Network Project
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Project Overview

Objective:

The objective of this home lab is to build and manage a virtualized network to help enhance skills in network security, administration and troubleshooting. Focused on utilizing PFSense for firewall management, Kali Linux for penetration testing and multiple operating systems to simulate real networking scenarios.

Network Architecture

Mini PC Specs: **(**Mini PC Purchase Link**)**

- **Name:** Trycoo WI-6 Pro Mini Pc
- **Firmware:**
- **Ram:** 16GB DDR4
- **Storage:** 512 SSD
- **CPU Speed:** 3.4 GHz
- **Processors:** 4
- **Network:** Gigabit Ethernet

Virtualized Environment:

Virtual Machine/ Container	Purpose
Proxmox VE	Virtualization management to create, manage and monitor multiple virtual machines and containers.
PFSense	Firewall & network security to manage traffic, implement intrusion detection and secure internal systems.
Kali Linux	Penetration testing and vulnerability assessment using tools like Metasploit, Nmap and Wireshark.
Ubuntu	Additional Linux machine for software testing and administration tasks.
Windows 10 & 11	Endpoint security testing and assessing system vulnerabilities.
Vulnhub	Hosting vulnerable machines to practice penetration testing and exploit mitigation.

Setup Process

Step 1: Install Proxmox

1. Download Proxmox ISO (Proxmox Download)
2. Create bootable USB drive using Rufus (Rufus Download)
3. Install Proxmox on the mini PC and configure storage and network

Step 2: Create Linux Bridge Network

1. PVE > Network > Create > Linux Bridge
    - Enter
        - Name: (ex. vmbr1)
        - IPv4: (ex. 10.10.1.0/24)
        - Check-On
            - AutoStart
            - VLAN aware

Step 3: Create Security VM

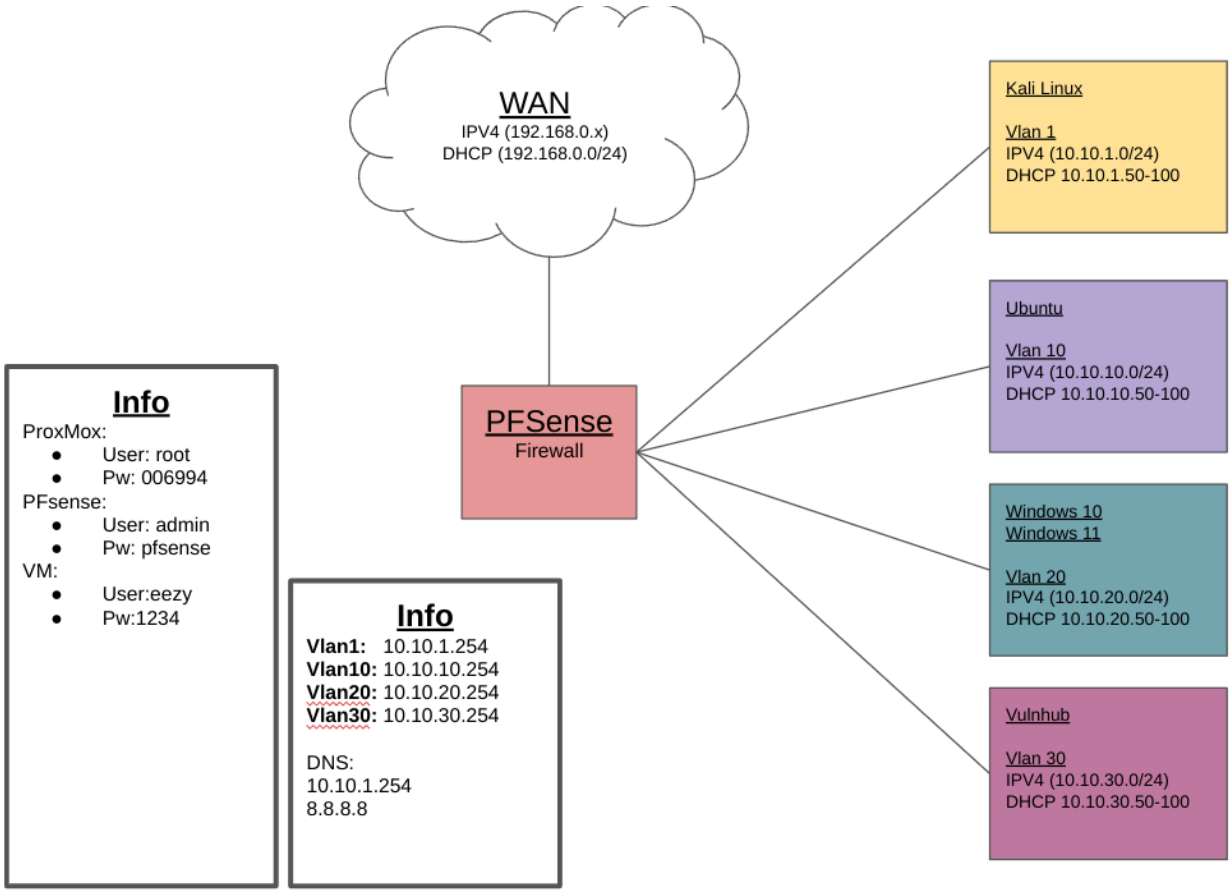
1. Download and install the following ISO's:
    - PFSense (Create VM)
        - Network
            - Bridge: vmbr0 (WAN)
        - Add Network
            - PFSense > Hardware > Add > Network Device
            - Bridge: vmbr1 (LAN)
            - VLAN Tag: 1
        - Launch
        - Set Interface(s) IP Address
            - New LAN IPv4 address: (ex. 10.10.1.254)
            - Bit Count: (ex. 24)
            - IPv4 Range: (ex. 10.10.1.50 - 10.10.1.100)
        - Create remaining VLANs through Kali
2. Download and Install Kali Linux ISO (Create VM)
    - Network:
        - Bridge: vmbr0 (LAN)
        - Install
3. Configure PFsense firewall rules and VLANs:
    - Add VLAN Interfaces:
        - Interfaces > Assignments > VLANs > Add
        - Ex.
            - Parent Interface: vtnet1
            - VLAN Tag: 10, 20, 30, etc.
    - Interface Assignments:
        - Add
            - VLANs
        - Configure
            - Enable interface
            - Description: (ex. VLAN1)
            - IPv4 Configuration Type: (ex. static)

- Alias IPv4 Address: (ex. 10.10.10.254)
    - Bit: (ex. 24)
- Firewall Rules:
  - Firewall > Rules
    - Copy (Default allow LAN to any rule) to all VLANs
  - Edit Each Firewall rule
    - Source: (ex. VLAN 10 subnets)
  - Setup DHCP Servers
    - Services > DHCP Server
      - Address Pool: (ex. 10.10.1.50 - 10.10.1.100)
      - DNS: (ex. 10.10.1.25)
      - DNS2: (ex. 8.8.8.8)

Step 4. Creating Other VMs

1. Download and Install Ubuntu ISO
    a. Network:
        i. Bridge: vmbr1
        ii. VLAN Tag: 10
2. Download and Install WIndows 10 ISO
    a. Network:
        i. CPU
            1. Cores: 2
            2. Type: Host
        ii. Bridge: vmbr1
        iii. VLAN Tag: 20
        iv. Create
    b. Add CD/DVD Drive
        i. Download Windows Virtio Driver (Proxmox website)
            1. Hardware > Add >CD/DVD Drive
            2. Virtio Driver
    c. Setup
        i. Windows Pro (remote access)
        ii. Custom Install
            1. Browse > virtio-win-0 > AMD64 > win10 folder
    d. Enable Network (once installed)
        i. CLI > (D:) Drive > virtio-win-gt-x64.msi > install
        ii. Right click settings > Device manager > network adapters > Red Hat (update driver)
            1. Browse computer > CD Drive (D:) virtio-win-0.1.266
        iii. Enable Remote Desktop
            1. Remote Desktop Settings > Enable Remote Desktop
3. Download and Install WIndows 11 ISO

Network


WAN
IPV4 (192.168.0.x)
DHCP (192.168.0.0/24)
PFSense
Firewall
Kali Linux
Vlan 1
IPV4 (10.10.1.0/24)
DHCP 10.10.1.50-100
Ubuntu
Vlan 10
IPV4 (10.10.10.0/24)
DHCP 10.10.10.50-100
Windows 10
Windows 11
Vlan 20
IPV4 (10.10.20.0/24)
DHCP 10.10.20.50-100
Vulnhub
Vlan 30
IPV4 (10.10.30.0/24)
DHCP 10.10.30.50-100
Info
ProxMox:
User: root
Pw: 006994
PFsense:
User: admin
Pw: pfsense
VM:
User:eezy
Pw:1234
Info
Vlan1: 10.10.1.254
Vlan10: 10.10.10.254
Vlan20: 10.10.20.254
Vlan30: 10.10.30.254
DNS:
10.10.1.254
8.8.8.8