Letterkenny ATU

CA1

Lecturer's Name: Danny Mc Fadden

Work to be submitted to: Blackboard via Turnitin

Date for submission of work: 11/24/2024

Student's Name: Zainab Masoudi

Student Number: L00179213

Class: MSc Cloud Computing

Subject Module: Virtual Server Administration

Word Count: 1,553

I confirm that the work submitted has been produced solely through my own efforts.

Student's signature: Zainab Masoudi

NOVEMBER 24, 2024

Contents

Description

This is the first assignment in the Virtual Server Administration Module. In this exercise, we will build two VMs (Microsoft Windows server 2016 & Windows client 10) for the whole experiment. We will also install and configure the DHCP (Dynamic Host Configuration Protocol) server, DNS (Domain Name System), and Active Directory Domain Services (AD DS). Additionally, we will promote the Windows server to the domain controller and create Organizational Units (OUs), as well as user and computer objects within the Active Directory domain.

Aim

The primary goal of this assignment is to gain practical experience in building **private** virtual environments with specific **RAM** & **hard disk** requirements, configuring DHCP (Dynamic Host Configuration Protocol), DNS (Domain Name System), and Active Directory Domain Services. Additionally, we will learn to promote the Windows server to the domain controller and centralize user authentication, authorization, and computer management within Active Directory. Finally, we will know how to design our Organizational Units (OUs) and isolate delegation and group policies.

Method

To start, we will create two new virtual machines (VMs) on the same *LAN segment* network to ensure they can communicate internally and don't use any external DHCP server.

The first VM will be a Windows Server with the recommended option of 4GB RAM and a 60GB hard disk. We choose additional disk space to ensure that the server has enough capacity to accommodate future services, preventing any issues with disk shortages. The second VM will be a Windows 10 client with the minimum requirements of 2GB of RAM and a 30GB hard disk.

Once both machines are successfully installed, our virtual environment is ready for the next steps.

Installing and Configuring DHCP

DHCP server (Dynamic Host Configuration Protocol) is a service that makes the IP distribution process more efficient and easier for our network. (Microsoft, 2021)

- Before installing the DHCP server, we need to set a static IP address for our Windows server. (Figure 1)
- Now that the IP is setup we will install DHCP Server. Go to the server manager, select the DHCP from Windows server tools, and install it as a new role and features
- In the installation type, we select Role-based installation, which means we add the DHCP service as a new role to our Windows server and click next. (Figure 2)
- Server selection: In this menu, select your server from the list, in my case I only have one server at the moment if you have more, make sure to select the right server to install the DHCP server on it. (Figure 3)

- Now that we have installed the DHCP server, we need to launch and configure it. Access your server from the server manager and click on the complete DHCP configuration menu.
- In the description option, setting up the corresponding account DHCP Administrators and DHCP Users account and authorizing the DHCP server.
- Authorization Wizard: we used the Administrator account and password to authorize our DHCP server inside AD DS. (Figure 4)
- In the summary section, we will see that both DHCP Authentication and Authorization have been setup successfully.

DHCP Pool

In the DHCP pool, we specify the range of IP addresses that the DHCP server will use and distribute IP for our Network.

- Access your DHCP server management page, right click to create the new pool, and set the name.
- In this exercise, the DHCP pool range is defined between 192.168.13.100 to 192.168.13.200. (Figure 5)
- Next step we determine the DHCP excluded address from 192.168.13.110 to 192.168.13.110, the addresses that we don't want DHCP to use for clients and we will use these IPs for devices like Storage, Routers, and Servers to set static IP, and for network accessibility and stability, these devices must have a stable IP. (Figure 5)
- The DHCP lease time is set to 10 minutes. After this period, if any network device is turned off, the DHCP server can reassign that IP address to another device. This ensures that the DHCP server does not run out of available IP addresses.

Installing and Configuring DNS Sever

DNS stands for (Domain Name System), the main role of the DNS server is to translate the IP address to a name and vice versa (Quiroz and Goodwin, 2024).
To install the DNS server, follow these steps:

- Select the DNS server from the Windows server manager
- Install it as a new role and feature.
- Continue with role based installation, which means on a single Windows server. installing a new role service (DNS).
- Select your server and click next.

- In the Result section there is an option **Export Configuration Setup,** if you want to keep your configuration file you can export it as an Excel file.
- For DNS to function and facilitate the IP translation and vice versa, we must create forward and lookup zones. (Figure 7)
- Right click on Forward zone and select **Create New Primary zone**
- Type the zone name, e.g. (zaina.com).
- Repeat the same steps in the reverse zone as well.
- Right click on the reverse zone and create **New Primary Zone**.
- Type three subnets of your address, e.g. (192.168.13).
- Check **do not allow dynamic updates**.

Installing and configuring Active Directory Domain Services (AD DS)

Active Directory is a directory service that provides centralized authentication for object management. Domain services is one of the key parts of the Active Directory services, which keep information about the domain's user and computer objects. (Microsoft, 2024)

- Install the Active Directory as new roles and features
- Continuing with role base installation
- Once it is completed, the Windows server must be promoted to the Domain Controller to provide domain services.
- In the deployment configuration section, create a new forest, e.g. (L00179213.com).
- Set your password recovery please note this is **not the Administrator** password it's used for recovery purposes only, especially when something is broken in your active directory.

Creating user and computer objects

Now that our environment is almost setup, we need to add users and computers to our domain.

- Click on Tools and select Active Directory Users and Computers.
- For better security, create a separate OU (Organization Unit) for each of your departments, then add users and computers to that specific OU. (Figure 10)
- To join the Windows client to the domain, go to the Windows client and access the system from the control panel. Under the change name option,

change your PC from workgroup to the Domain and type your domain name if everything works fine your PC will join to the domain. (Figure 11)

Results and Testing

1. To test DHCP and verify it's configured properly, go to the Windows client and run the ipconfig/all command in the Command Prompt (CMD). By doing this, we can confirm that the client received dynamic IP from the DHCP server. (Figure 6)

1- To check whether DNS is working or not we launch nslookup. (Figure 8)

2- To ensure that your AC DS is configured properly, and it's working, open the Windows Server Dashboard and check your server's name and you will see that it's changed from workgroup to the Domain. (Figure 9)

3- Testing user profile, log in with the new domain user account and see if you can log in. (Figure 11)

4- To see whether your client machine is joined successfully or not, check your Windows workstation and you will notice that your computer has changed from workgroup to domain. (Figure 12)

Conclusion

By completing this assignment, we learned the basic practical concept of DHCP, DNS and Active Directory Domain services, which is an important step in establishing a functional network infrastructure. We have successfully set up a dynamic and scalable network environment that supports seamless management of IP address allocation, domain name resolution, and centralized user authentication and authorization. By promoting the Windows server to the domain controller, we provide a centralized environment for resources and security management to restrict users from accessing sensitive data. Additionally, we gained the idea of replication and redundancy and how various domain controllers exchange information between each other. In case of any failure, if the primary domain controller stops working, the secondary domain controller (Backup) will provide services automatically. By creating different OUs, we improve the security of the organizational structure of our domain even more and simplify the process of group policy implementation in our organization.

References:

(Microsoft, 2021a) ‘Dynamic Host Configuration Protocol (DHCP)’. Available at: https://learn.microsoft.com/en-us/windows-server/networking/technologies/dhcp/dhcp-top (Accessed: 20 November 2024).

(Microsoft, 2024) ‘Active Directory Domain Services Overview’. Available at: https://learn.microsoft.com/en-us/windows-server/identity/ad-ds/get-started/virtual-dc/active-directory-domain-services-overview (Accessed: 11 November 2024)

(Quiroz, C and Goodwin, Q, 2024) ’ What is a DNS server?’. Available at: What Is DNS (Domain Name System)? | IBM (Accessed: 18 November 2024)

Appendixes:

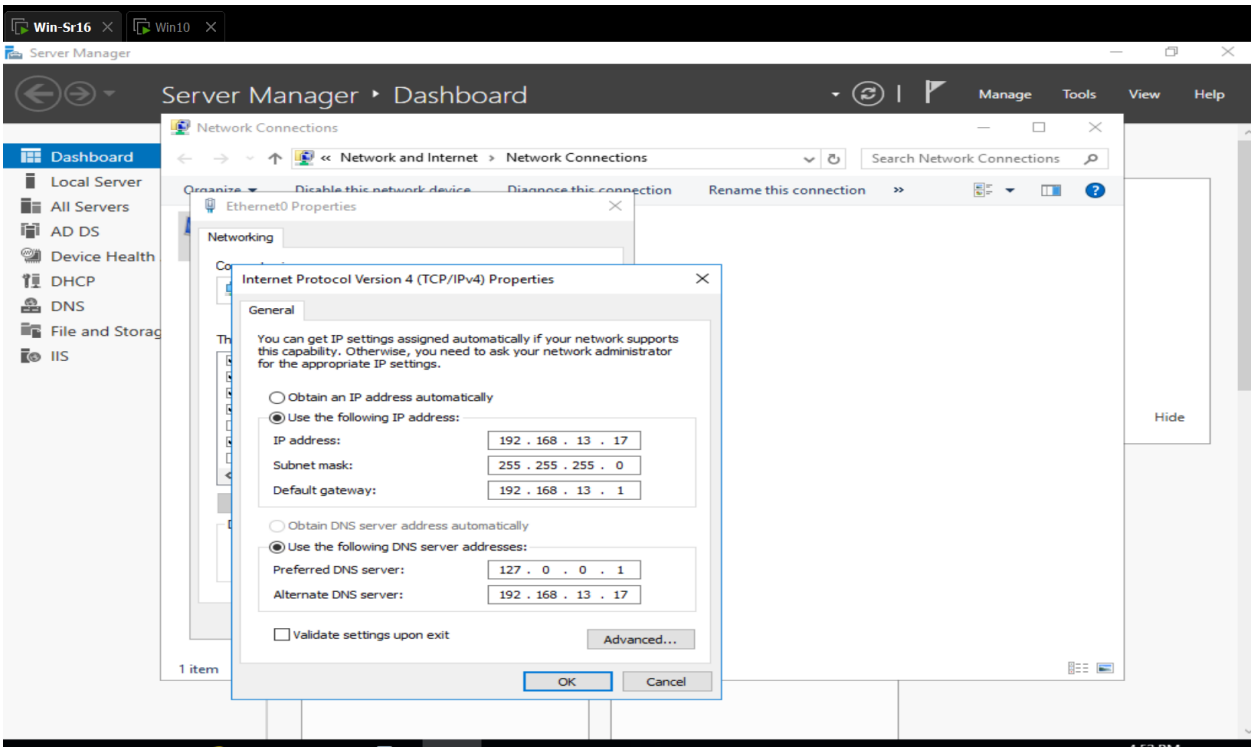

Figure 1

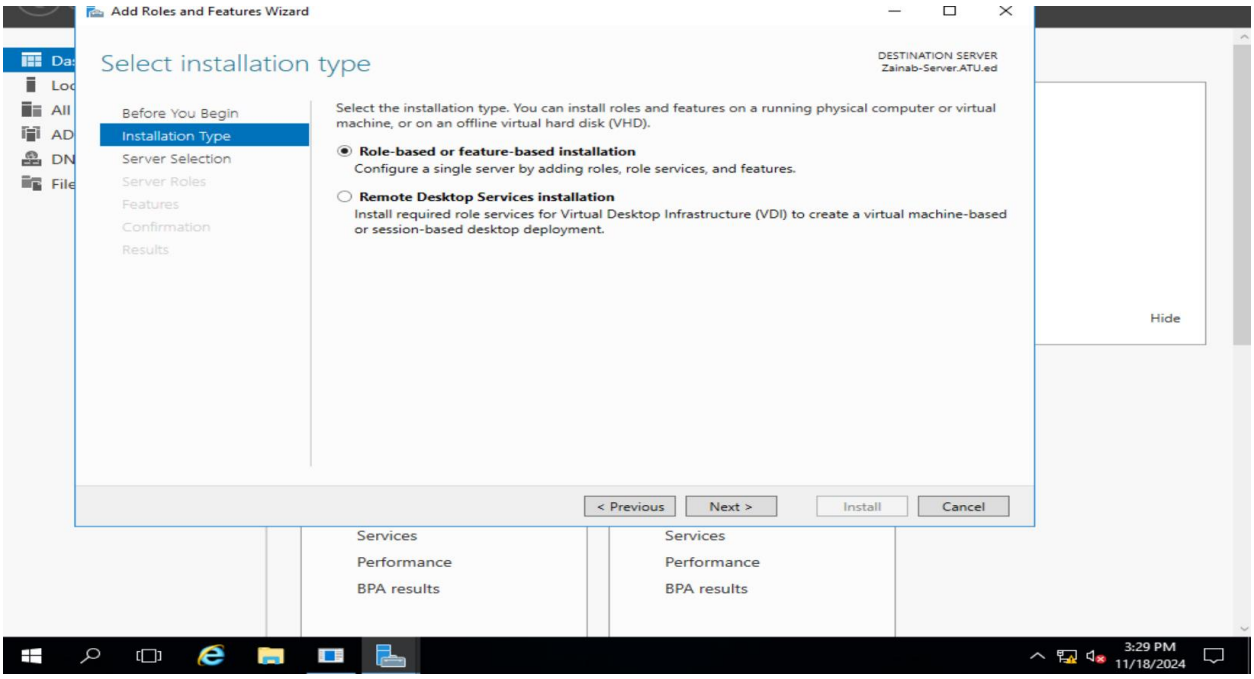

Figure 2

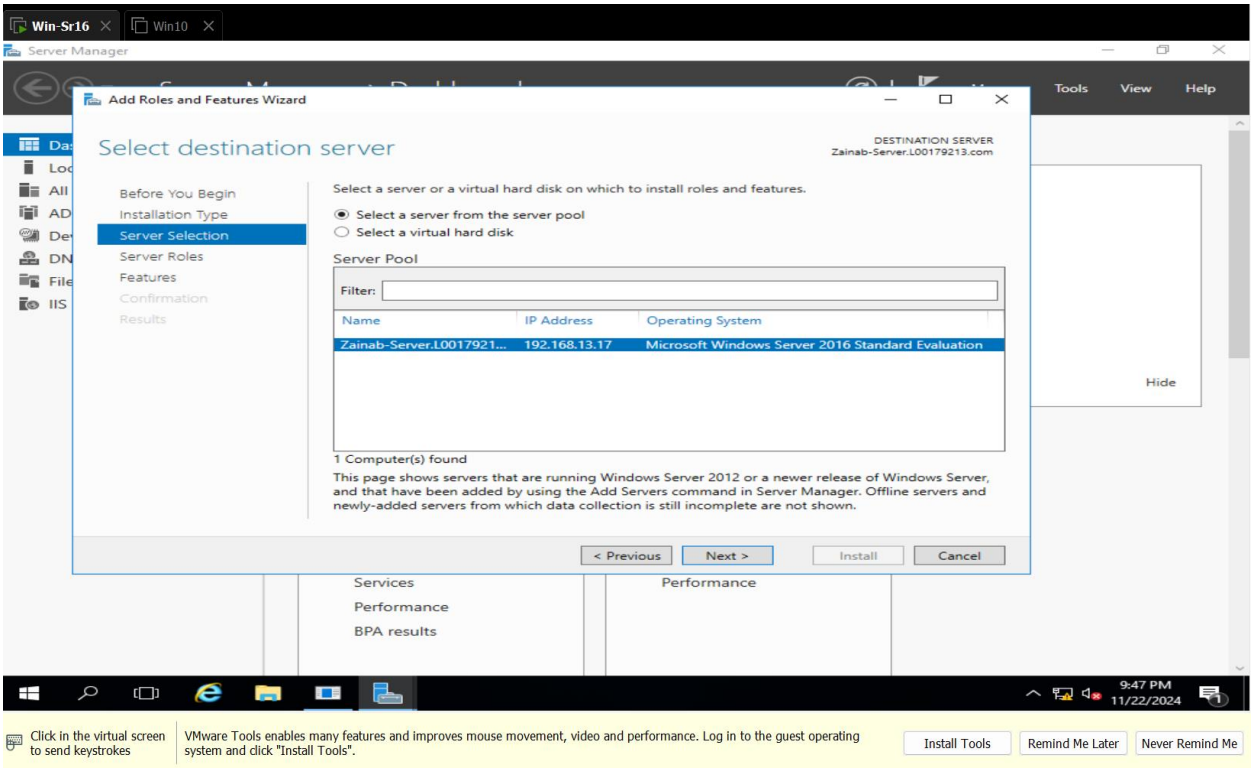

Figure 3

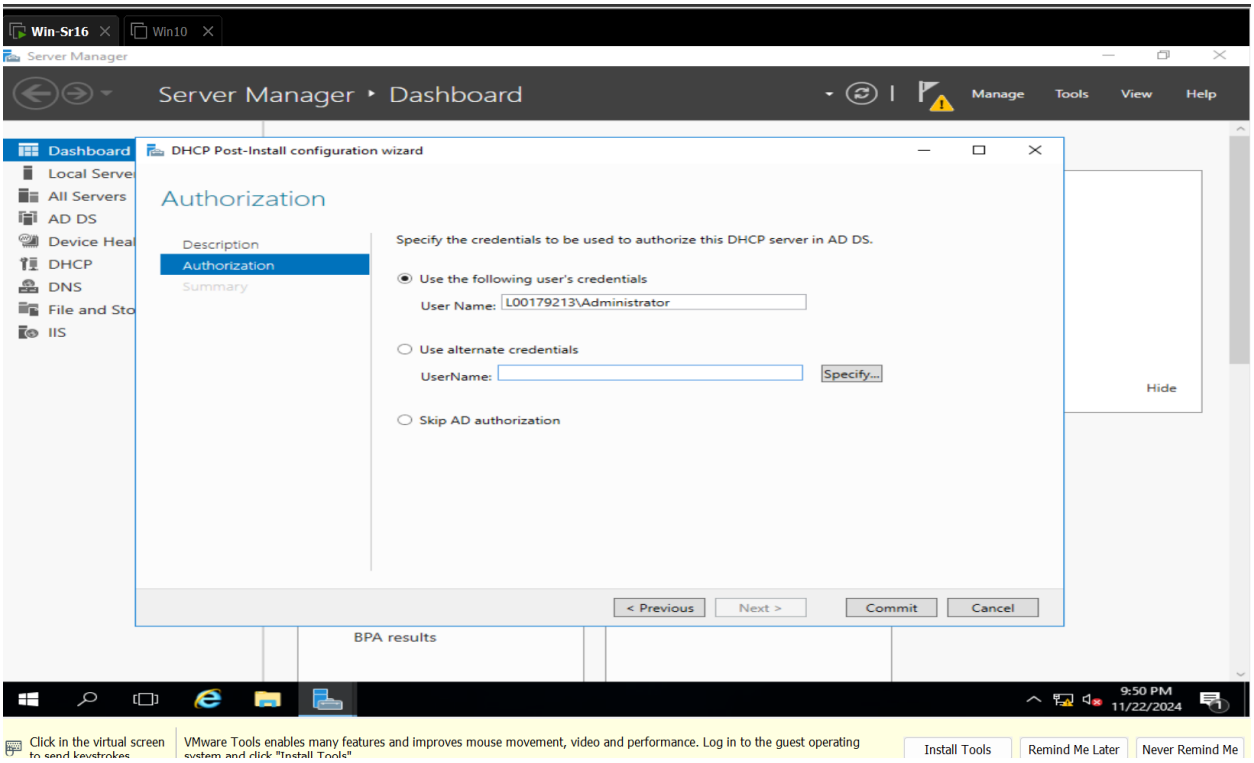

Figure 4

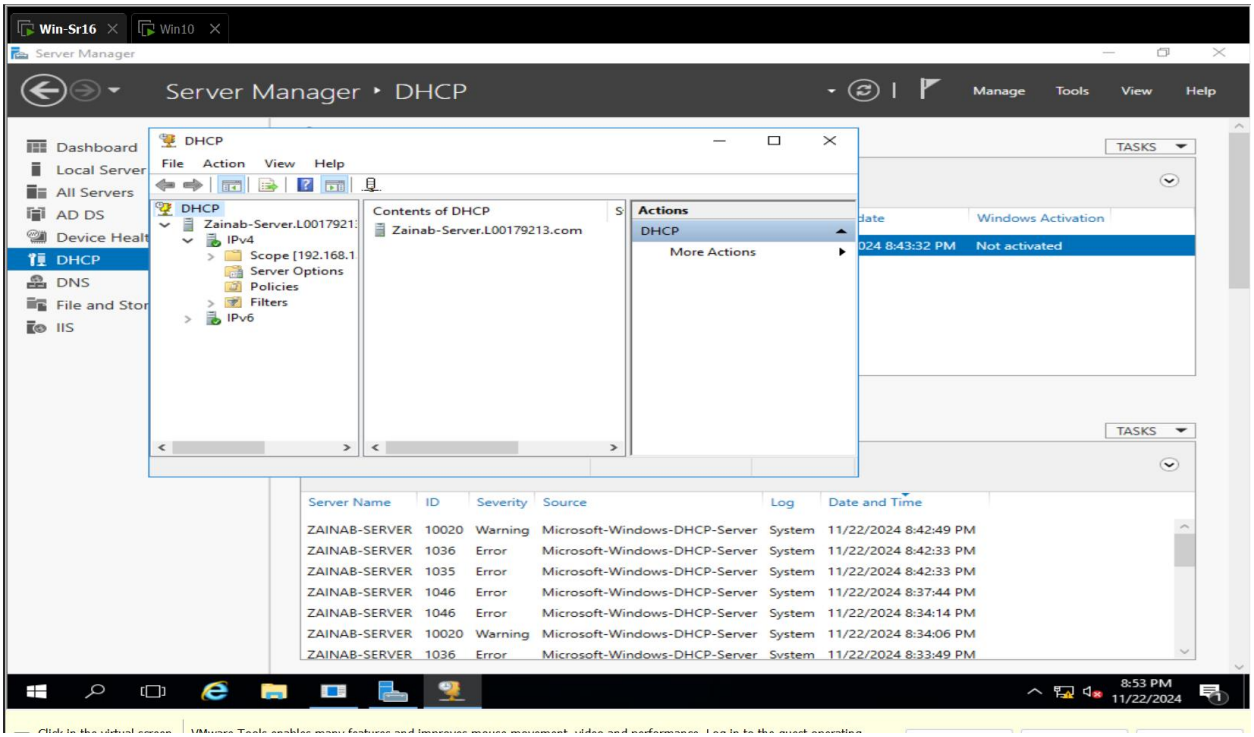

Figure 5

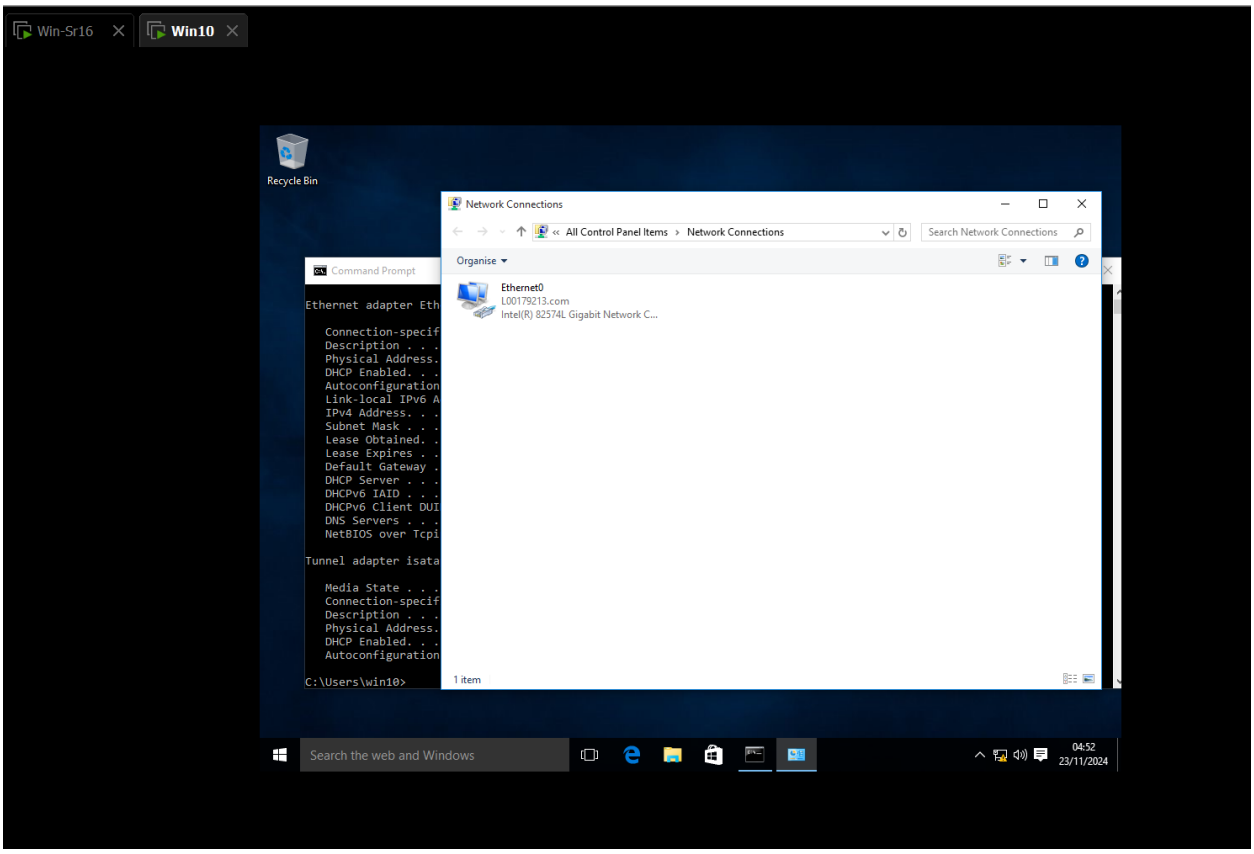

Figure 6

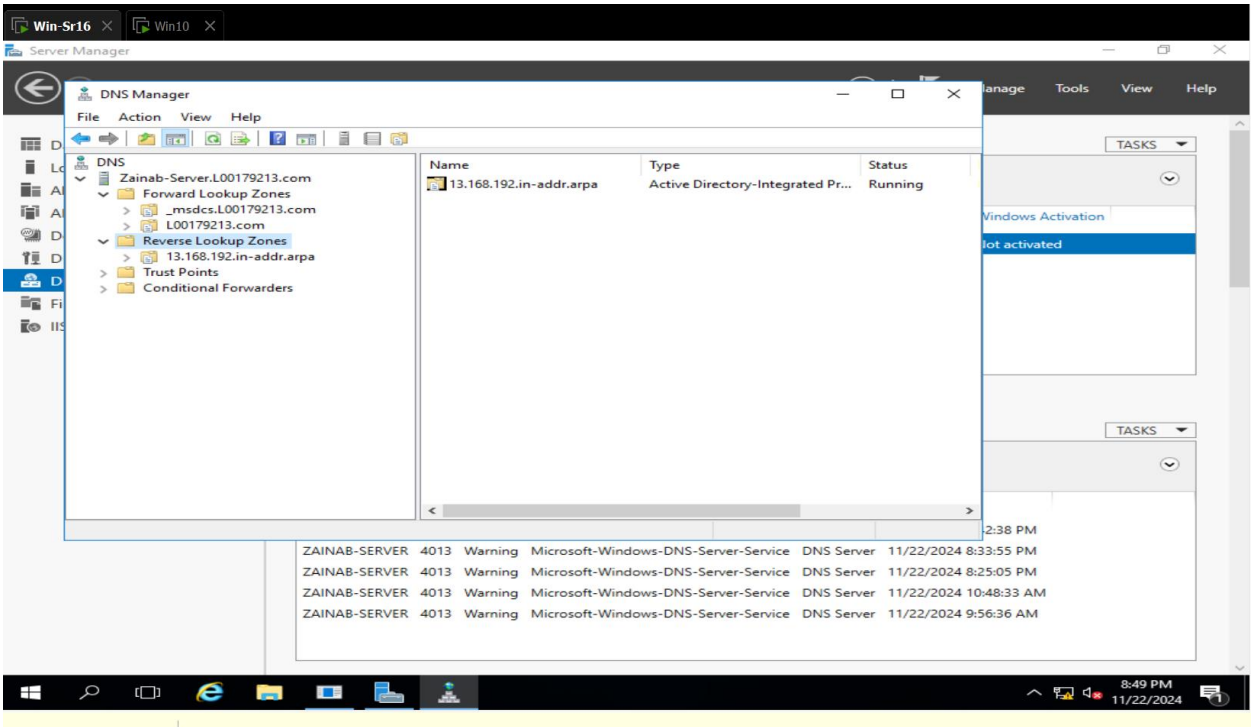

Figure 7

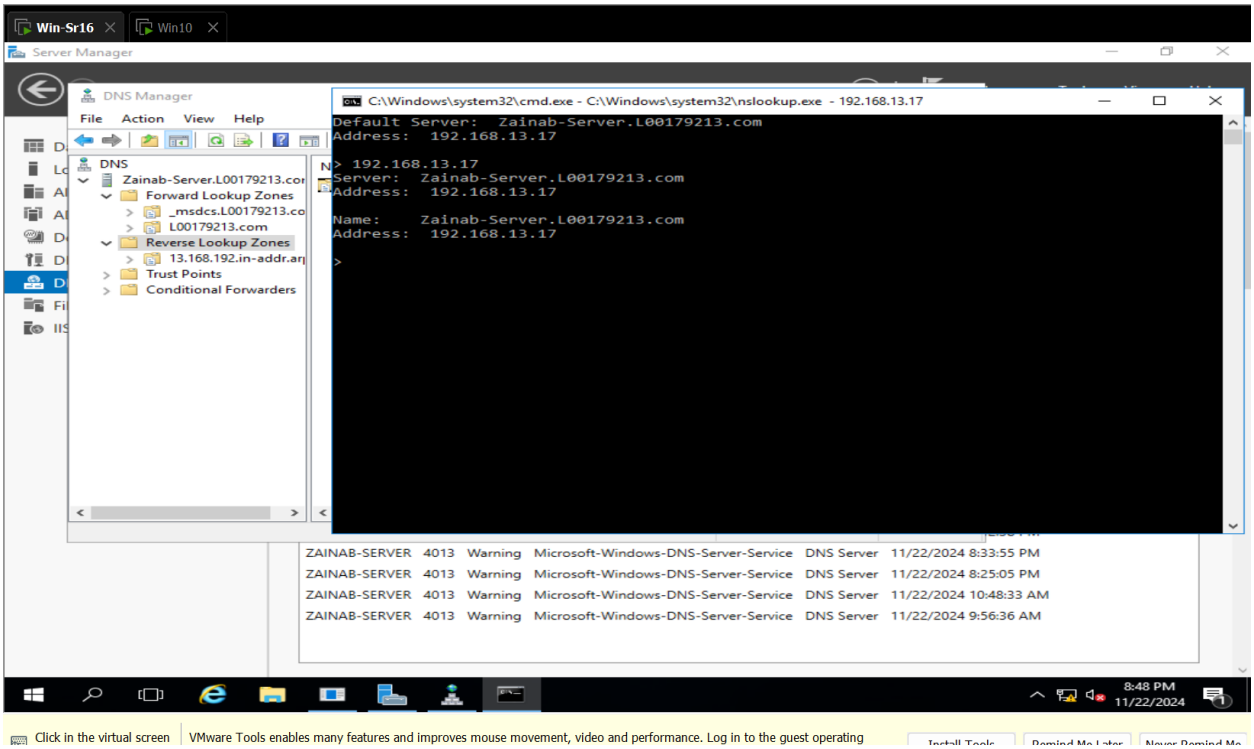

Figure 8

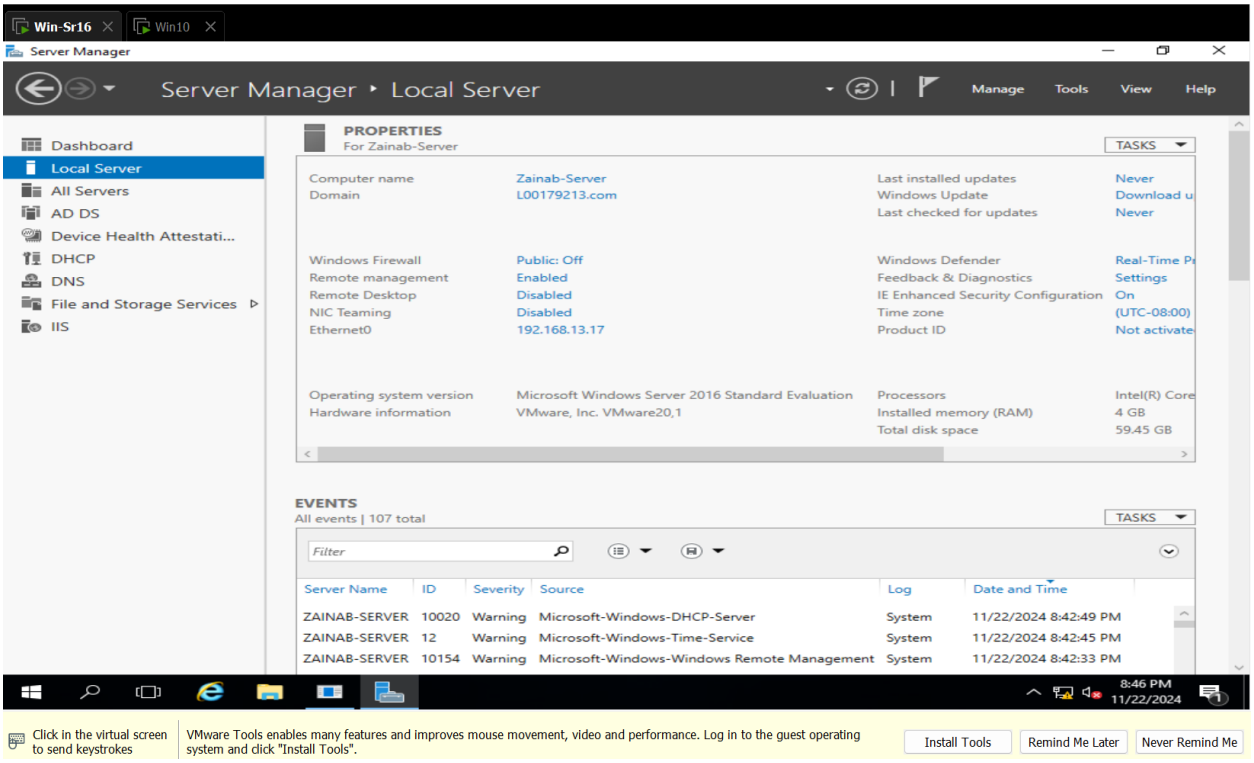

Figure 9

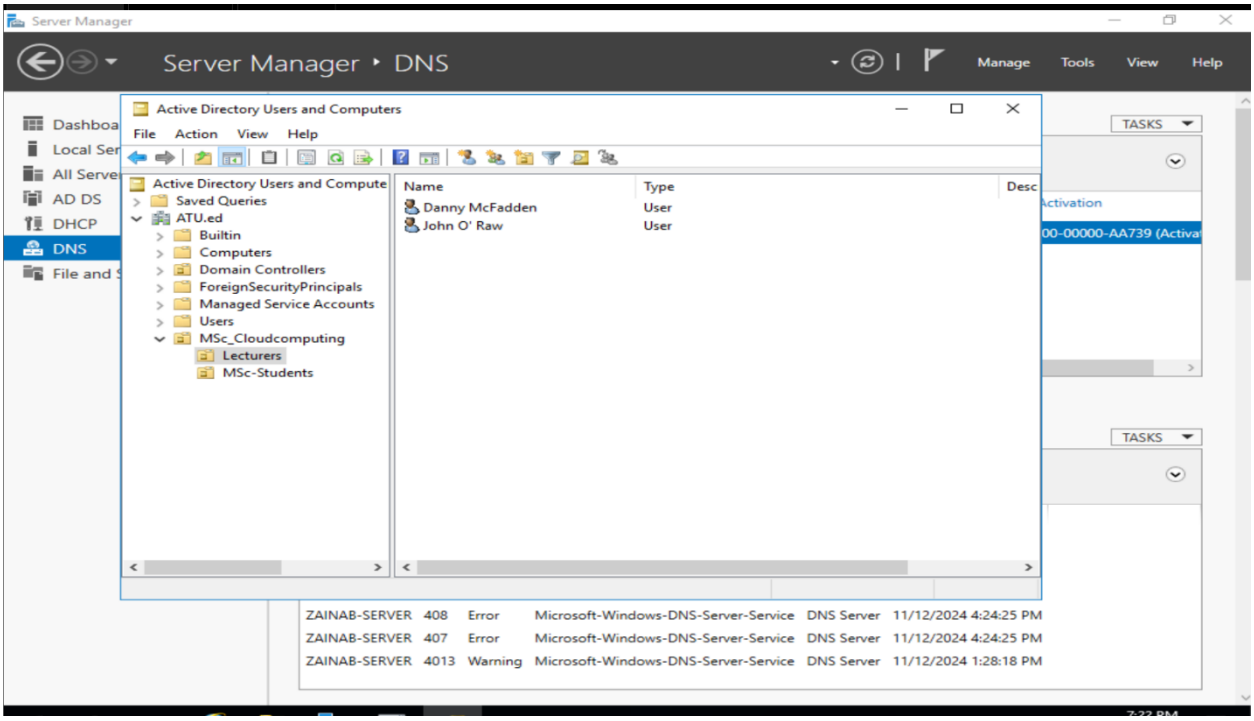

Figure 10

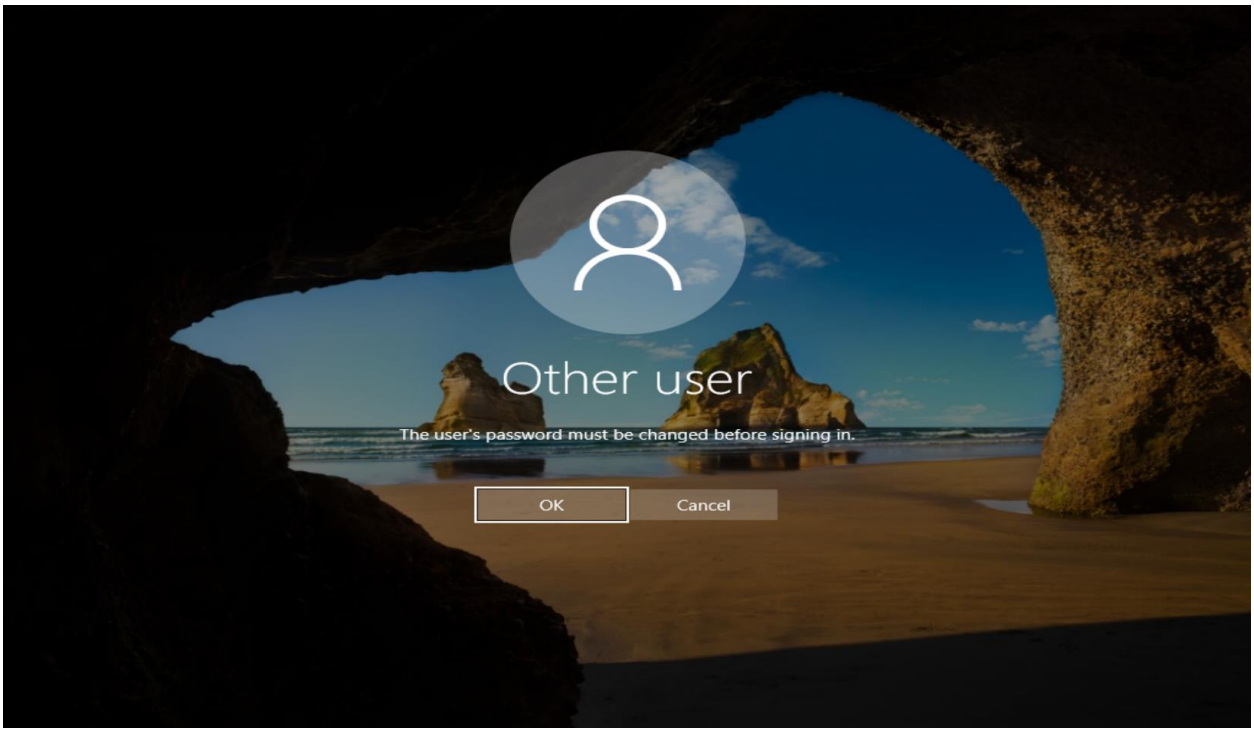

Figure 11

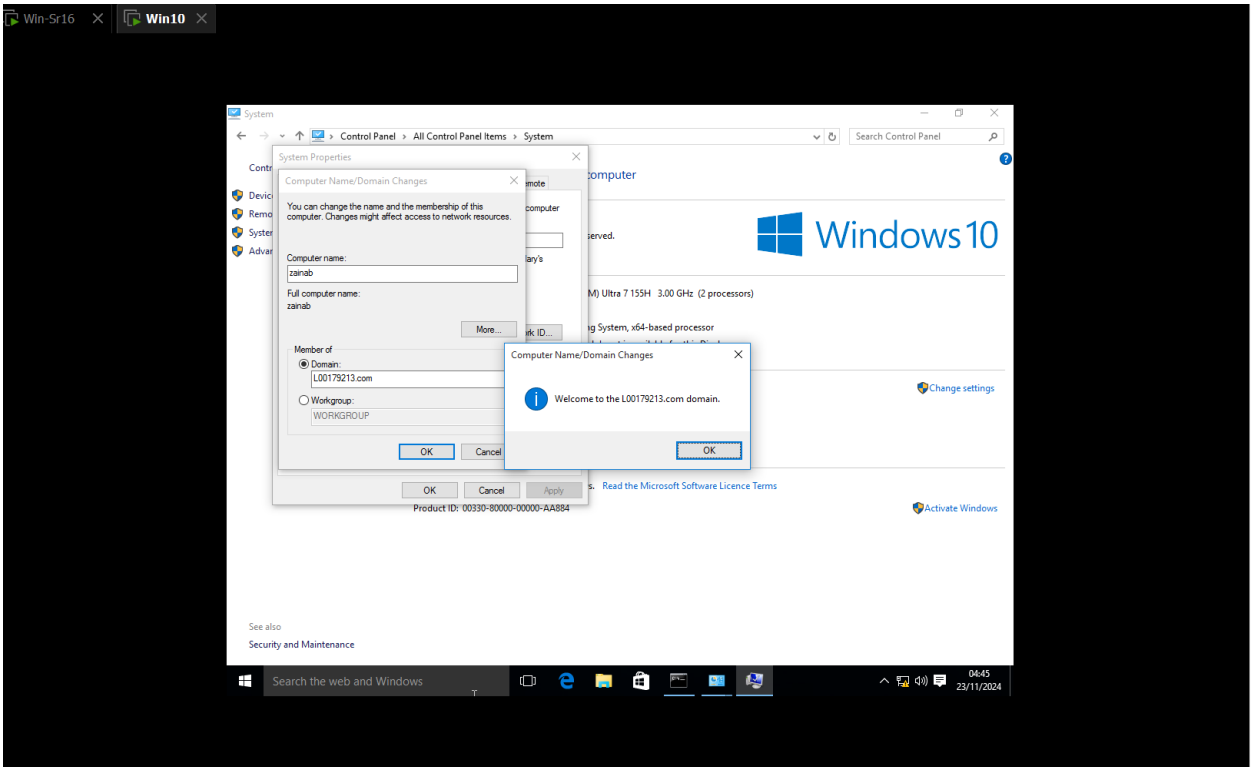
Win-Sr16
Win10
System
Control Panel › All Control Panel Items › System
Search Control Panel
System Properties
Computer Name/Domain Changes
You can change the name and the membership of this computer. Changes might affect access to network resources.
Computer name:
zainab
Full computer name:
zainab
More...
Member of
Domain:
L00179213.com
Workgroup:
WORKGROUP
OK
Cancel
Apply
Computer Name/Domain Changes
Welcome to the L00179213.com domain.
OK
Windows 10
Change settings
Read the Microsoft Software Licence Terms
Activate Windows
Product ID: 00330-80000-00000-AA884
See also
Security and Maintenance
Search the web and Windows
04:45
23/11/2024

Figure 12