

Network Project

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Project Overview

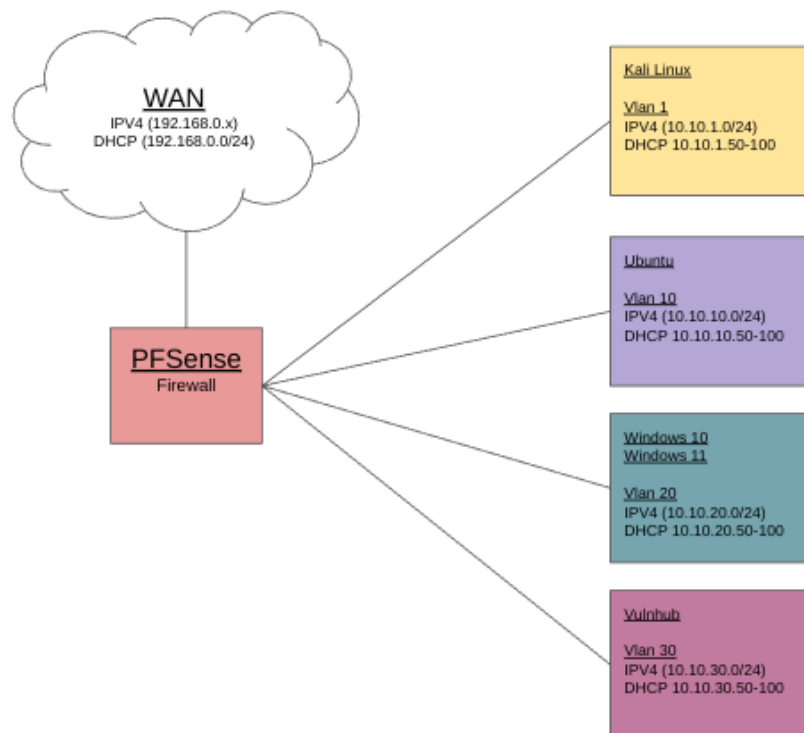
Objective:

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 Specifications:

- **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.

Virtual Machines Installation

Hypervisor Installation

- Hypervisor: Proxmox
- Bootable File Creation Tool: Rufus
- Install Proxmox on the mini PC and configure storage and network settings.

Linux Bridge

- PVE > Network > Create > Linux Bridge
- Configure
 - Name: e.g., vmbr1
 - IPv4: e.g., 10.10.1.0/24
 - Enable **AutoStart** and **VLAN** aware

PFSense Installation and Configuration

- Download and install PFSense ISO
- Create a new virtual machine (VM) and configure settings:
 - WAN Bridge: VMBR0
 - Lan Bridge: VMBR1
 - VLAN Tag: 0
 - Model: VirtIO (paravirtualized)
 - PFSense (Create VM)
- Assign IP address for the LAN interface:
 - New LAN IPv4 Address: e.g., 10.10.1.254/24
 - IPv4 Range: e.g., 10.10.1.50 - 10.10.1.100
- Configure VLANs in PFSense:
 - Navigate to Interfaces > Assignments > VLANs > Add
 - E.g. VLAN Configurations:
 - Parent Interface: vtnet1
 - VLAN Tags: 10, 20, 30
 - Enable interfaces and set static IP Configurations
- Firewall Rules and DHCP Setup
 - Firewall > Rules: Copy Default LAN to Any rule to all VLANs.
 - Services > DHCP Server: Assign DHCP ranges and configure DNS:
 - Address Pool: 10.10.1.50 - 10.10.1.100

- Primary DNS: 10.10.1.254
- Secondary DNS: 8.8.8.8

Creating Other VMs

- **Ubuntu Installation**

- Network Bridge: vmbr1
- VLAN Tag: 10

- **Windows 10 Installation**

- General Settings:
 - Node: PVE
 - VMID: 103
 - Name: Windows10
- OS Selection:
 - ISO Image: Win10
 - Guest OS: Microsoft Windows
- System Configuration:
 - Machine: q35
 - Firmware: OVMF (UEFI)
 - TPM Version: 2.0
- Disk and Memory Allocation:
 - Disk Size (GiB): 32GB
 - Memory: 4096MB
- Network Configuration:
 - Bridge: vmbr1 (lab bridge)
 - VLAN Tag: 20
 - Model: Intel E1000
- Final Configuration Before Launching
 - Attach CD/DVD Drive with Windows VirtIO drivers from Proxmox
- Final Configuration After Launching
 - OS: Windows 10 Pro x64 (remote access)
 - Custom Install: Browse > virtio-win-0 > AMD64 > win10 folder
 - Enable Remote Desktop Access for remote management

- **Windows 11 Installation**

- Follow windows 10 Installation with updated ISO

- **Mr. Robot (Vulnhub)**

- General Settings:
 - Node: PVE
 - VMID: 104
 - Name: Mr-Robot
 - OS Selection:
 - Do not use any media
 - System Configuration:
 - Machine: default
 - Disk and Memory Allocation:
 - Disk Size (GiB): 32GB
 - Cores: 2
 - Memory: 2048MB
 - Network Configuration:
 - Bridge: vmbr1 (lab bridge)
 - VLAN Tag: 30
 - Model: VirtIO

- **Final Configuration Before Launching**

- Type in Shell
 - `cd /tmp`
 - `mkdir mr-robot && cd mr-robot`
 - `wget (mr. robot link)`
 - `ls`
 - `tar -xvf mrRobot.ova`
 - `ls`
 - `cd /tmp`
 - `rm -rf ./mr-robot`
 - In Mr. Robot VM GUI
 - Hardware > Unused Disk 0
 1. Set: Bus/Device : SATA
 - Hardware > Options > Boot Order
 1. Sata0 (checked)
 2. Ide2 (unchecked)

3. Net0 (unchecked)

4. Scsi0 (unchecked)

- Network Troubleshoot (no IP generated)
 - Edit Bootloader
 - On start up press "e"
 - Edit line "ro quiet splash"
 - Updated line "rw init=/bin/bash"