**Mini Enterprise HomeLab - Technical Documentation (English Version)**

PHASE 1: Building the Base Environment – NAT Network, Domain Controller, and Network Services

The first part of the project was dedicated to building the foundation of the lab from scratch: the virtual network and the first server, the Domain Controller.

The idea was to create a small enterprise-like infrastructure to simulate real services such as Active Directory, DNS, and DHCP, but within a controlled and isolated environment, avoiding any interference with the physical network of the host machine.

To start, I configured a private NAT network in VMware, which I named LabNAT.

The chosen address for this network is 192.168.149.0/24, with a gateway of 192.168.149.2.

NAT allows virtual machines to access the Internet through the host computer while keeping them isolated from the external network.

VMware’s built-in DHCP was disabled because I wanted the Domain Controller to manage IP addressing, exactly as it happens in a real corporate network.

Once the network was ready, I created the virtual machine DC01, based on Windows Server 2019 Standard (Desktop Experience).

The machine was assigned 2 CPUs, 4 GB of RAM, and a 60 GB virtual disk, connected to an LSI Logic SAS controller, which is the most stable option for Microsoft systems.

The network adapter was connected to LabNAT, and I selected a traditional BIOS firmware, which is simpler to manage in these kinds of environments.

After installing the operating system, I set a static IP address because a Domain Controller must never change its IP.

The network parameters are:

IP: 192.168.149.10

Subnet mask: 255.255.255.0

Gateway: 192.168.149.2

Primary DNS: 127.0.0.1

Secondary DNS: 8.8.8.8

The primary DNS points to itself because the server must handle internal domain resolutions, while the secondary (8.8.8.8) serves only as a backup for external requests.

PowerShell commands:

New-NetIPAddress -InterfaceAlias "Ethernet0" -IPAddress 192.168.149.10 -PrefixLength 24 -DefaultGateway 192.168.149.2

Set-DnsClientServerAddress -InterfaceAlias "Ethernet0" -ServerAddresses 127.0.0.1,8.8.8.8

Install the main roles: Active Directory Domain Services, DNS Server, and DHCP Server.

Install-WindowsFeature AD-Domain-Services, DNS, DHCP -IncludeManagementTools

Then promote the server to Domain Controller, creating the domain lab.local.

Add DNS forwarders: Add-DnsServerForwarder -IPAddress 8.8.8.8,1.1.1.1

Configure DHCP Scope LabNAT (192.168.149.100 - 192.168.149.200) and options.

Add-DhcpServerv4Scope -Name "LabNAT" -StartRange 192.168.149.100 -EndRange 192.168.149.200 -SubnetMask 255.255.255.0

Set-DhcpServerv4OptionValue -Router 192.168.149.2

Set-DhcpServerv4OptionValue -DnsServer 192.168.149.10 -DnsDomain "lab.local"

Add-DhcpServerInDC -DnsName "dc01.lab.local" -IpAddress 192.168.149.10

Verification commands:

ping 8.8.8.8

Resolve-DnsName lab.local

Resolve-DnsName dc01.lab.local

Get-Service DHCPServer

PHASE 2: Installing and Integrating Ubuntu01 into the Domain

After setting up the Domain Controller, the second part of the project introduced a Linux server into the network to experiment with a mixed Windows–Linux environment and understand how they interact under an Active Directory domain.

Ubuntu01 configuration details:

Ubuntu Server 22.04 LTS

2 CPUs, 4 GB RAM, 30 GB Disk

Static IP: 192.168.149.20, Gateway: 192.168.149.2, DNS: 192.168.149.10, 8.8.8.8

Search domain: lab.local

Connectivity verification:

ping -c 4 192.168.149.10

ping -c 4 8.8.8.8

ping -c 4 lab.local

Packages installed:

sudo apt install -y realmd sssd sssd-tools sssd-ad libnss-sss libpam-sss adcli samba-common-bin packagekit oddjob oddjob-mkhomedir

Domain discovery and join:

realm discover lab.local

sudo realm join -U Administrator lab.local

realm list

id Administrator@lab.local

Ubuntu01 is now a domain member with centralized authentication handled by the Domain Controller.

Understanding the Infrastructure

What we have built so far is not just a set of virtual machines linked together. It is a functional model of a corporate network. Every configured component — network, domain, DNS, and server roles — represents a fundamental part of an enterprise infrastructure.

Through LabNAT, we learn segmentation and routing. With DC01, we learn identity management and service coordination. By adding Ubuntu01, we explore interoperability and security under a unified identity space. This is the mindset of a system administrator: build, test, understand, and improve — one component at a time.