Homelab VM Networking & File Structure Overview

Overview

This guide provides a structured overview of key file locations and configuration points related to networking in a typical homelab environment using virtual machines. It focuses on hostname resolution, IP addressing, DNS via Bind9, and port configuration. This setup uses two virtual machines: one running Ubuntu as the server (defender) and the other running Kali Linux as the attacker.

1. Hostname Configuration

The hostname identifies each VM on the network.

Configuration File:
/etc/hostname — Stores the system hostname (e.g., 'ubuntu', 'kali')

To view or change the hostname:
View: cat /etc/hostname
Change: sudo hostnamectl set-hostname <new-hostname>

The /etc/hosts file may also be edited to manually map hostnames to IP addresses, although DNS is preferred in this setup.

2. IP Address & Network Interfaces

VMs typically use two types of network adapters:
- NAT (e.g., eth0 / enp0s3) for internet access
- Host-only (e.g., eth1 / enp0s8) for internal VM communication

To view interface and IP address information:
ip a

Static IPs are configured using Netplan on Ubuntu at /etc/netplan/*.yaml. DHCP leases, if used, are stored in /var/lib/dhcp/.

3. Bind9 DNS Server

Bind9 is used to enable hostname resolution within the lab environment. The Ubuntu VM acts as the local DNS server, allowing the attacker VM to resolve hostnames such as 'ubuntu-

defender.local' to internal IP addresses.

Important Bind9 files:
- /etc/bind/named.conf
- /etc/bind/named.conf.local
- /etc/bind/db.lab (forward zone)
- /etc/bind/db.192 (reverse zone)

To test DNS from the Kali VM:
dig @<Ubuntu-IP> ubuntu-defender.local
nslookup ubuntu-defender.local <Ubuntu-IP>

Ensure the Kali VM is configured to use the Ubuntu VM as its nameserver in /etc/resolv.conf:

nameserver <Ubuntu-IP>

4. Ports & Services

In this setup, the Ubuntu VM runs a standard LAMP stack with DVWA (Damn Vulnerable Web App) hosted via Apache on port 80.

Common services and their default ports:
- Apache: Port 80 (HTTP)
- MySQL: Port 3306 (Database)
- ModSecurity (optional): runs as an Apache module, not on a standalone port

To view active ports and services:
sudo netstat -tulnp
or
ss -tuln

Relevant Apache configuration files:
- /etc/apache2/ports.conf
- /etc/apache2/sites-available/000-default.conf

To check if ModSecurity is active:
apachectl -M | grep security

5. How It All Works Together

1. The Ubuntu VM serves DVWA through Apache on port 80.
2. The Bind9 DNS server on Ubuntu maps hostnames to internal IP addresses.

3. The Kali VM queries the Ubuntu DNS server to resolve hostnames.
4. Once resolved, Kali communicates with the DVWA web app using the internal IP or hostname.
5. Apache handles web requests, optionally passing traffic through ModSecurity if enabled.
6. Apache and DVWA interact with MySQL on port 3306 for backend operations.