🖥️ Windows Server 2022 Administration Lab Project

📌 Project Overview

In this personal lab project, I designed, implemented, and administered a **Windows Server 2022** environment entirely from scratch using **VirtualBox**. My goal was to create a functional Active Directory ecosystem, complete with DHCP, DNS, and printer services, and demonstrate how both **Windows** and **Linux clients** can be integrated into a centralized domain system. All configurations, installations, and troubleshooting were handled by me, giving me hands-on exposure to real-world enterprise system administration tasks.

🧰 Tools & Technologies I Used

- VirtualBox (for virtualization on my local machine)
- Windows Server 2022 (Evaluation Center)
- Windows 11 Enterprise (Client VM)
- Ubuntu 24.04 Desktop (Linux Client VM)
- Rocky Linux (Linux Client VM)
- Active Directory Domain Services (AD DS)
- DNS Server
- DHCP Server
- Print and Document Services
- RealmD / SSSD (for Linux AD integration)
- IONOS Domain + AWS Route53 DNS Management

🛠️ How I Set Up the Environment

1. Virtual Machine Configuration

I created and configured four VMs using VirtualBox:

Machine	OS	Role
Server	Windows Server 2022	Domain Controller (AD, DNS, DHCP, Print Services)
Windows Client	Windows 11 Enterprise	Client joined to domain
Linux Client 1	Ubuntu 24.04 Desktop	Linux client joined to AD using RealmD
Linux Client	Rocky Linux	Second Linux client joined to AD

Machine	OS	Role
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2. Windows Server Setup & Domain Configuration

a. Initial Installation & Network Setup

- I installed Windows Server 2022 on a VM in VirtualBox.
- I assigned it a static IP address and renamed the server to `DC01`.

b. Roles and Features I Installed

Using **Server Manager**, I installed:

- Active Directory Domain Services (AD DS)
- DNS Server
- DHCP Server
- Print and Document Services

c. Domain Controller Promotion

- I promoted the server to a Domain Controller.
- I registered a domain name (**physicstutors.org**) on IONOS.
- I used **AWS Route53** to manage DNS records for this domain.
- I changed the NS record on IONOS to point to my Route53 Hosted Zone.

3. Active Directory Configuration

a. Users and Organizational Units (OUs)

- Through the **ADUC** (Active Directory Users and Computers) console, I:
  - Created OUs for `Staff`, `Students`, and `Admins`
  - Created sample users and assigned them to the appropriate groups

b. DNS Setup

- The forward lookup zone for `physicstutors.org` was automatically created.
- I manually created a reverse lookup zone to support name-to-IP resolution.

c. DHCP Configuration

- I authorized the DHCP server in AD.
- I created a custom DHCP scope with:
  - Defined IP range
  - Default gateway
  - DNS server pointing to the Domain Controller

4. Windows Client Domain Join

- I configured the Windows 11 Enterprise VM to use the domain controller as its DNS server.
- I successfully joined it to `physicstutors.org` using domain admin credentials.
- I logged into the client as one of the domain users I created.

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5. Linux Clients Domain Join (Ubuntu & Rocky Linux)

a. Installing Required Packages

On **Ubuntu 24.04**, I ran:

```
sudo apt update
sudo apt install realmd sssd adcli samba-common krb5-user -y
```

On **Rocky Linux**, I ran:

```
yum install realmd sssd adcli samba-common krb5-workstation -y
```

b. Discovering & Joining the Domain

For both clients:

```
realm discover physicstutors.org
sudo realm join physicstutors.org -U Administrator
```

- I verified domain join with:

```
realm list
```

c. Logging In as AD User

I confirmed success by logging in as a domain user:

```
su - 'physicstutors.org\\domainuser'
```

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6. Print Services Setup (Optional)

- I added **Print and Document Services** through Server Manager.
- I configured a test printer and shared it with domain users.
- I assigned permissions to users and groups using AD.

✅ Project Results & Key Takeaways

- I successfully deployed and configured a **fully functional domain environment**.

- My server acted as a DNS, DHCP, and AD controller, serving both Windows and Linux clients.
- Windows 11 and both Ubuntu and Rocky Linux clients were seamlessly joined to the domain.
- I achieved centralized authentication across all machines.
- I also gained practical experience configuring external DNS using **IONOS** + **AWS Route53**.

📚 What I Learned

- How to deploy and manage a **Windows Server 2022** domain environment
- How to register and manage a real domain using **IONOS** and **AWS Route53**
- How to integrate **Linux systems with Active Directory** using RealmD and SSSD
- How to administer core services like **DHCP**, **DNS**, and **Printer sharing**
- How to configure and manage users, groups, and permissions in **Active Directory**

This project pushed me to apply both my **system administration** and **network configuration** skills in a real-world simulation. It solidified my understanding of domain infrastructure and helped me build confidence managing mixed-OS environments.