Proxmox & Pfsesne – Installation & Configuration

A Foundational Infrastructure for Cybersecurity and Network Management

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Project Objectives

This project demonstrates the setup of a virtualized home lab environment using **Proxmox VE** as the hypervisor and **pfSense** as the firewall and router.

The goal is to create a segmented and secure environment for practicing real-world scenarios such as DHCP, DNS, VLAN, firewall configuration, and internal network visibility.

Tools Used

- Host Machine
- Proxmox VE
- Pfsense
- Windows 10 VM (Testing purpose & configuration of pfsense from web console)

Network Architecture

Proxmox VE

Pfsesnse

- Installed as VM on Proxmox VE
- Act as a router & will provide IPs to other VMs.
- WAN: Connected to internet.
- LAN: Connected to internal lab network.

Windows VM

- get IP from Pfsense

Linux VM

- get IP from Pfsense

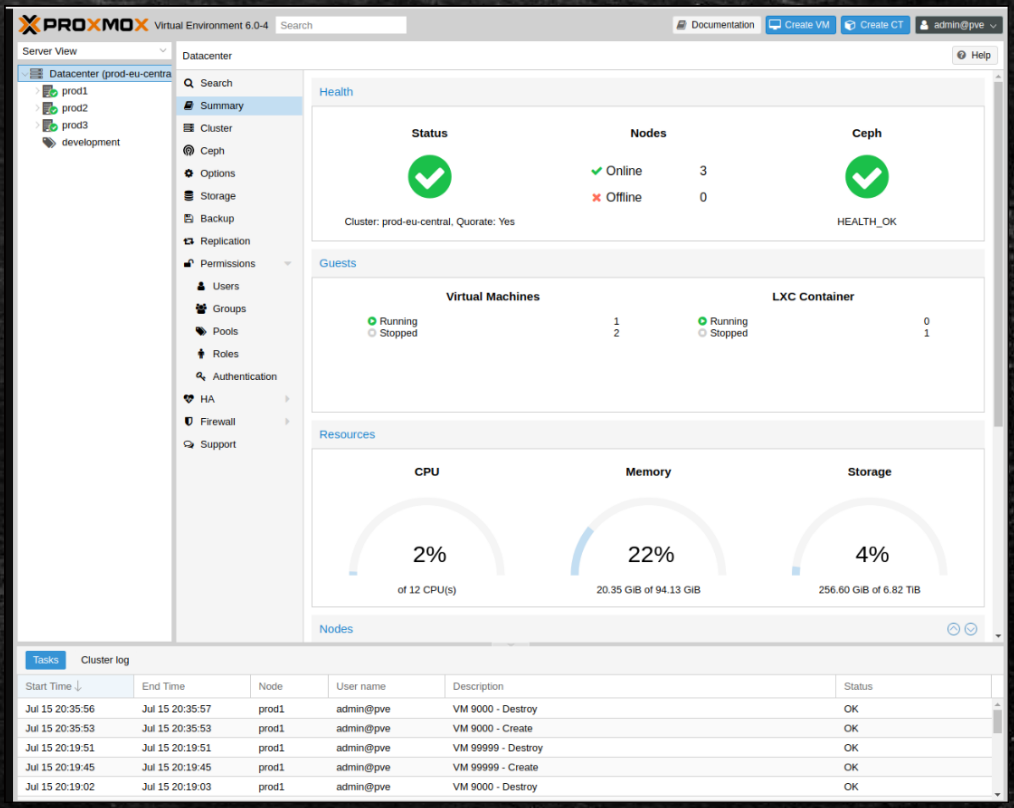
Windows Server 2022 VM

- get IP from Pfsense

Installing Proxmox VE

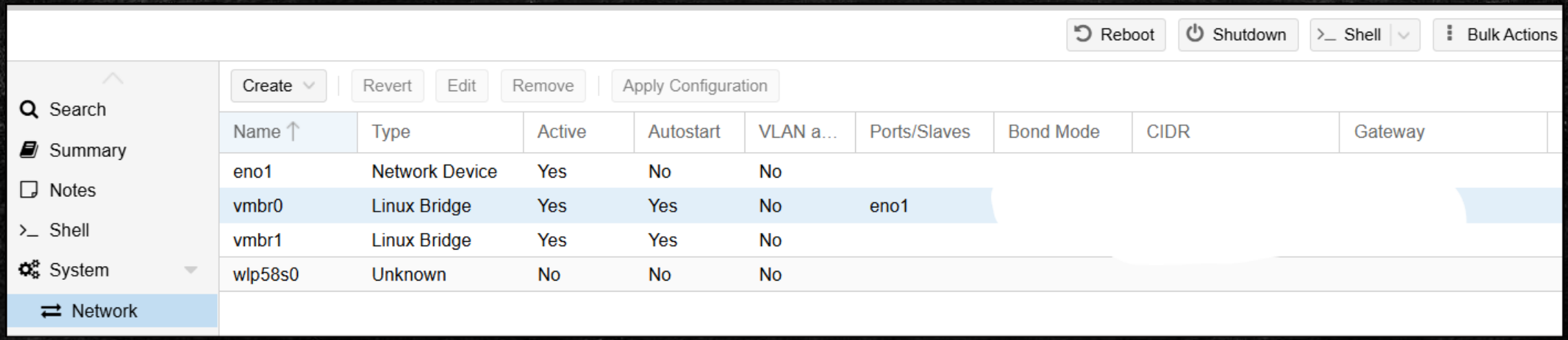
Steps to Install Proxmox VE:

1. Download the Proxmox VE ISO image from the official website and create a bootable USB drive using a tool Balena Etcher.
2. Insert the bootable media into the host machine and adjust BIOS/UEFI settings to boot from it.
3. Choose install Proxmox VE from the boot menu. Read and agree to the End-User License Agreement.
4. Select the hard drive where Proxmox VE will be installed.
5. Configure your region, time zone, and keyboard layout.
6. Set a root password and provide an email address for notifications.
7. Set up network details, including hostname, IP address (static IP is required for Proxmox), gateway, and DNS server addresses.
8. Review the summary of your settings and confirm the installation. The system will reboot after the installation is complete.
9. Once the server reboots, access the Proxmox VE web interface using the configured IP address and port 8006 (e.g., https://your_proxmox_ip:8006).
10. Use the root username and the password you created during the installation to log in.



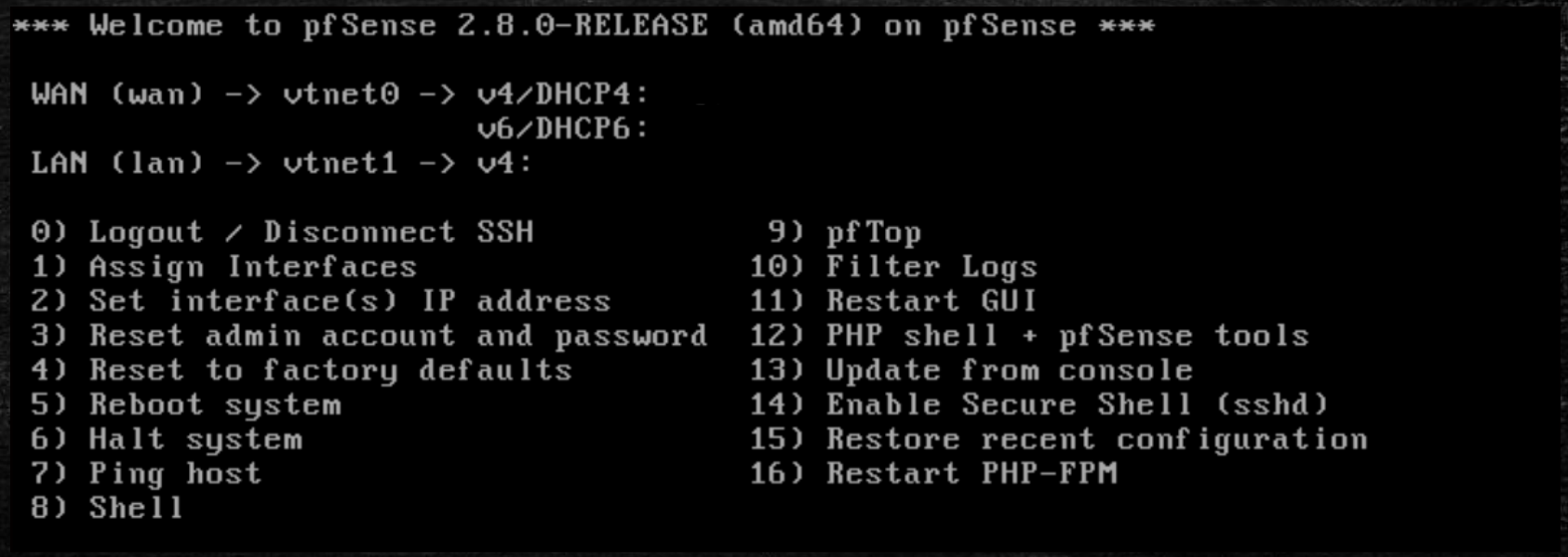
Setting Up Proxmox Network Bridges

- vmbro = WAN, vmbr1 = LAN
- Proxmox > Network tab



Creating pfSense VM

- Download pfsense ISO from official website
- Upload ISO on proxmox storage.
- Create VM > provide ISO and basic network and hardware configuration.
- - 2 NICs: vtneto (WAN / vmbro), vtnet1 (LAN / vmbr1)

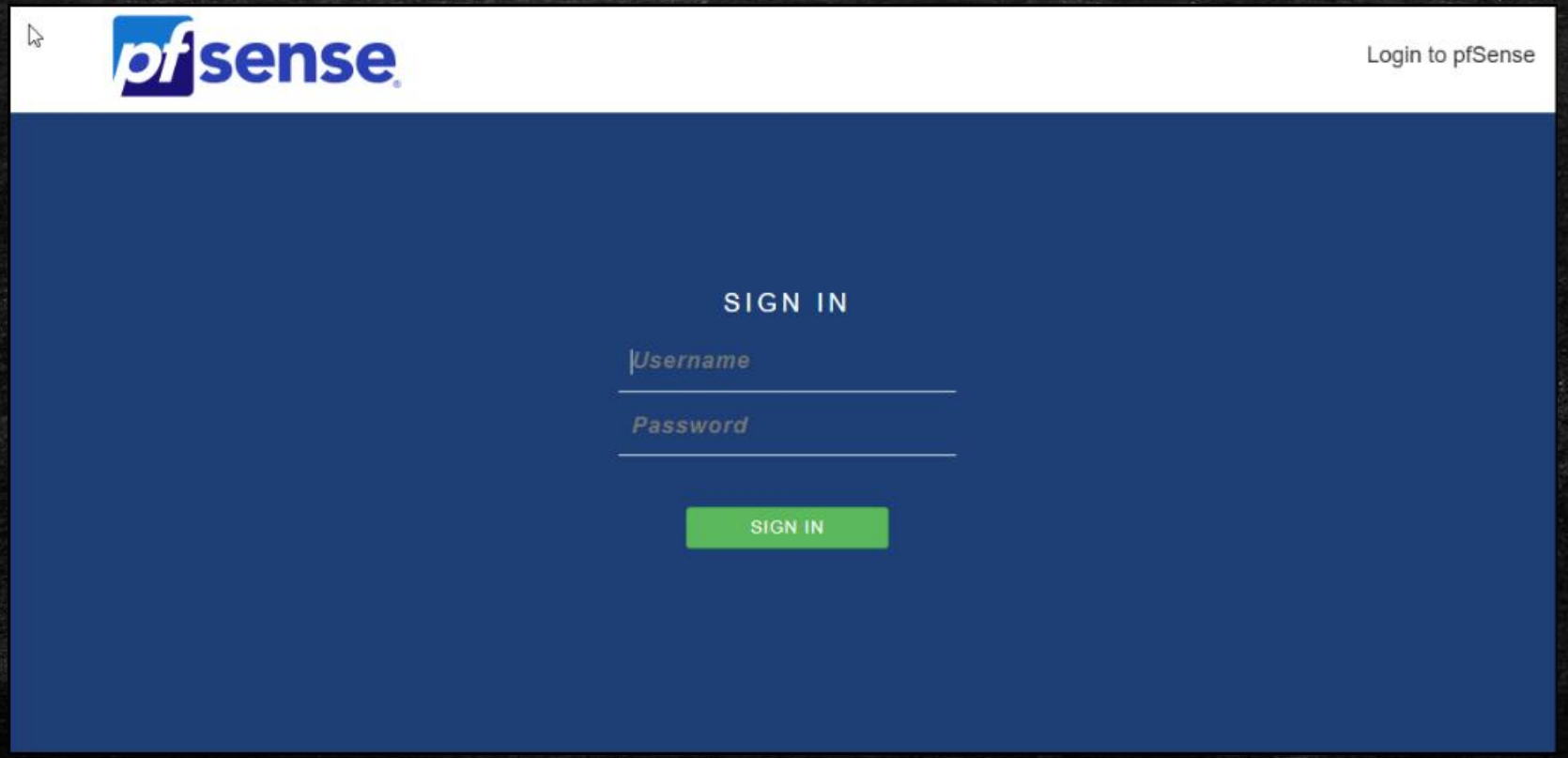


Test Machine: Windows 10 VM

- Steps:
- - Use same Windows 10 ISO as for VirtualBox
- - Attach NIC to vmbr1

Accessing pfSense Web UI

- Steps: Browser on LAN VM → https://172.16.150.26



pfSense Web Configuration

- Accessed via https:// 172.16.150.26 from LAN-connected VM
- Configured DNS, Firewall Rules, NAT
- - Enable DHCP on LAN
- - Use pfSense LAN IP as DNS (default)

Testing Network and pfSense Access

- Steps:
- - Open browser on Windows VM → access pfSense
- - Test ping to LAN gateway

Lessons Learned

- Learned how to install and manage virtual machines using Proxmox VE as well as how to allocate CPU, RAM, and storage to multiple VMs efficiently within a single host.
- Hands-on exposure to virtual network interfaces, NAT, bridging, and internal LANs.
- Gained practical experience with basic firewall rule creation, WAN/LAN separation, and web interface configuration.
- Diagnosed common issues like no internet access, VM boot failures, or misconfigured network interfaces.
- Resolved issues with pfSense web access and DHCP.