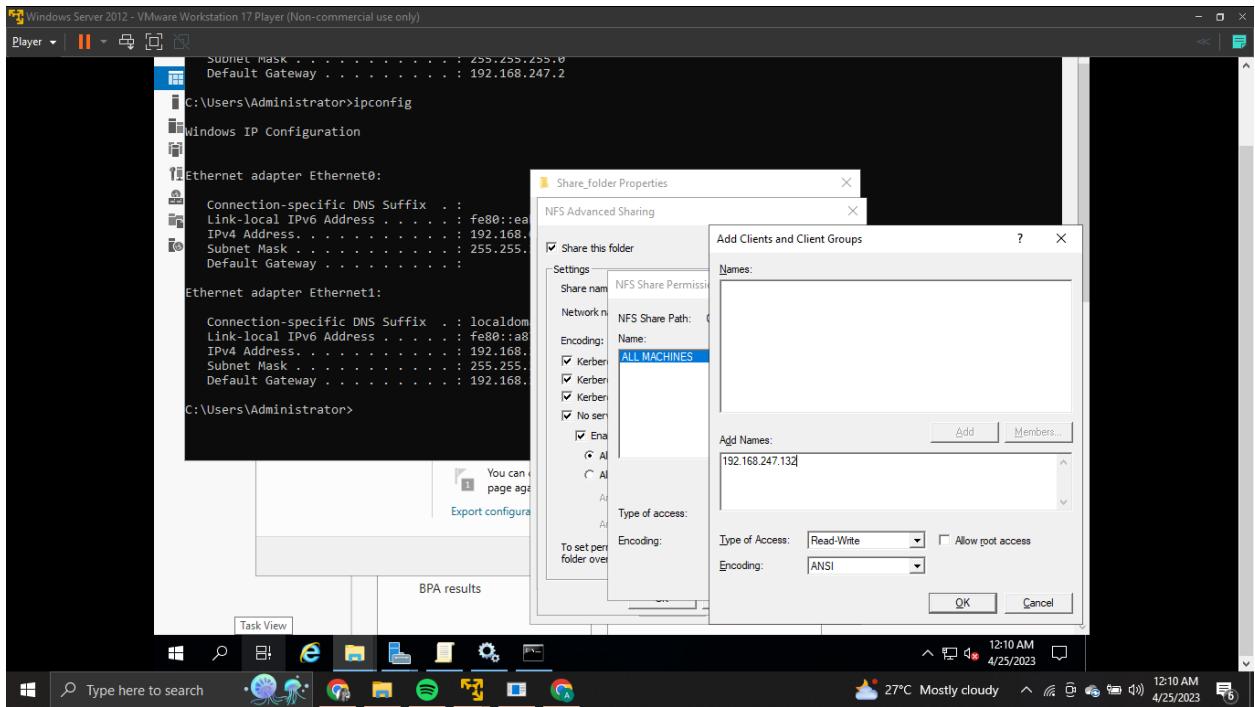


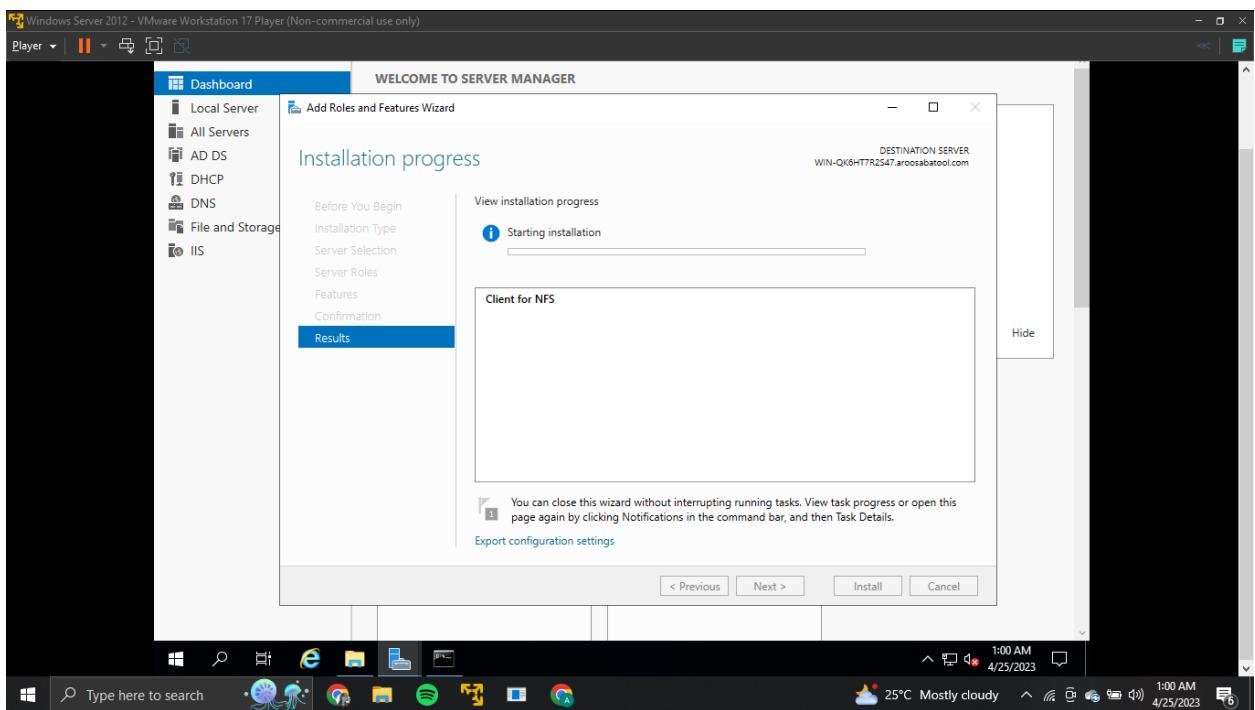
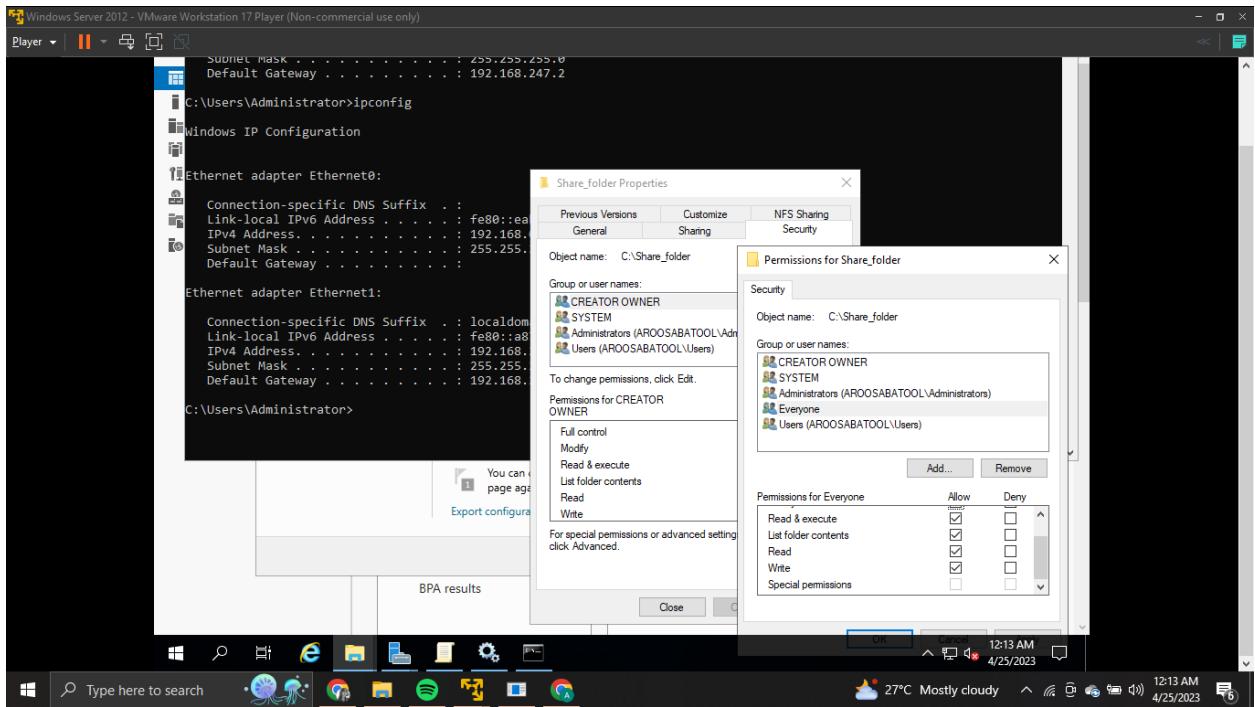




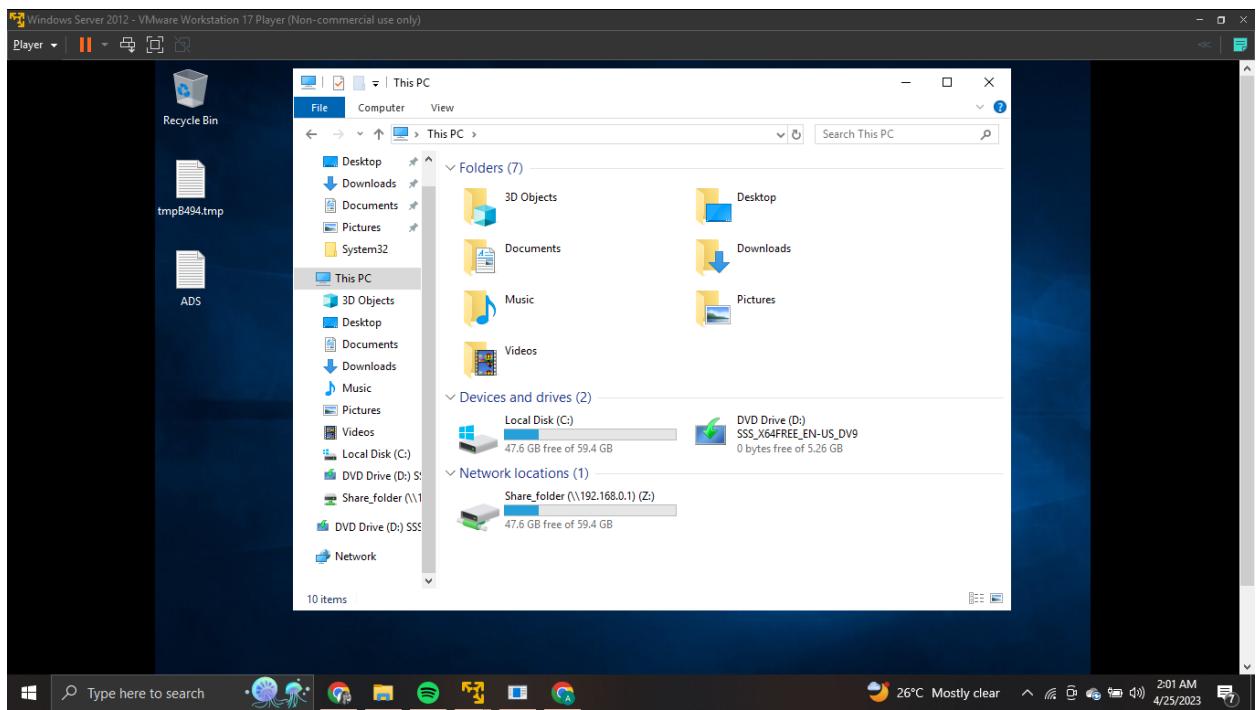




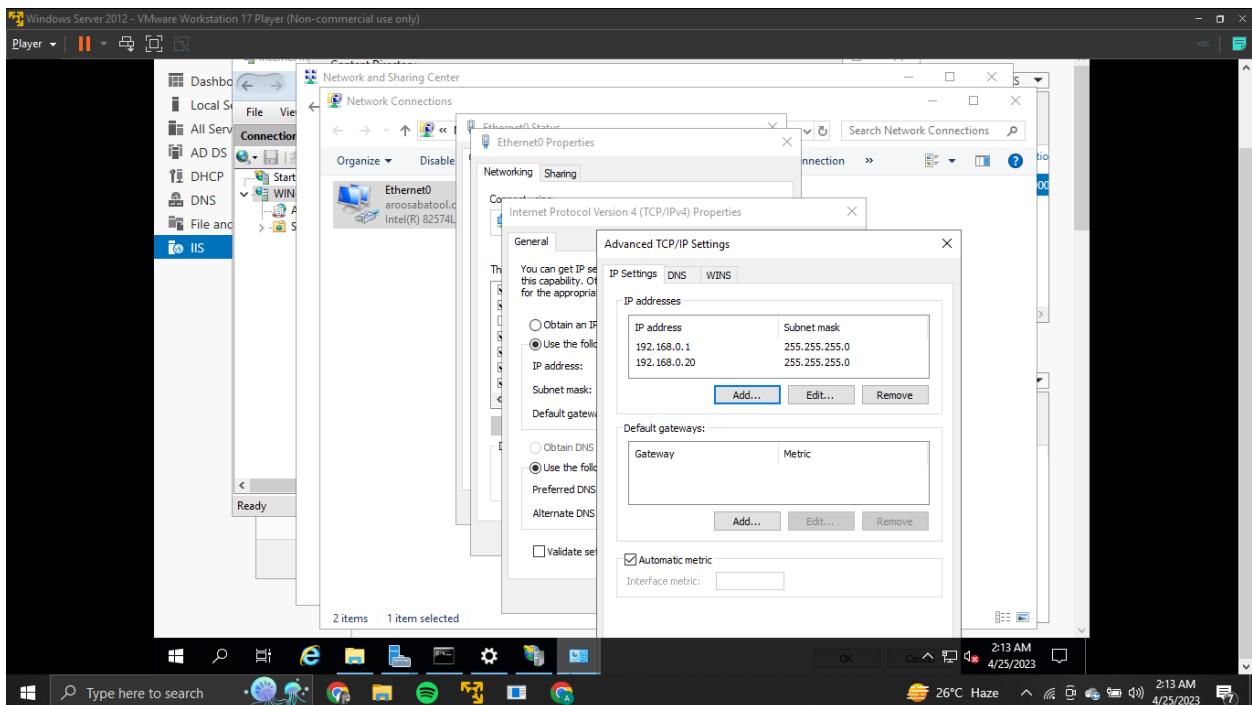
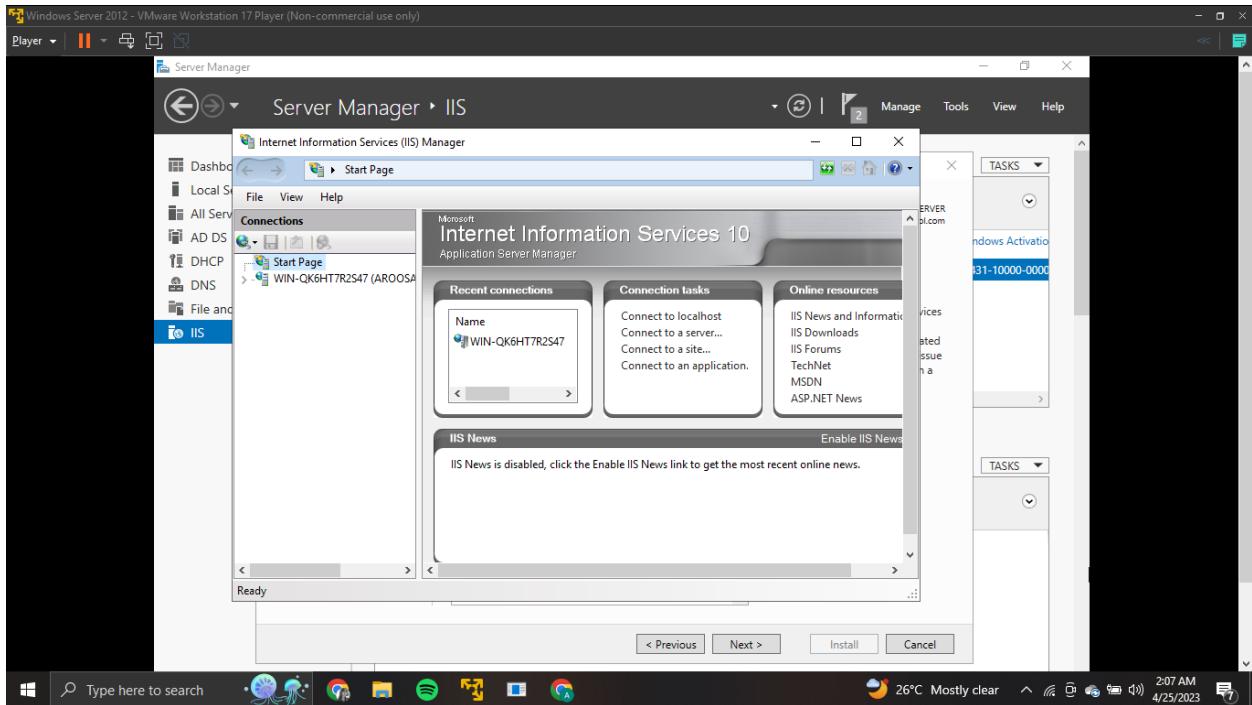


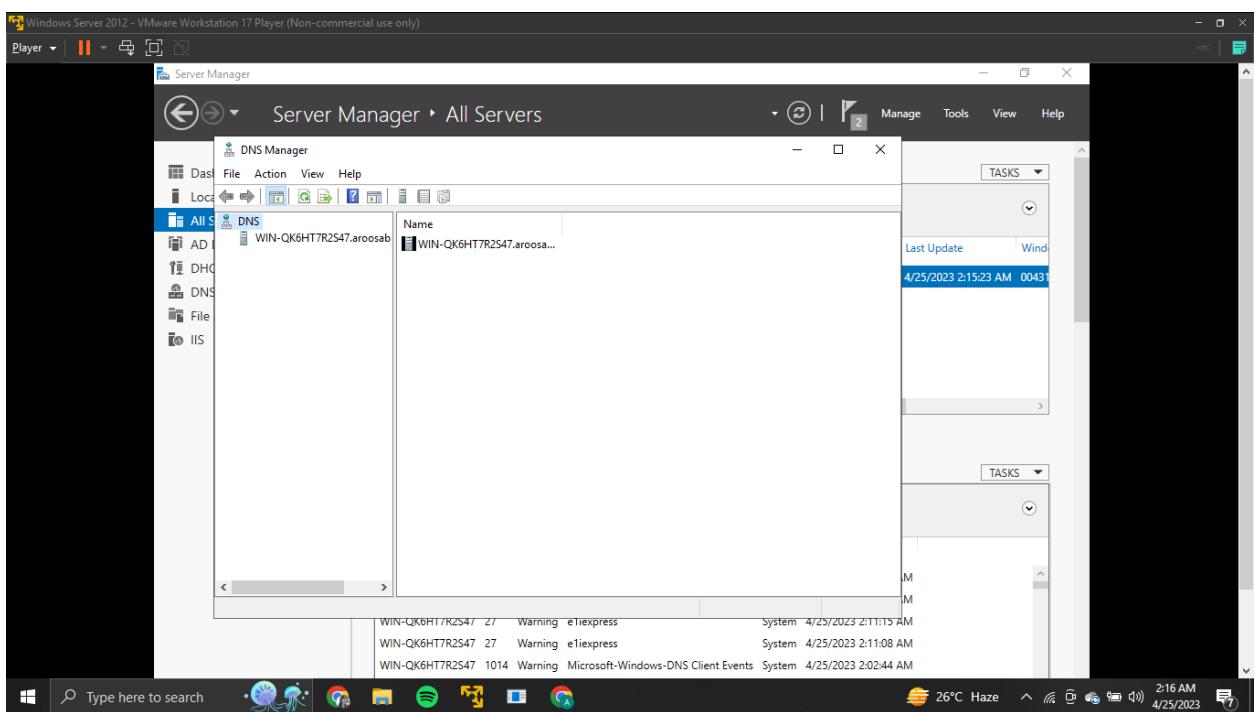
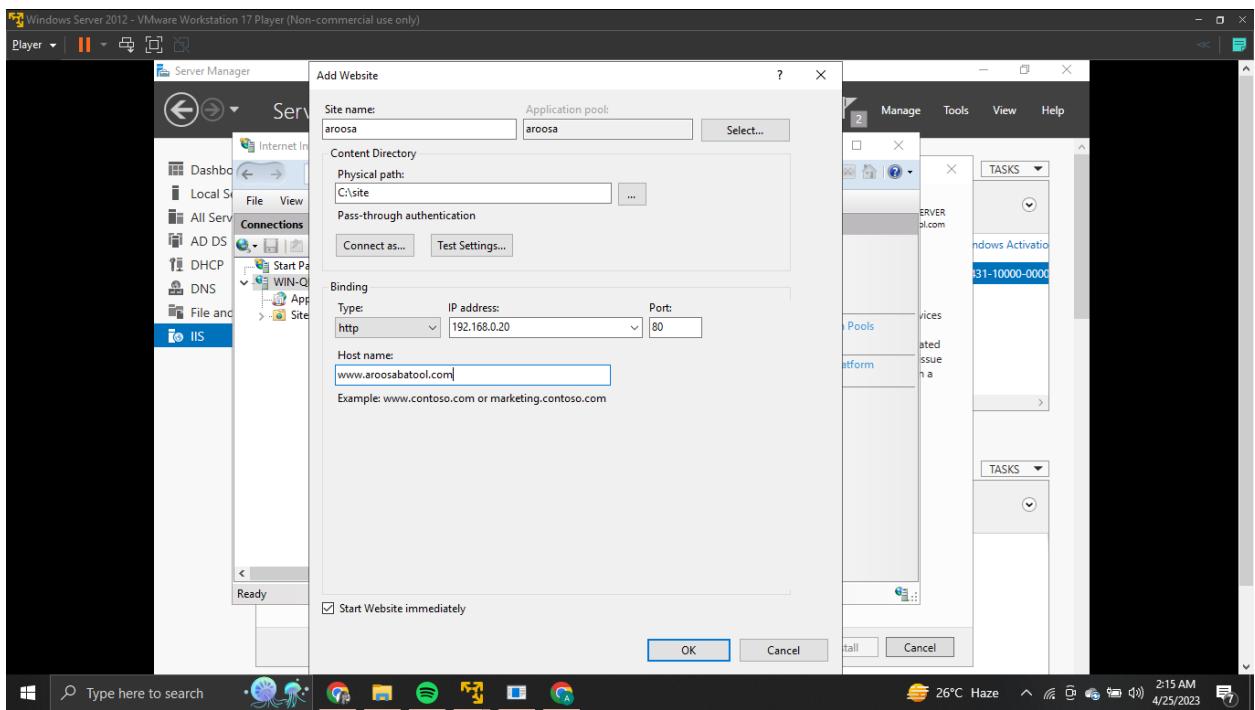


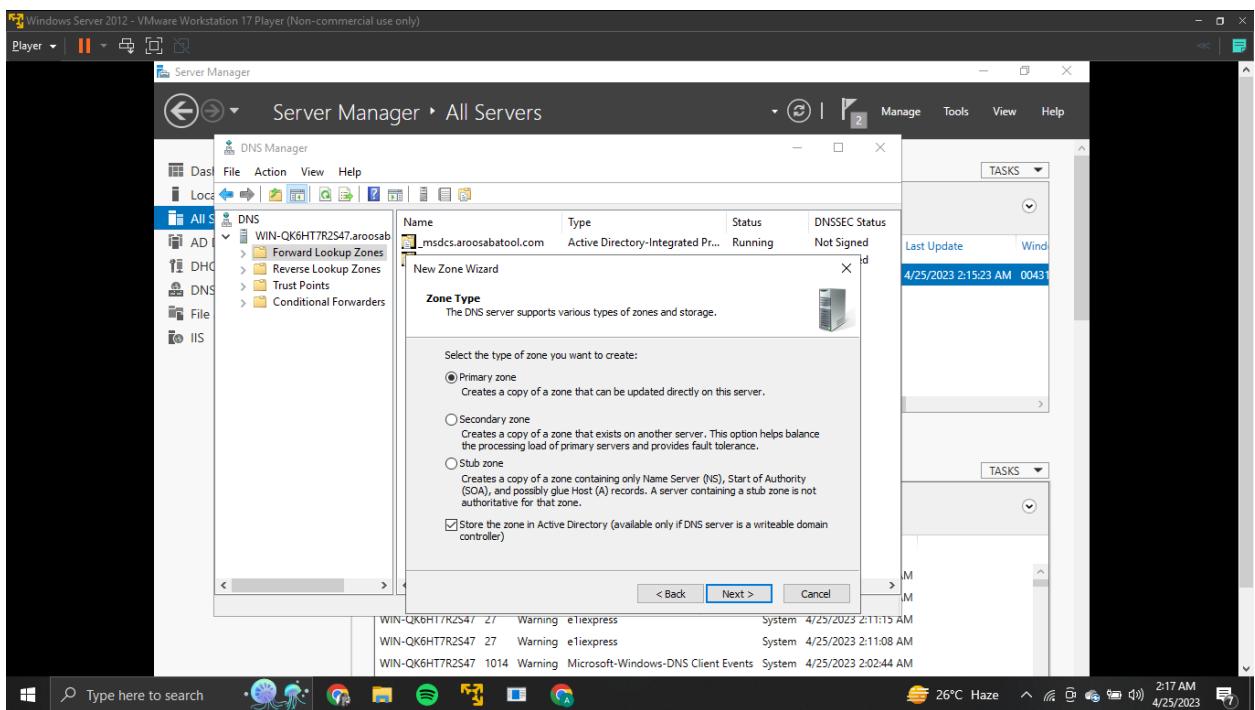
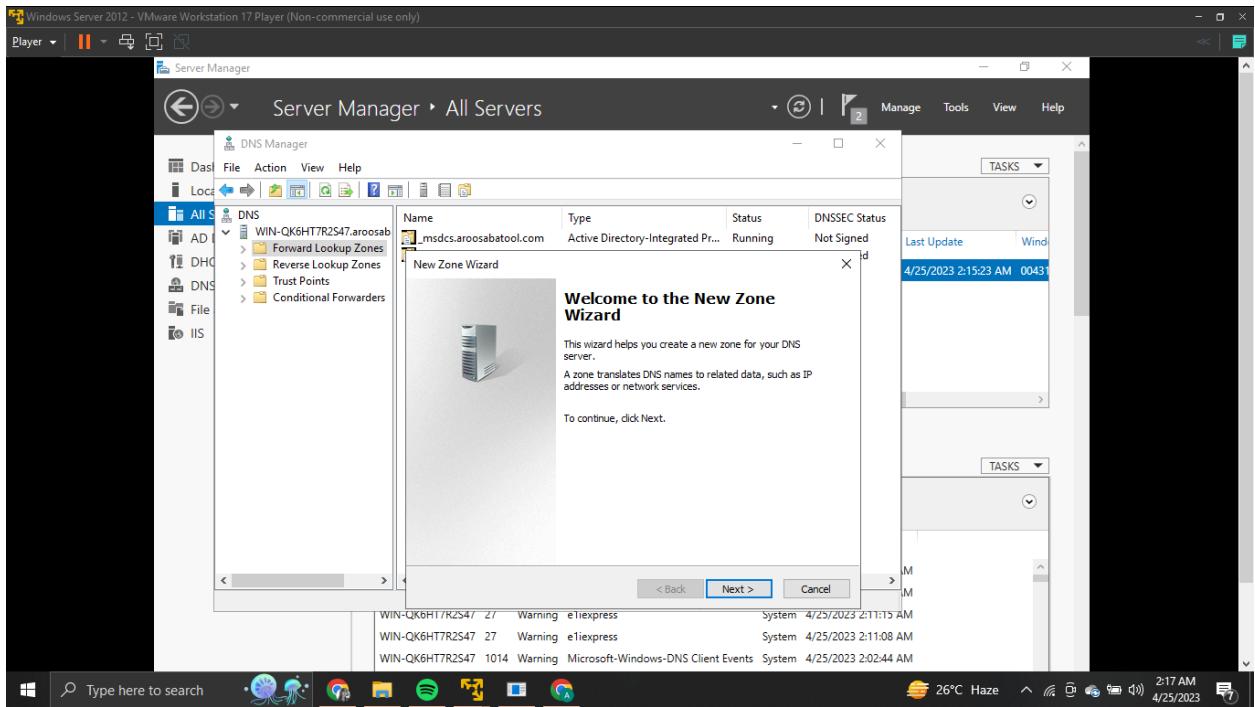
The folder is shared

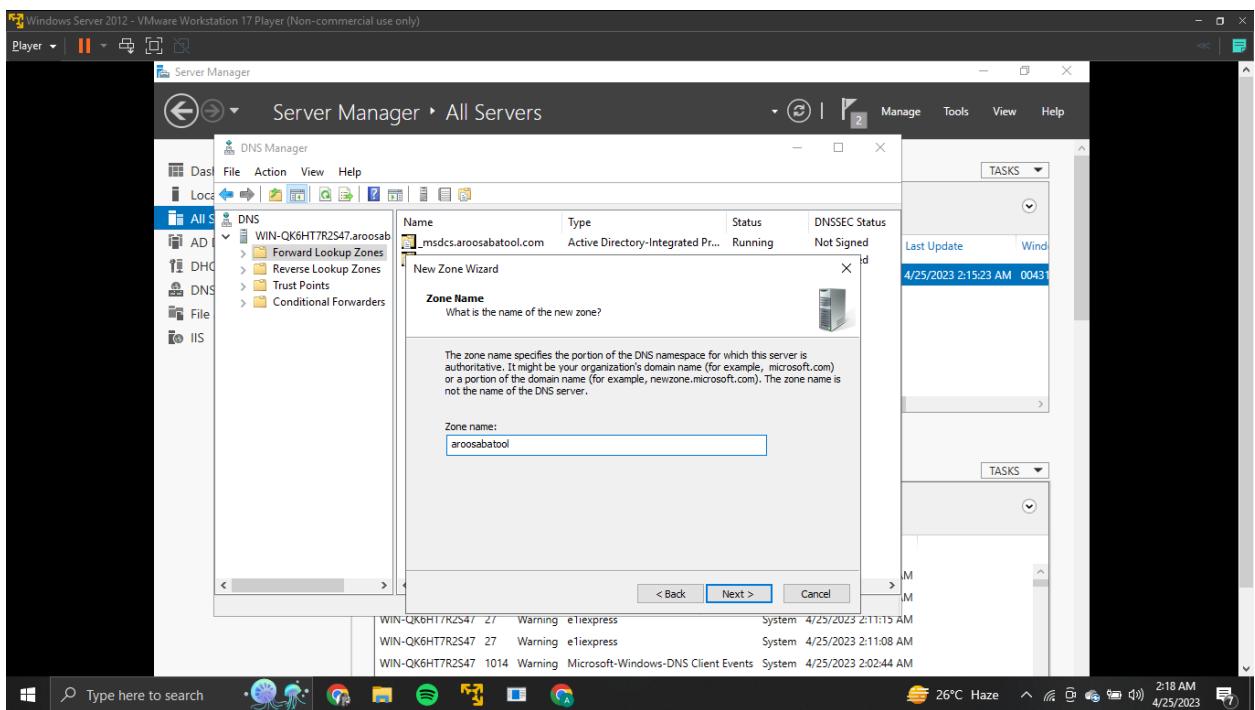
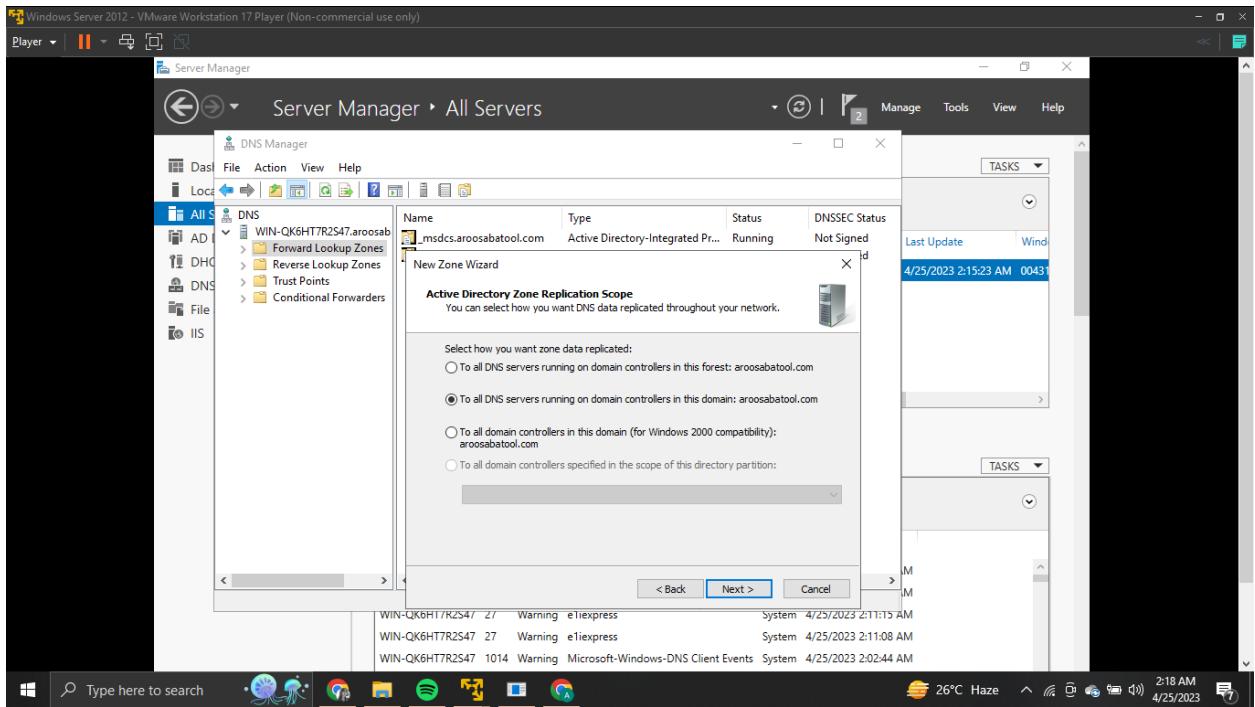


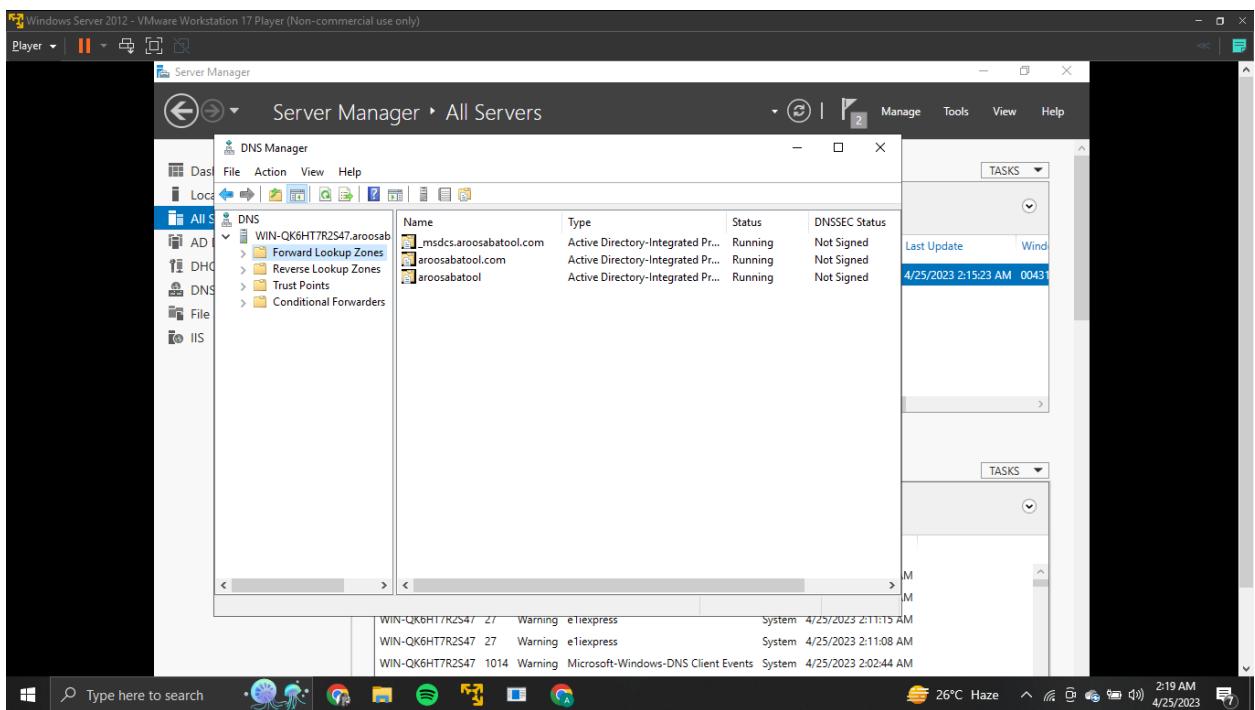
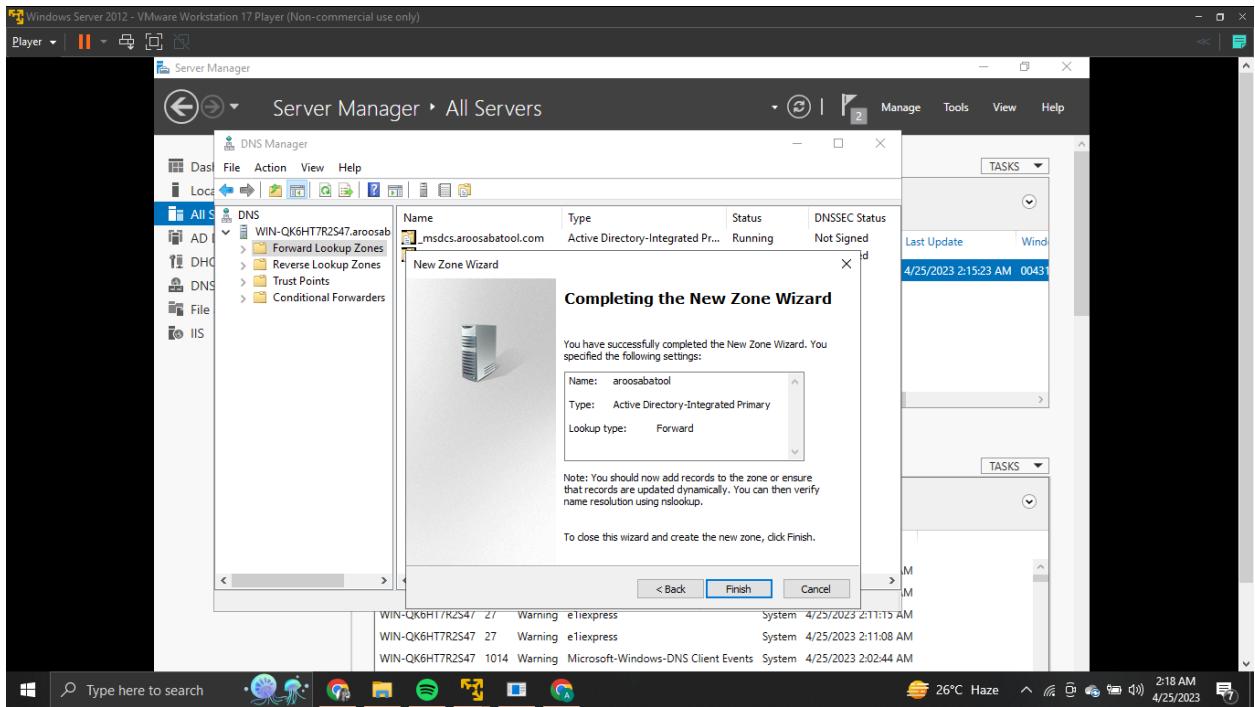
WEB SERVER

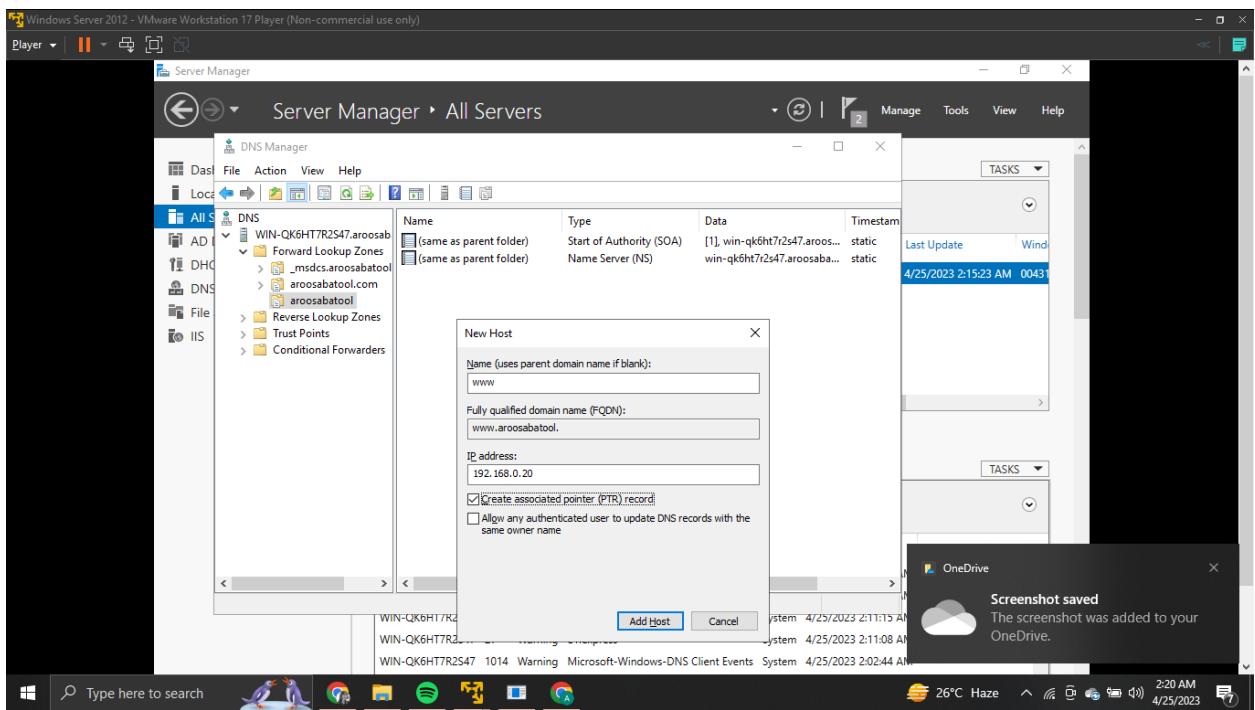


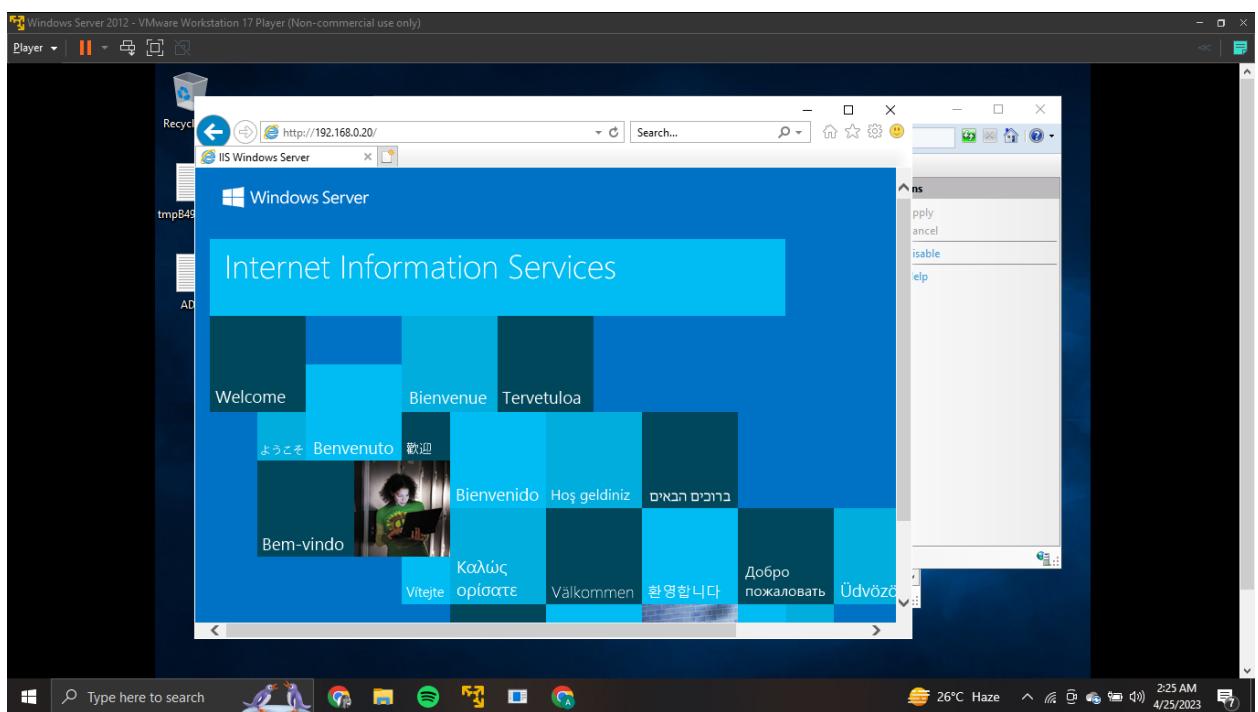
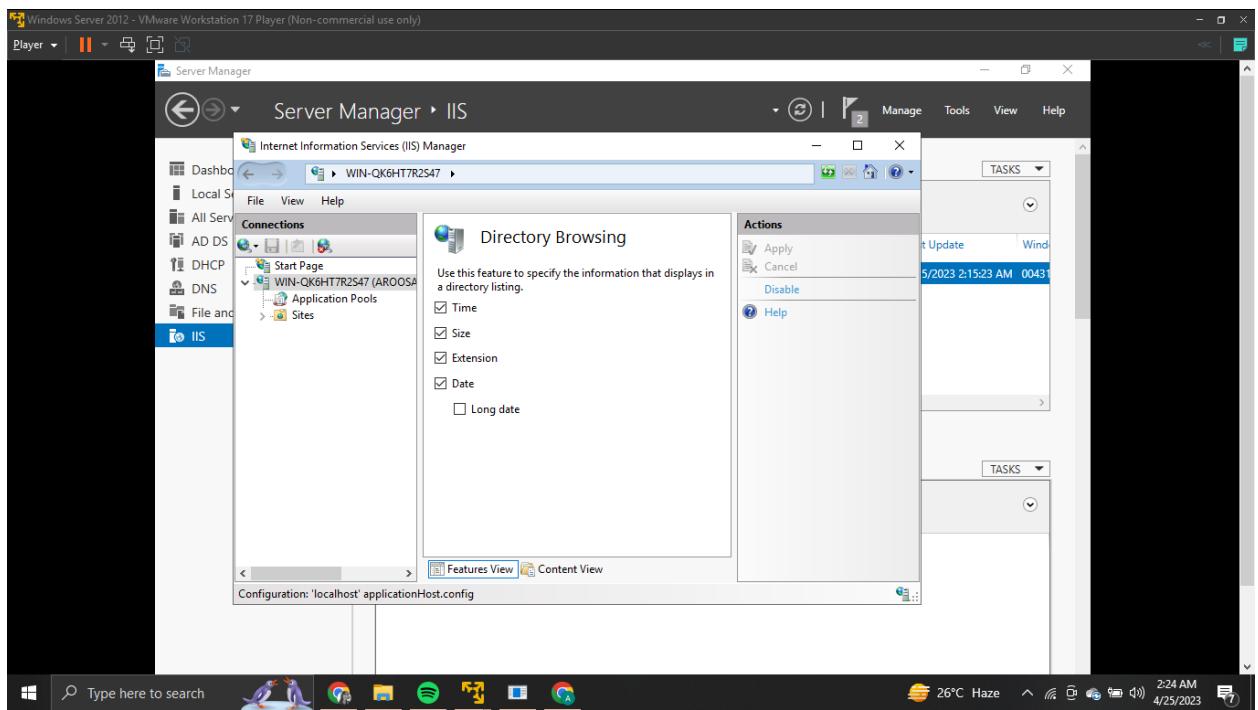




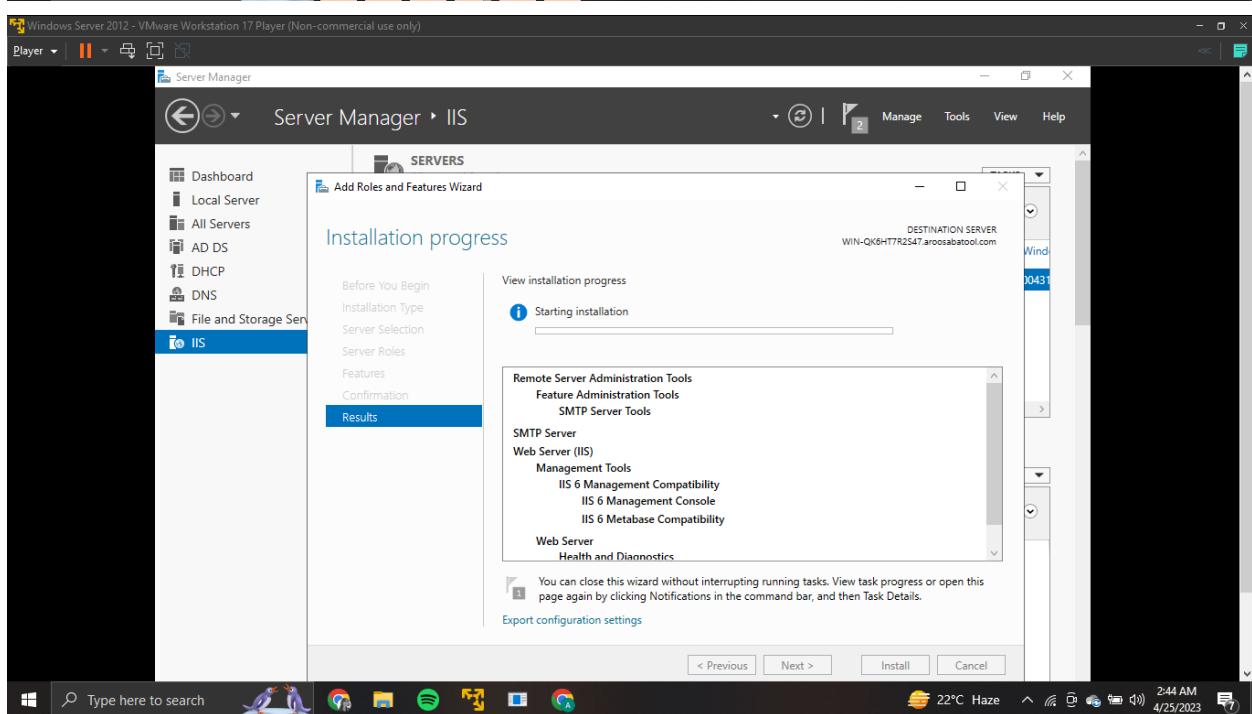
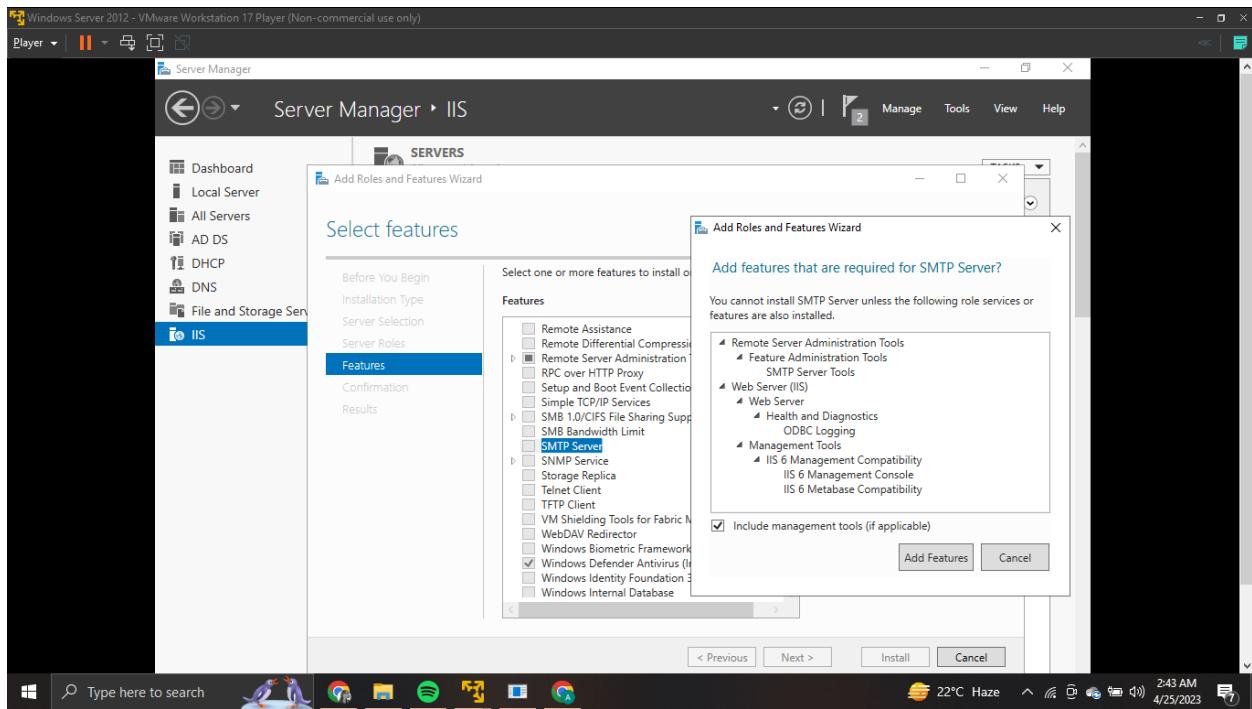


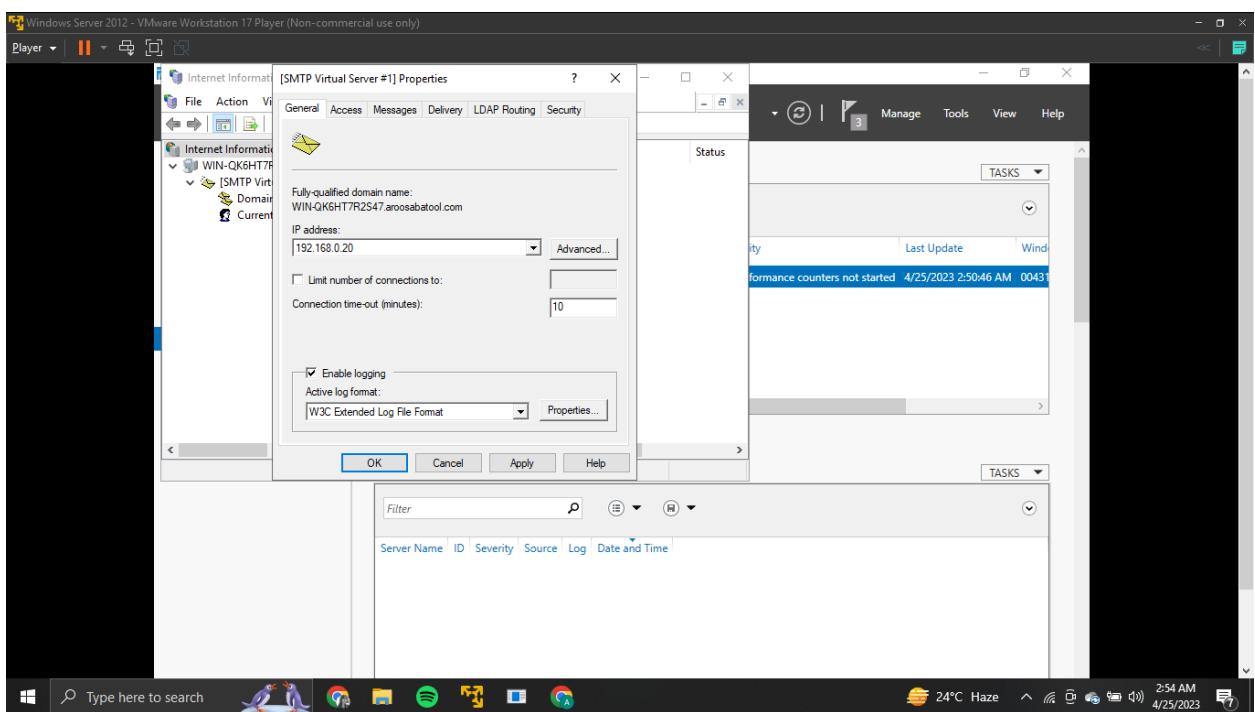
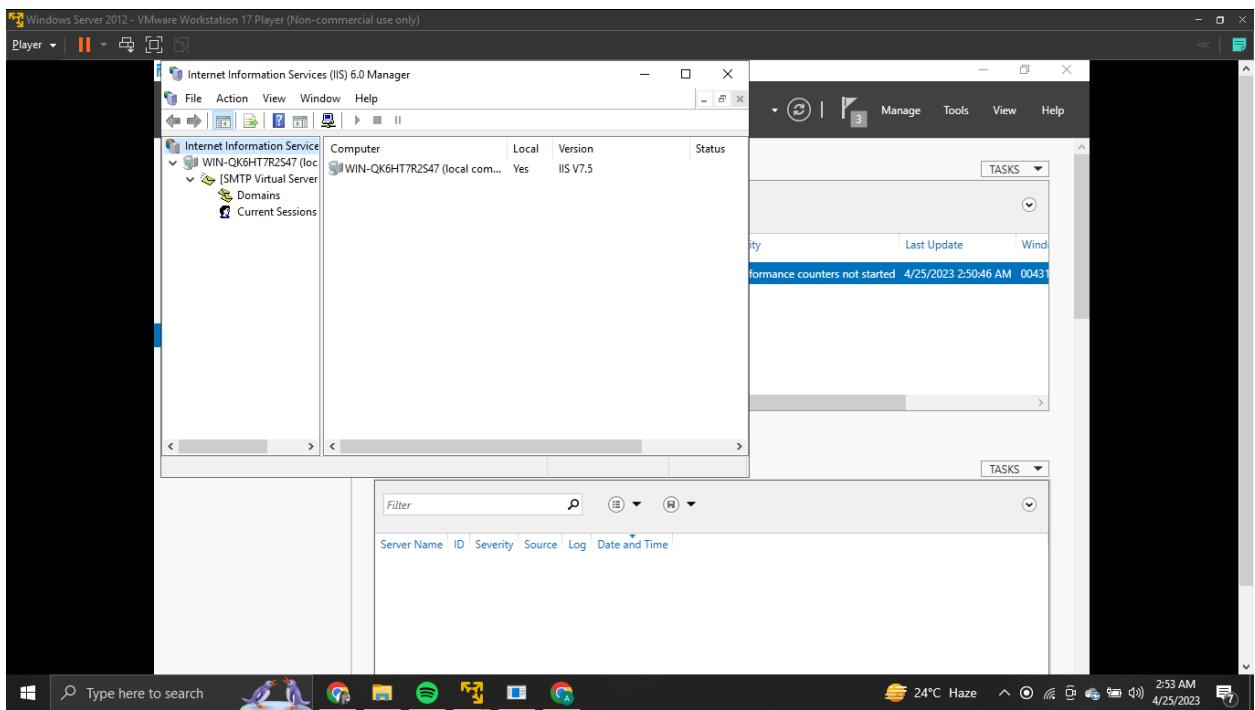


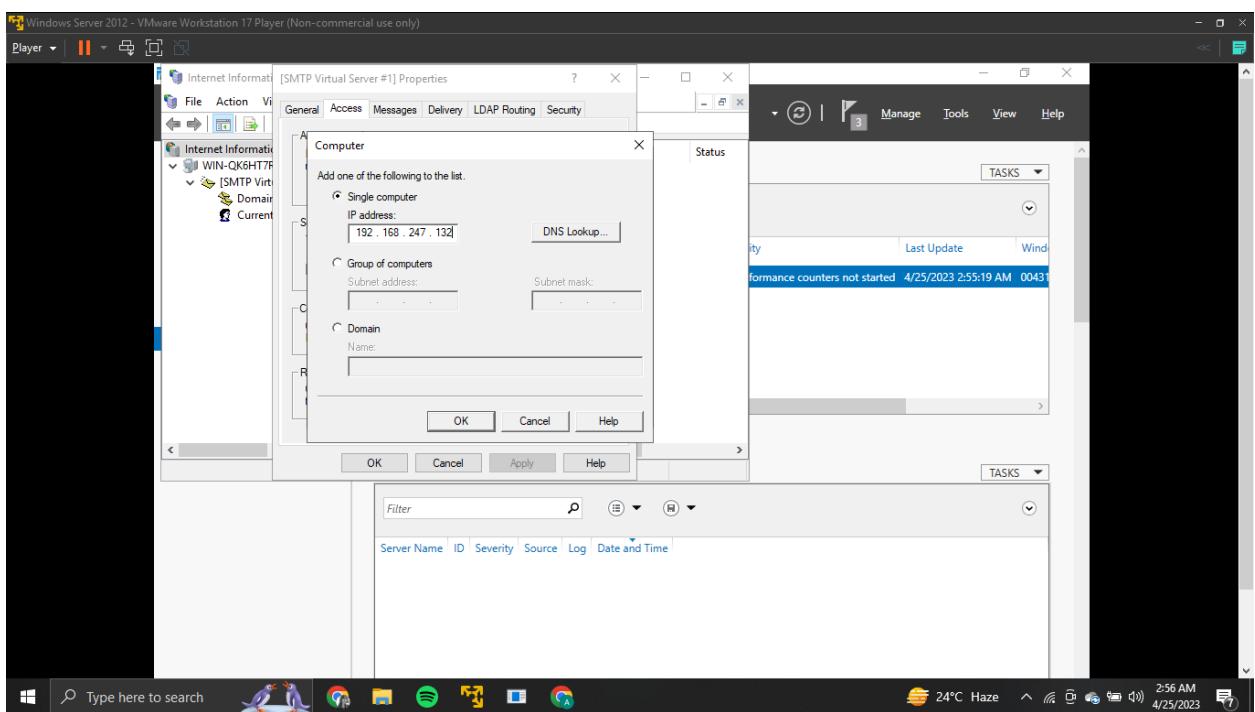
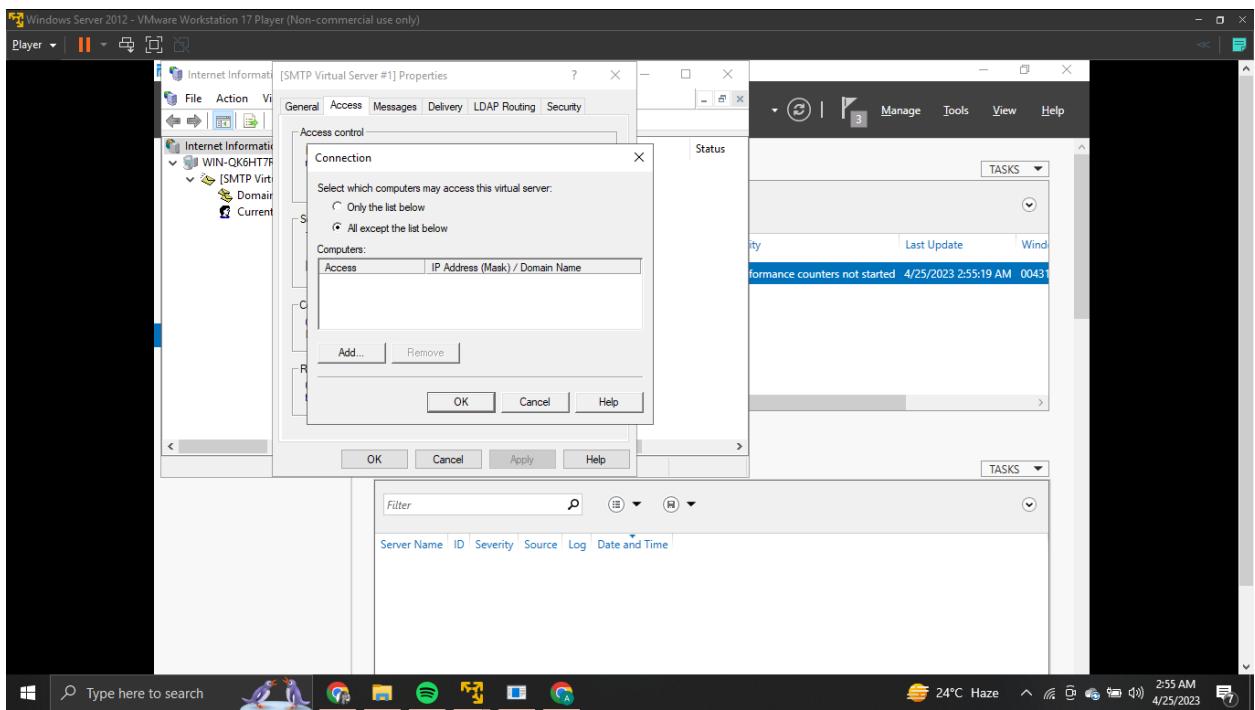


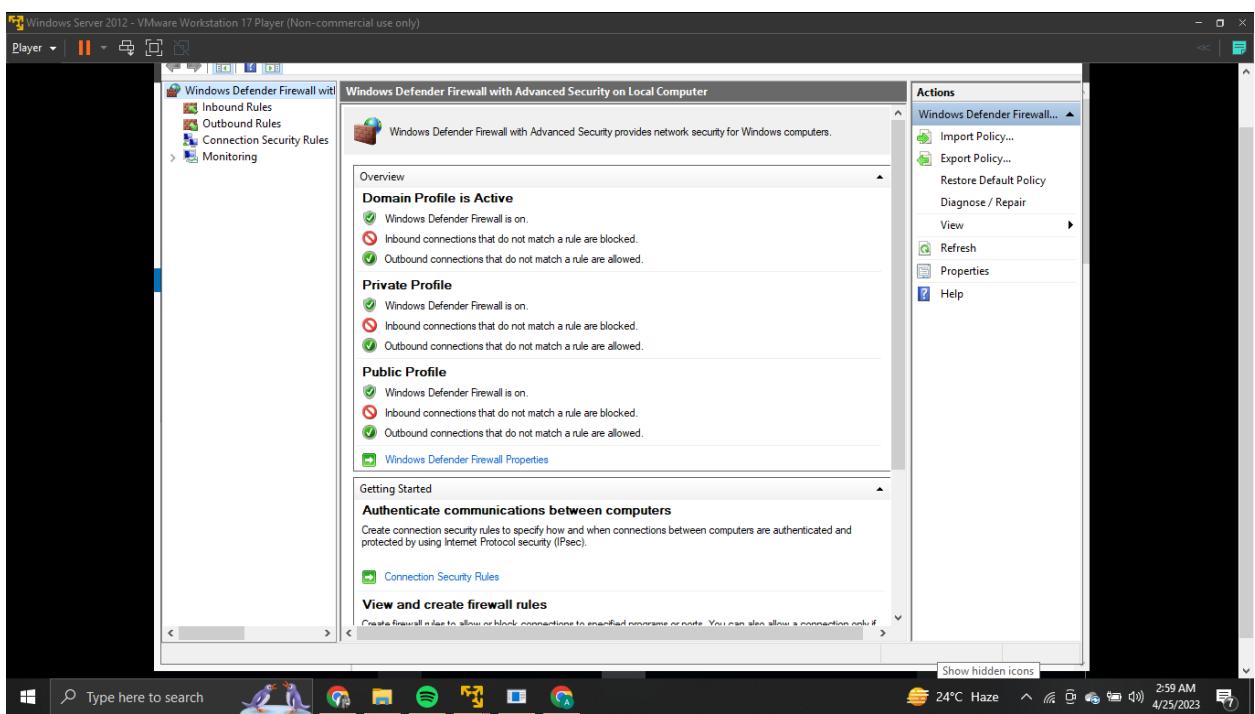
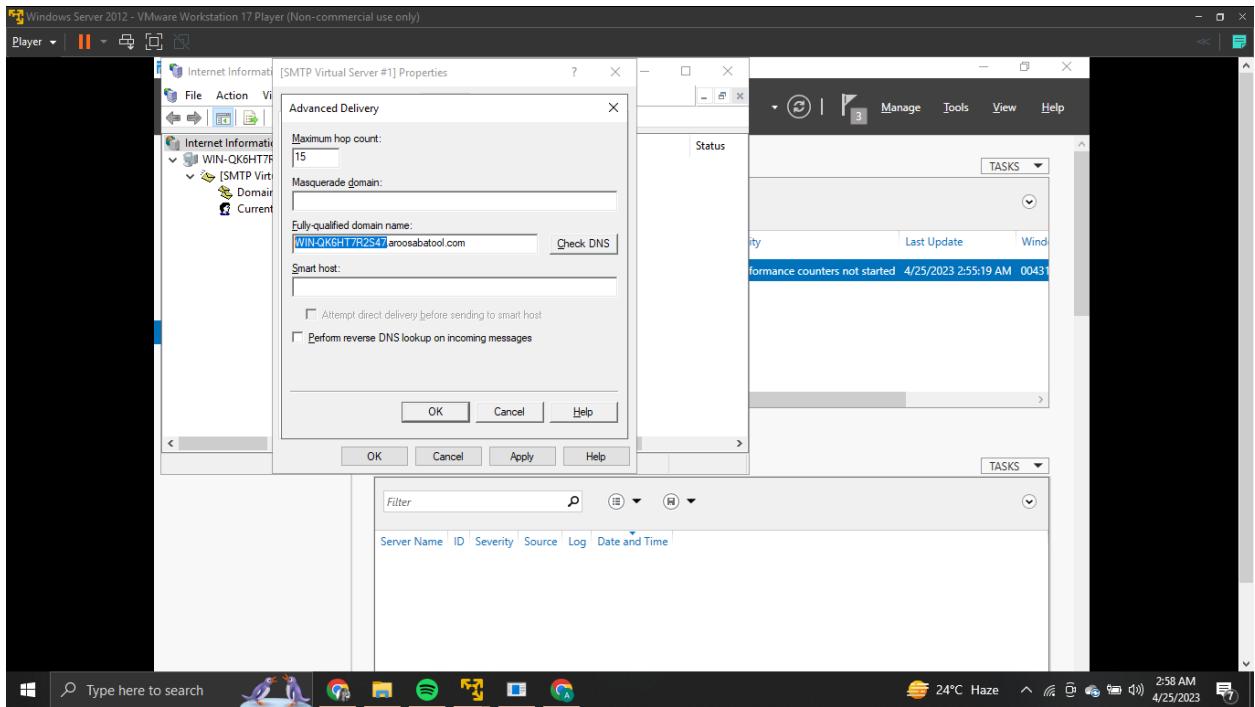


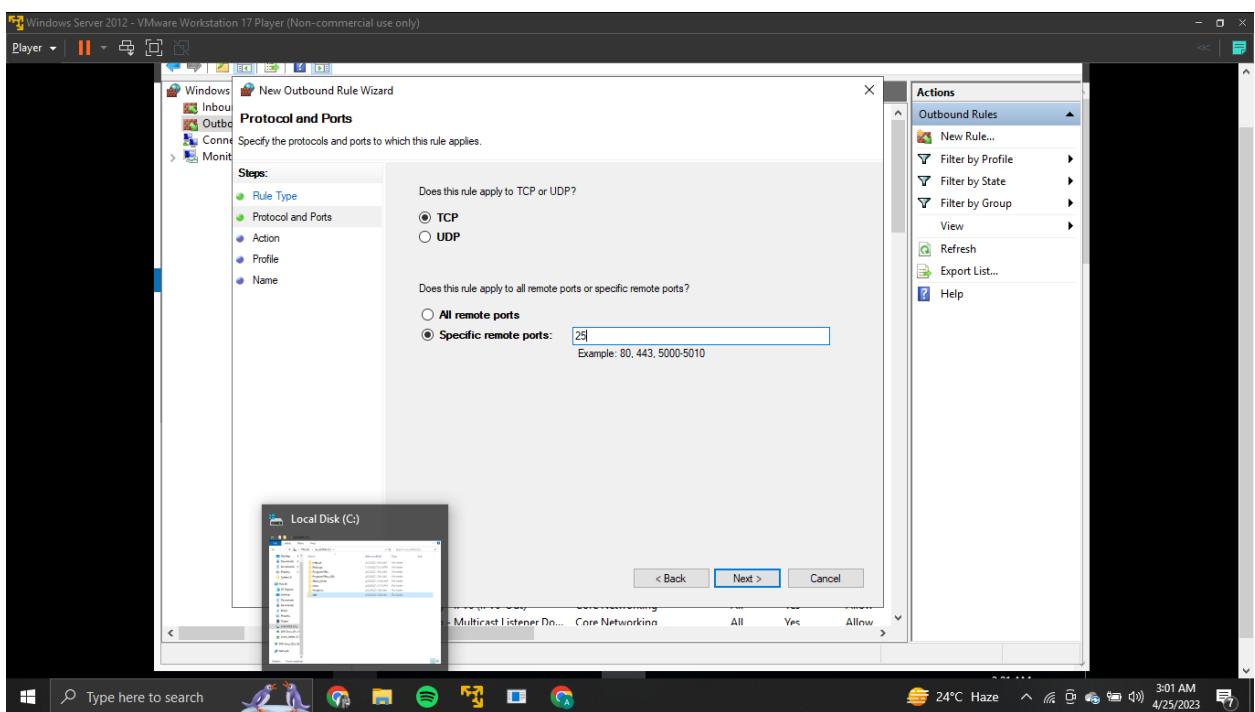
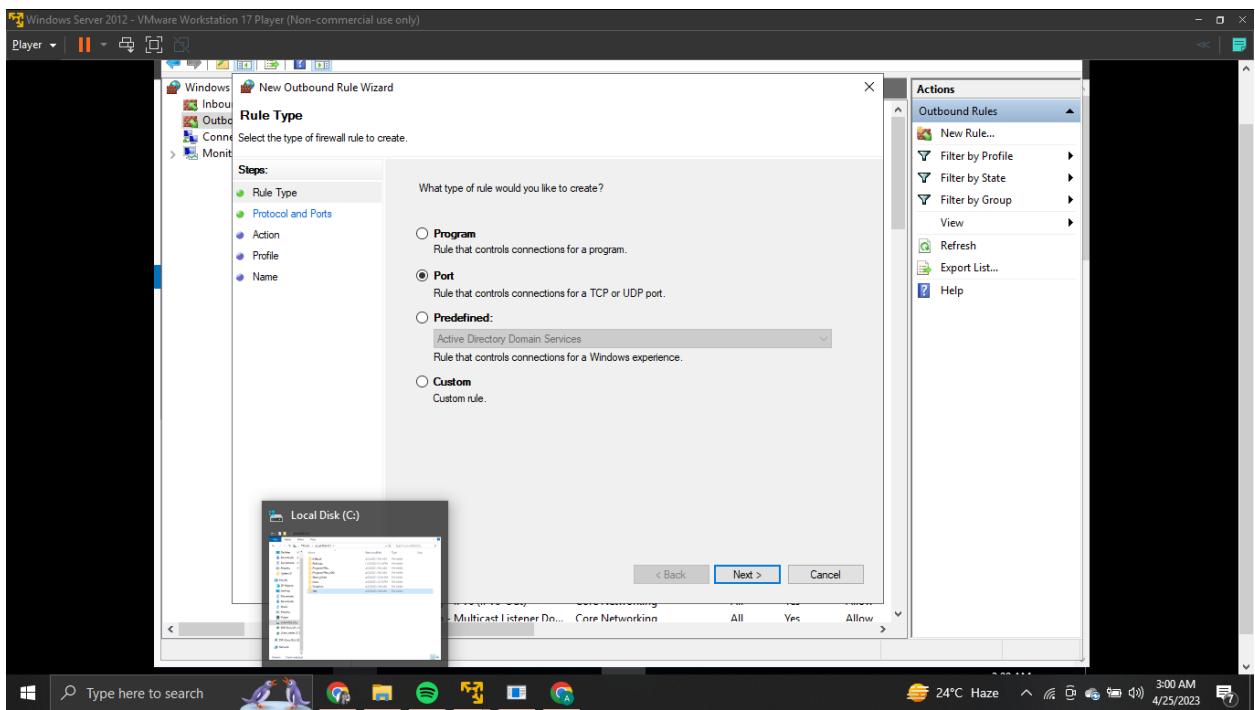
SMTP server

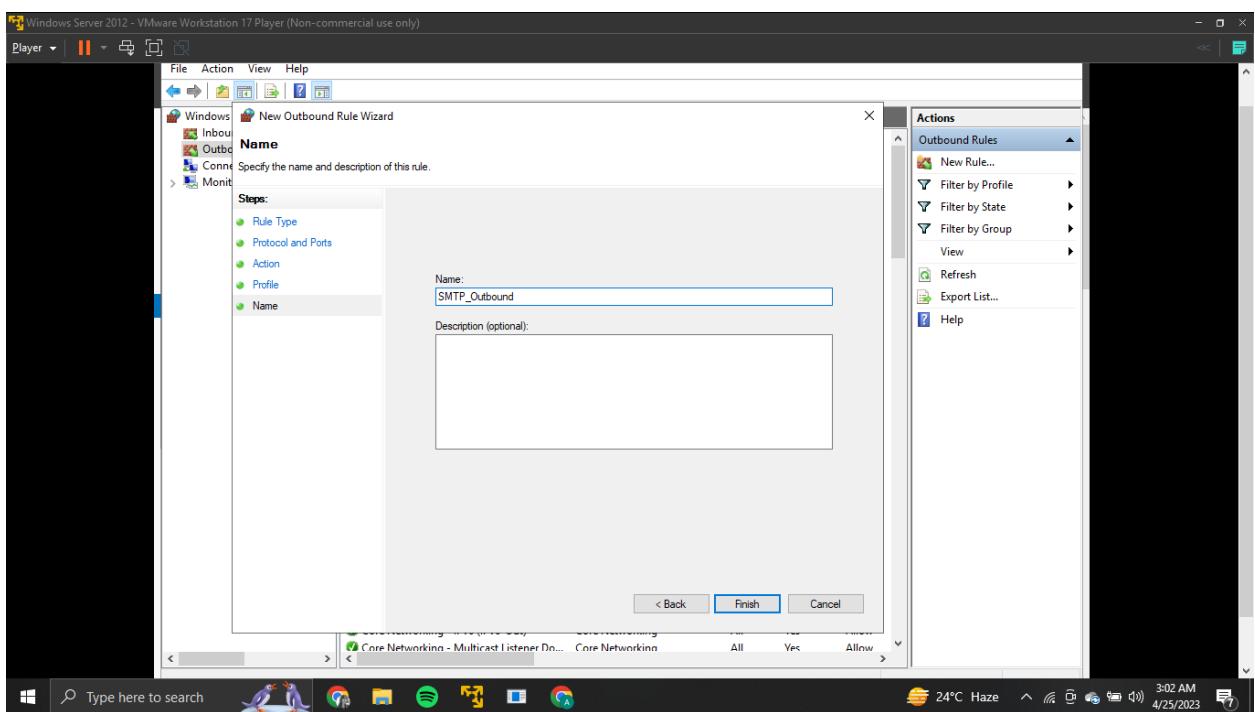
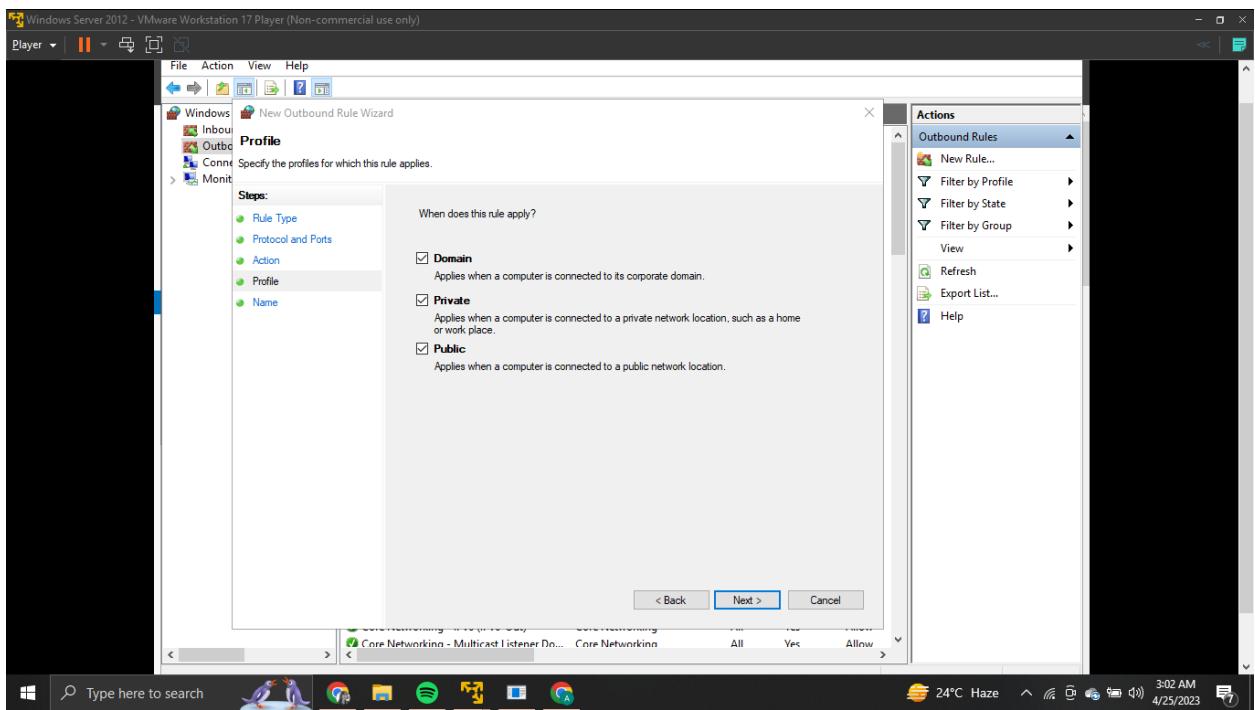


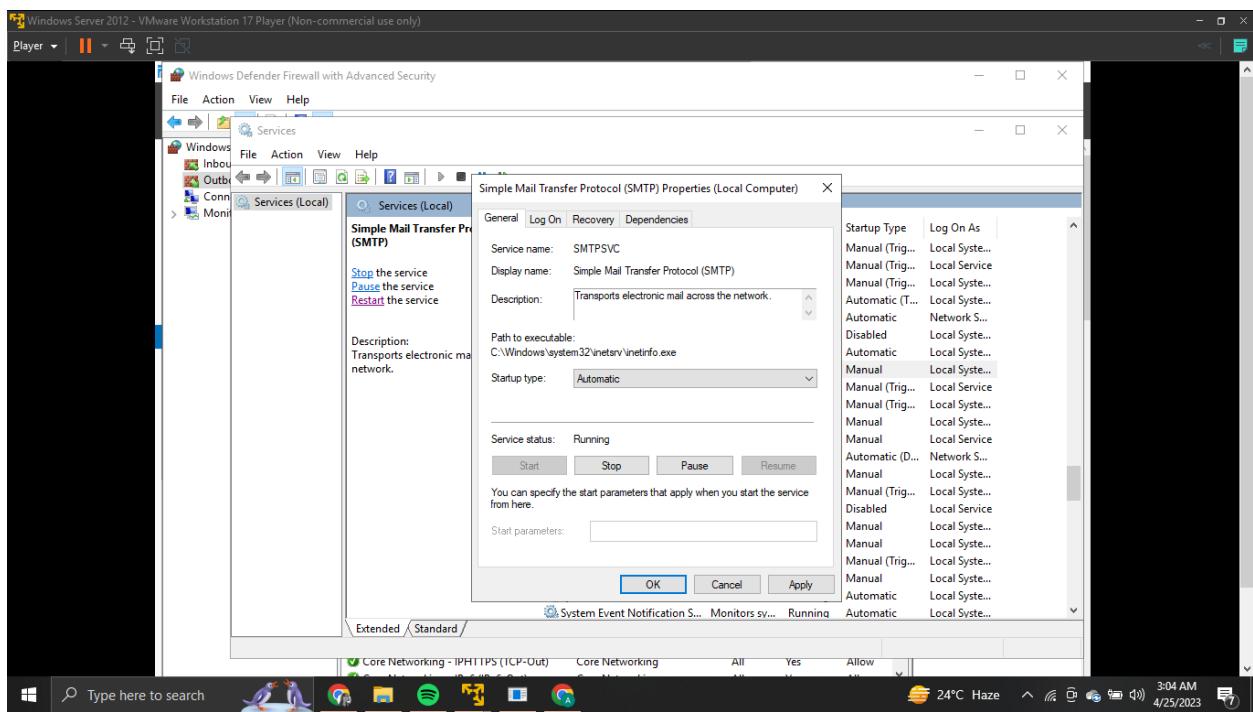
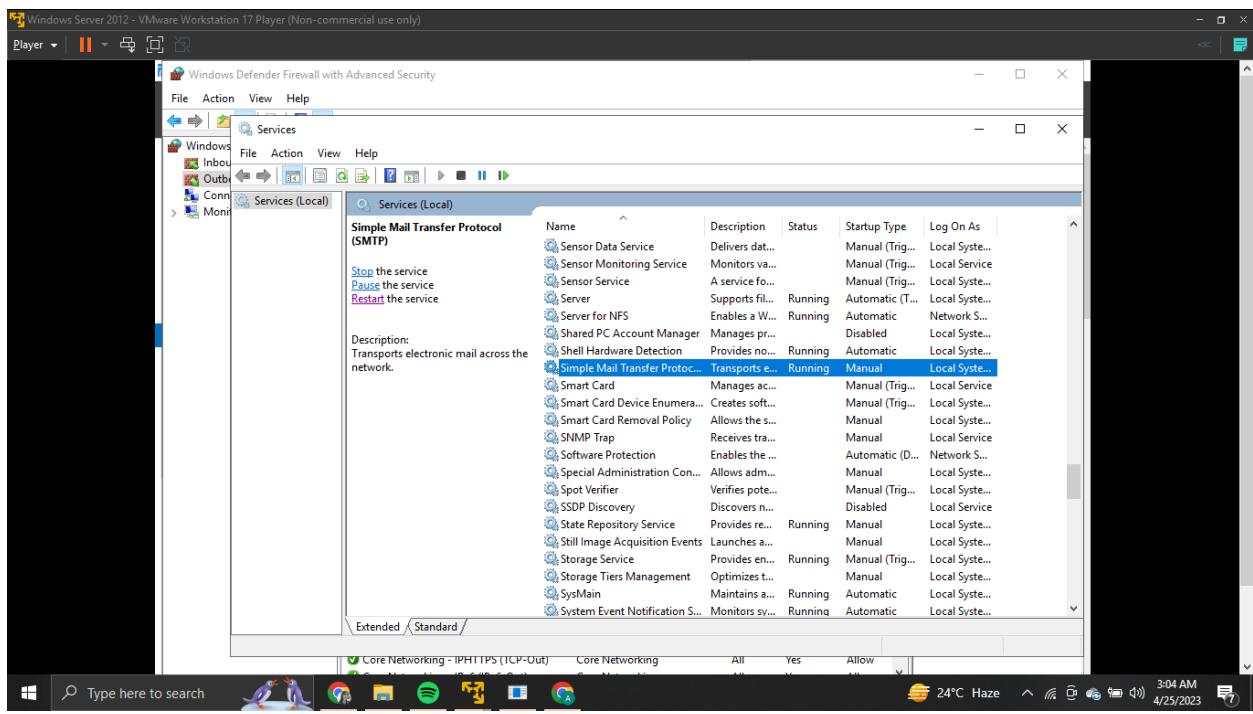












Conclusion of the Project

In this project, I have used a VMware workstation for virtualization, Windows 2012 r2 Server as a server machine, and Windows 10 as a test machine.

The main purpose of this project was to configure and test different networking services, for example, DHCP, DNS, Web servers, Mail servers, NFS, and Directory servers.

Alternative Methods:

For Virtualization Virtual Box could be used as an alternative to VMware Workstation, Ubuntu could also be used as a Server Machine, and Kali Linux, Ubuntu, or other Windows could be used as test machines.

There are a lot of other alternatives available as well but these are among the most popular ones.

Virtualization:

Virtualization is the process of creating a virtual version of something, such as an operating system, a server, a storage device, or a network resource. It involves running multiple virtual instances of a resource on a single physical machine, effectively creating a virtual environment that behaves as if it were a separate physical entity.

Virtualization is typically used to improve resource utilization, simplify management and maintenance, and provide flexibility and scalability to IT systems. For example, in server virtualization, multiple virtual servers can be created on a single physical server, allowing businesses to consolidate their server infrastructure and reduce costs. Similarly, desktop virtualization allows multiple virtual desktops to run on a single physical machine, providing a more flexible and manageable desktop environment for users.

Virtualization can be achieved through various techniques, such as hypervisors, containers, and virtual machines. These techniques isolate the virtual resources from the underlying physical hardware, allowing them to be managed and configured independently.

Directory Server / AD DS:

A directory server, also known as a directory service or LDAP server, is a software application that provides a centralized directory of user, group, and other system-related information for a network of computers. It allows users to authenticate and authorize access to network resources and services.

A directory server stores information in a hierarchical format called a directory, which is similar to a file system but is optimized for access speed and search efficiency. The most commonly used directory service protocol is Lightweight Directory Access Protocol (LDAP), which is an open-standard protocol for accessing and maintaining directory information over a network.

Directory servers are used in a variety of environments, including enterprise networks, government agencies, and educational institutions, to manage user accounts, network resources, and security policies. They provide a single point of administration for network administrators, making it easier to manage large networks and maintain consistency across different systems.

Some popular directory server software includes OpenLDAP, Microsoft Active Directory, and Novell eDirectory.

DHCP:

DHCP stands for Dynamic Host Configuration Protocol. It is a network protocol that enables devices to automatically obtain IP addresses and other network configuration settings, such as subnet masks, default gateways, and DNS servers, from a DHCP server.

DHCP simplifies network administration by automating the process of assigning and managing IP addresses. When a device connects to a network, it sends a DHCP request to the DHCP server, which responds with an IP address and other configuration parameters. This allows devices to be quickly and easily added to a network without requiring manual configuration. DHCP is commonly used in small and large networks, such as in homes, offices, and data centers. It enables network administrators to centrally manage and configure IP addresses and other network settings, making it easier to troubleshoot and maintain network infrastructure. DHCP is also used to prevent IP address conflicts, which can occur when multiple devices are assigned the same IP address.

DNS:

DNS stands for Domain Name System. It is a system used to translate human-readable domain names, such as www.example.com, into IP addresses, which are the numerical addresses used by computers to identify each other on the internet. I have used www.google.com and www.aroosabatool.com

DNS works by using a distributed database of domain name servers to resolve domain names into IP addresses. When a user types a domain name into their web browser, the browser sends a DNS query to a DNS resolver, which then sends a request to a domain name server to resolve the domain name into an IP address. If the domain name server has the requested IP address in its cache, it returns the address to the resolver, which then returns it to the user's browser. If the domain name server does not have the requested IP address in its cache, it sends a query to another domain name server until the IP address is found and returned.

DNS is an essential component of the internet, as it enables users to access websites and other resources by using human-readable domain names rather than numerical IP addresses. It also plays a critical role in internet security, as it can be used to prevent users from accessing malicious or fraudulent websites by blocking their domain names.

NTP:

NTP stands for Network Time Protocol. It is a protocol used to synchronize the clocks of devices on a computer network. Accurate time synchronization is important in computer networks for a variety of reasons, such as maintaining accurate logs, ensuring proper sequencing of events, and facilitating security protocols that rely on time-stamping.

NTP operates by exchanging time synchronization messages between devices on a network. One device is designated as the NTP server, which serves as the time reference for all other devices on the network. The NTP server obtains accurate time information from an external time source, such as a GPS or atomic clock, and broadcasts it to other devices on the network. The

NTP clients, which are the other devices on the network, receive these time synchronization messages and adjust their clocks accordingly.

NTP is widely used in computer networks, from small office networks to large enterprise networks and the Internet. It is often used in conjunction with a GPS or atomic clock to provide accurate time synchronization. By keeping all devices on a network synchronized with accurate time, NTP helps ensure that network services operate correctly and that security protocols are effective.

NFS:

NFS stands for Network File System, which is a distributed file system protocol that allows a user on a client computer to access files over a network as if those files were on the local computer. An NFS server is a computer system that provides access to shared file systems and resources over a network using the NFS protocol.

An NFS server typically contains a collection of shared files or directories that can be accessed by other computers on the network. The NFS server software running on the server handles the requests from clients and provides access to the shared files or directories.

NFS is commonly used in environments where multiple computers need to share access to the same set of files, such as in a cluster or in a network of workstations. NFS is available for various operating systems, including Linux, Unix, and macOS.

Web Server:

A web server is a software program that runs on a computer system and is responsible for delivering web pages or other content over the internet or an intranet. It receives requests from client computers and responds by delivering the requested content through the use of Hypertext Transfer Protocol (HTTP) or other protocols.

A web server hosts web content such as HTML files, images, videos, and other files that make up a website. It processes requests for web pages, processes forms and other user input, and delivers the appropriate response to the requesting client.

Web servers can run on different operating systems and can be configured to support different web technologies such as PHP, Java, and .NET. They can also support different types of web hosting, including shared hosting, virtual private server (VPS) hosting, and dedicated server hosting.

Some popular web server software programs include Apache HTTP Server, Microsoft IIS, Nginx, and Lighttpd. These web servers are widely used by web developers and hosting companies to serve websites and web applications.

SMTP:

SMTP stands for Simple Mail Transfer Protocol, which is a protocol used for sending and receiving email messages between servers on the internet. SMTP is the primary protocol used for email transmission across the internet and is used by email clients such as Microsoft Outlook and web-based email services like Gmail.

SMTP operates on port 25 and uses a client-server model for communication between email servers. When an email is sent, the SMTP server on the sending end communicates with the

SMTP server on the receiving end to transmit the email message. The receiving SMTP server then delivers the email to the recipient's email client.

SMTP also supports features such as message queuing, message retries, and message delivery status notifications. These features help to ensure reliable delivery of email messages and provide feedback to senders about the status of their messages.

SMTP is supported by a variety of email clients, servers, and applications. It is an open protocol and is widely used for email transmission across the internet. However, due to its simplicity, SMTP does not include features such as encryption or authentication, which can leave email messages vulnerable to interception or spoofing. To address these security concerns, additional protocols such as STARTTLS and SPF have been developed to enhance the security of SMTP transmissions.