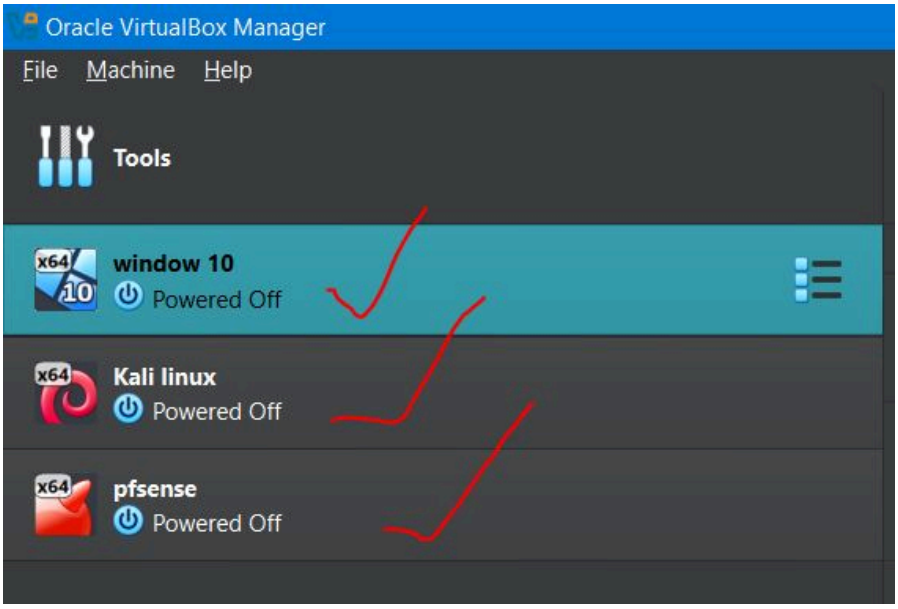
🛡️ pfSense Virtual Firewall Lab Report

📌 **OBJECTIVE**

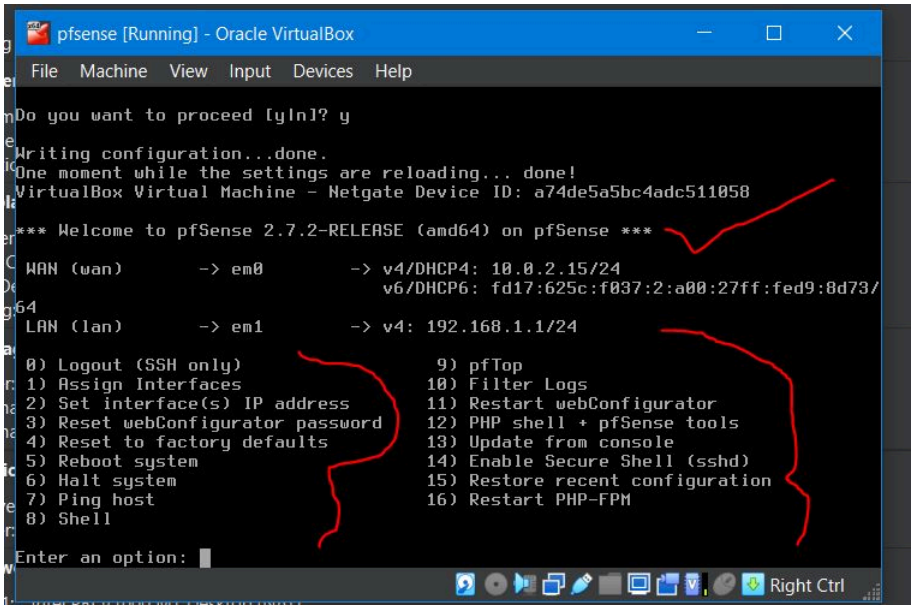
Enhance your cybersecurity lab by placing a pfSense virtual firewall between your Kali Linux and Windows 10 VMs to control, inspect, and secure internal traffic

🧰 Tools Used
VirtualBox
pfSense CE ISO (v2.7.2)
Kali Linux VM
Windows 10 VM

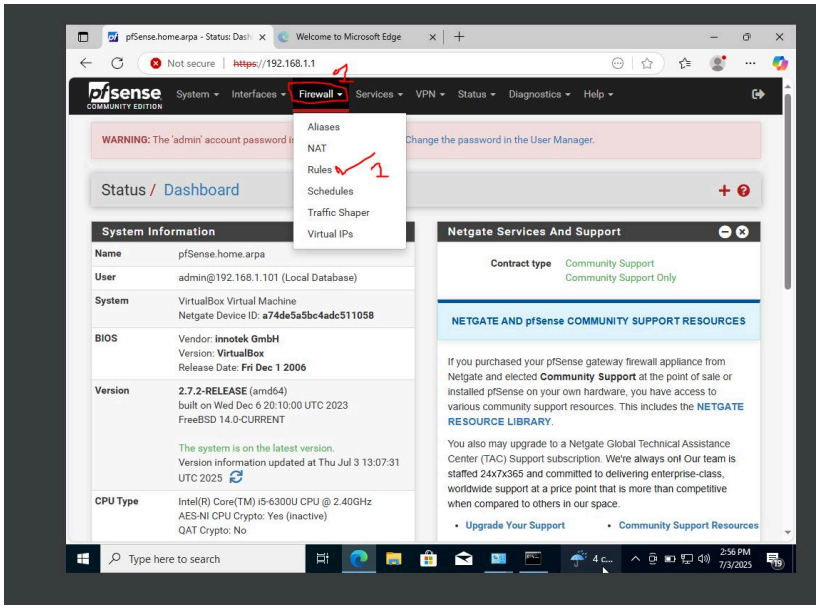


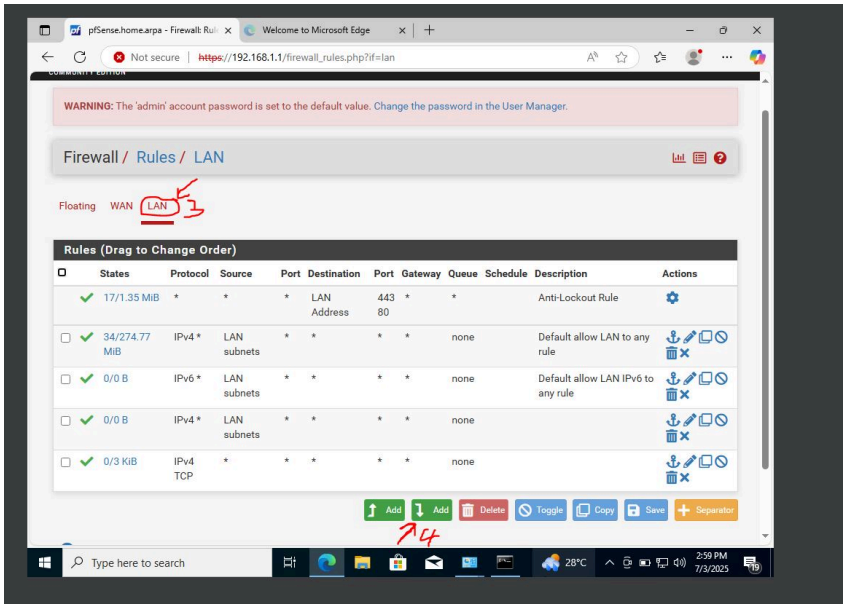
⚙️ pfSense Configuration
1. Network Interfaces
WAN (em0) – Connected to NAT (Internet access)

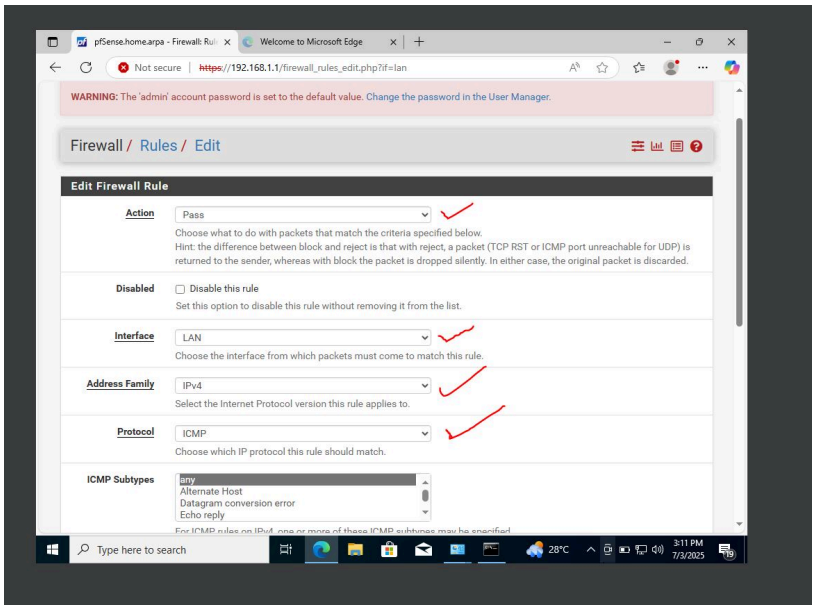
LAN (em1) – Connected to Internal Network
LAN IP: 192.168.1.1/24



2. Firewall Rules
ICMP Rule (Allow Ping):
Interface: LAN
Protocol: ICMP
Source: LAN Subnet
Destination: any
Description: Allow ICMP Ping
Log packets: ✔


pfSense.home.arpa - Status: Dash
Welcome to Microsoft Edge
Not secure | https://192.168.1.1
pfsense COMMUNITY EDITION
System
Interfaces
Firewall
Services
VPN
Status
Diagnostics
Help
Aliases
NAT
Rules
Schedules
Traffic Shaper
Virtual IPs
WARNING: The 'admin' account password is
Change the password in the User Manager.
Status / Dashboard
System Information
Name pfSense.home.arpa
User admin@192.168.1.101 (Local Database)
System VirtualBox Virtual Machine
Netgate Device ID: a74de5a5bc4adc511058
BIOS Vendor: innotek GmbH
Version: VirtualBox
Release Date: Fri Dec 1 2006
Version 2.7.2-RELEASE (amd64)
built on Wed Dec 6 20:10:00 UTC 2023
FreeBSD 14.0-CURRENT
The system is on the latest version.
Version information updated at Thu Jul 3 13:07:31 UTC 2025
CPU Type Intel(R) Core(TM) i5-6300U CPU @ 2.40GHz
AES-NI CPU Crypto: Yes (inactive)
QAT Crypto: No
Netgate Services And Support
Contract type Community Support
Community Support Only
NETGATE AND pfSense COMMUNITY SUPPORT RESOURCES
If you purchased your pfSense gateway firewall appliance from Netgate and elected Community Support at the point of sale or installed pfSense on your own hardware, you have access to various community support resources. This includes the NETGATE RESOURCE LIBRARY.
You also may upgrade to a Netgate Global Technical Assistance Center (TAC) Support subscription. We're always on! Our team is staffed 24x7x365 and committed to delivering enterprise-class, worldwide support at a price point that is more than competitive when compared to others in our space.
Upgrade Your Support
Community Support Resources
Type here to search
2:56 PM
7/3/2025


pfSense.home.arpa - Firewall: Rul
Welcome to Microsoft Edge
Not secure | https://192.168.1.1/firewall_rules.php?if=lan
WARNING: The 'admin' account password is set to the default value. Change the password in the User Manager.
Firewall / Rules / LAN
Floating
WAN
LAN
Rules (Drag to Change Order)
States Protocol Source Port Destination Port Gateway Queue Schedule Description Actions
17/1.35 MiB * * * LAN Address 443 80 * * Anti-Lockout Rule
34/274.77 MiB IPv4 * LAN subnets * * * * none Default allow LAN to any rule
0/0 B IPv6 * LAN subnets * * * * none Default allow LAN IPv6 to any rule
0/0 B IPv4 * LAN subnets * * * * none
0/3 KiB IPv4 TCP * * * * * none
Add
Add
Delete
Toggle
Copy
Save
Separator
Type here to search
28°C
2:59 PM
7/3/2025


pfSense.home.arpa - Firewall: Rul
Welcome to Microsoft Edge
Not secure
https://192.168.1.1/firewall_rules_edit.php?if=lan
WARNING: The 'admin' account password is set to the default value. Change the password in the User Manager.
Firewall / Rules / Edit
Edit Firewall Rule
Action
Pass
Choose what to do with packets that match the criteria specified below.
Hint: the difference between block and reject is that with reject, a packet (TCP RST or ICMP port unreachable for UDP) is returned to the sender, whereas with block the packet is dropped silently. In either case, the original packet is discarded.
Disabled
Disable this rule
Set this option to disable this rule without removing it from the list.
Interface
LAN
Choose the interface from which packets must come to match this rule.
Address Family
IPv4
Select the Internet Protocol version this rule applies to.
Protocol
ICMP
Choose which IP protocol this rule should match.
ICMP Subtypes
any
Alternate Host
Datagram conversion error
Echo reply
Type here to search
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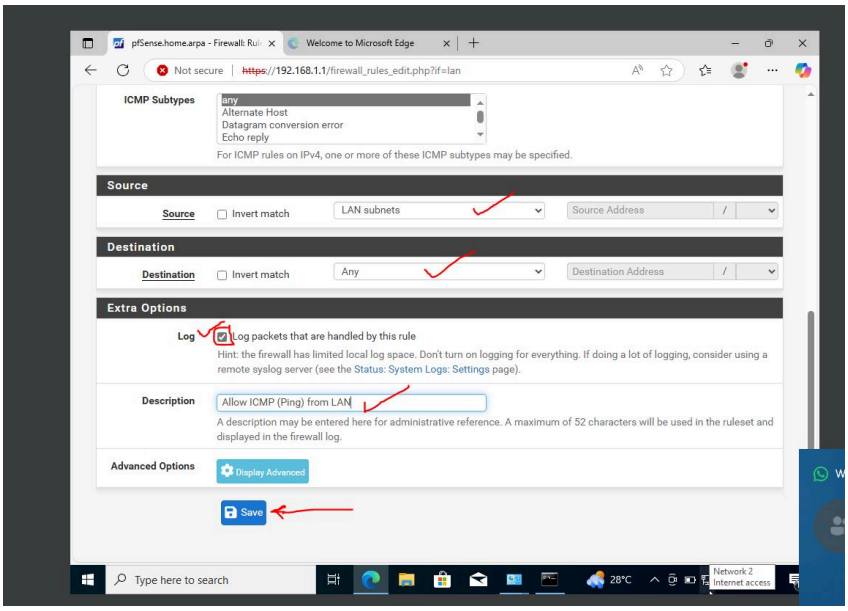
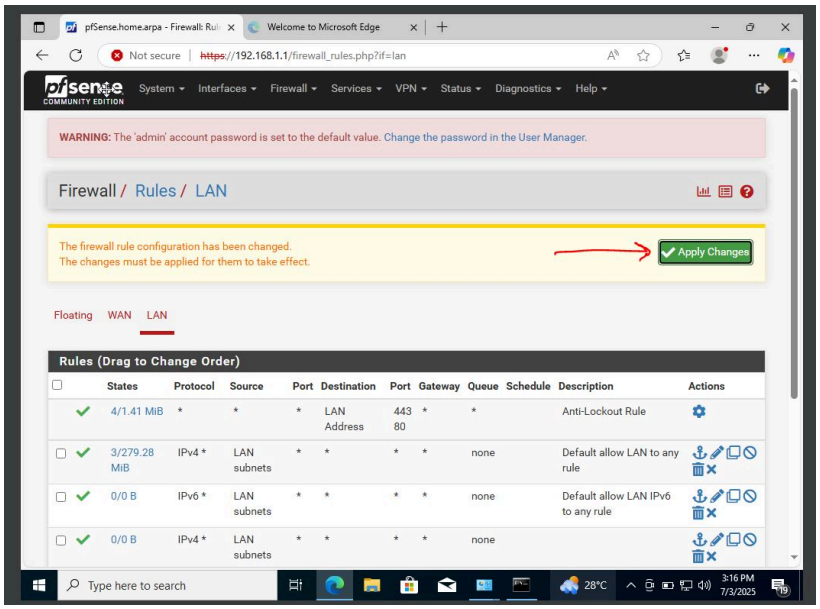
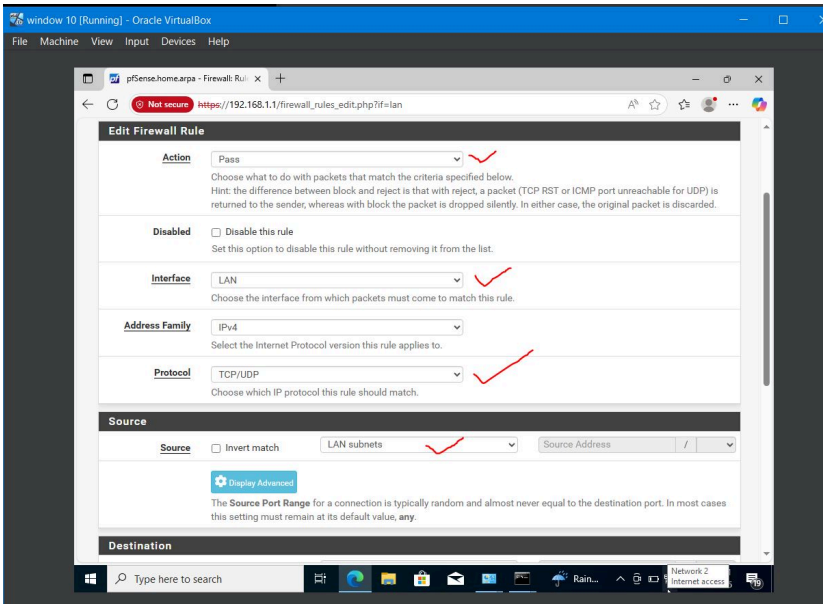
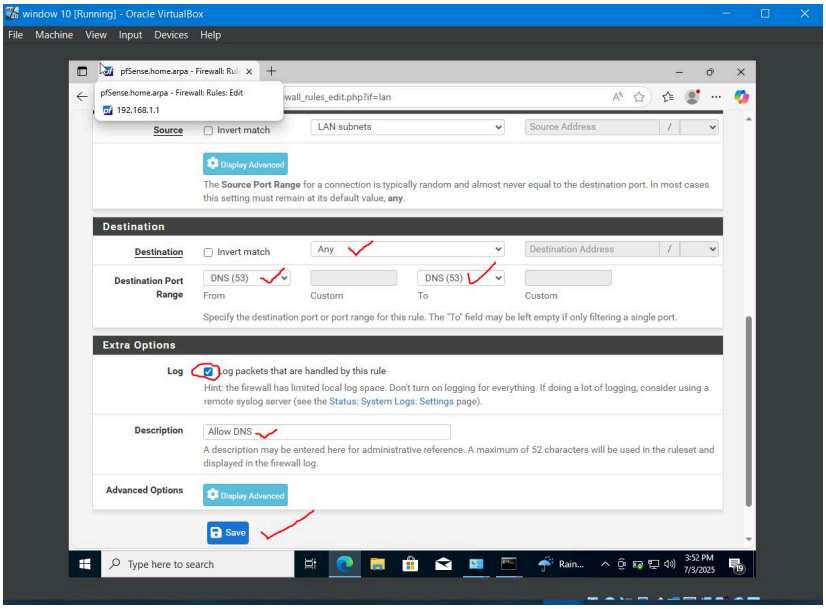
3:11 PM
7/3/2025


pfSense.home.arpa - Firewall: Rul
Welcome to Microsoft Edge
Not secure
https://192.168.1.1/firewall_rules_edit.php?if=lan
ICMP Subtypes
any
Alternate Host
Datagram conversion error
Echo reply
For ICMP rules on IPv4, one or more of these ICMP subtypes may be specified.
Source
Source
Invert match
LAN subnets
Source Address
Destination
Destination
Invert match
Any
Destination Address
Extra Options
Log
Log packets that are handled by this rule
Hint: the firewall has limited local log space. Don't turn on logging for everything. If doing a lot of logging, consider using a remote syslog server (see the Status: System Logs: Settings page).
Description
Allow ICMP (Ping) from LAN
A description may be entered here for administrative reference. A maximum of 52 characters will be used in the ruleset and displayed in the firewall log.
Advanced Options
Display Advanced
Save
Type here to search
28°C
Network 2
Internet access



DNS Rule (Allow DNS):
Interface: LAN
Protocol: TCP/UDP
Source: LAN Subnet
Destination Port Range: DNS (53) to DNS (53)
Description: Allow DNS
Log packets: ✔

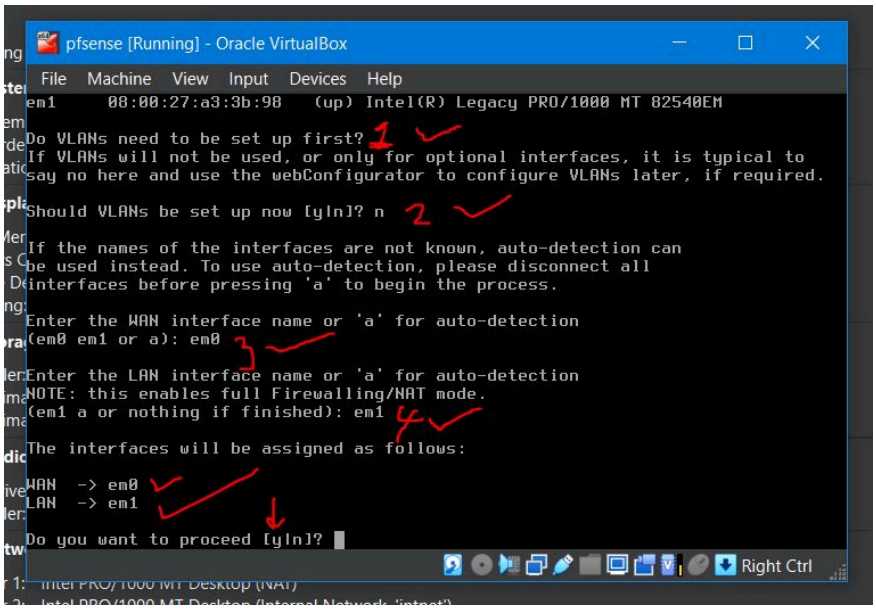




1. NAT Configuration

Mode: Automatic Outbound NAT (default)

Translates LAN traffic to WAN for internet access

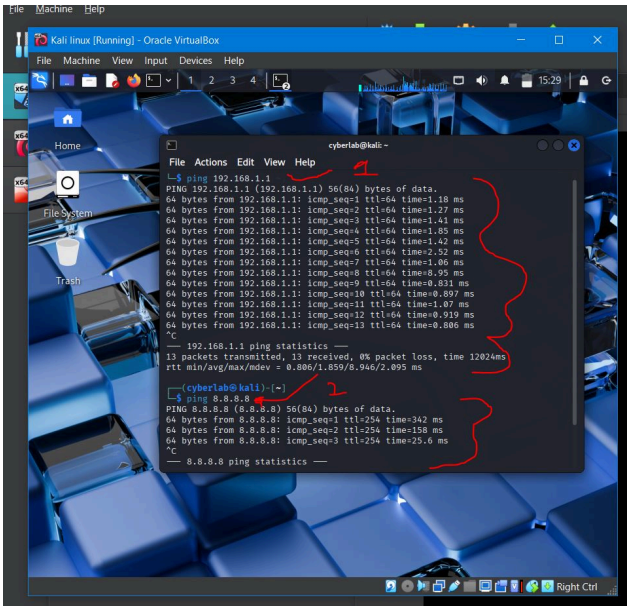


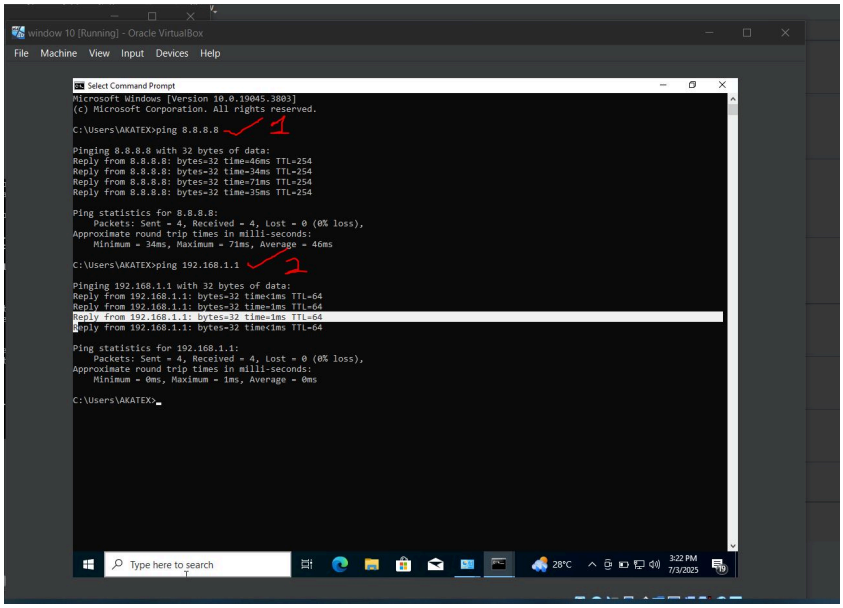
🧪 TESTING & VALIDATION

✅ Ping Tests

From To Result

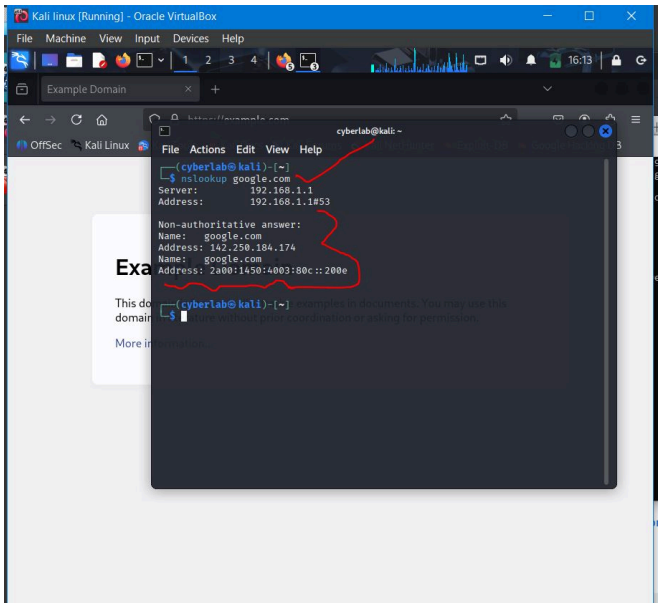
Kali 192.168.1.1 SuccessWindows 192.168.1.1 SuccessKali 8.8.8.8 SuccessWindows 8.8.8.8 Success



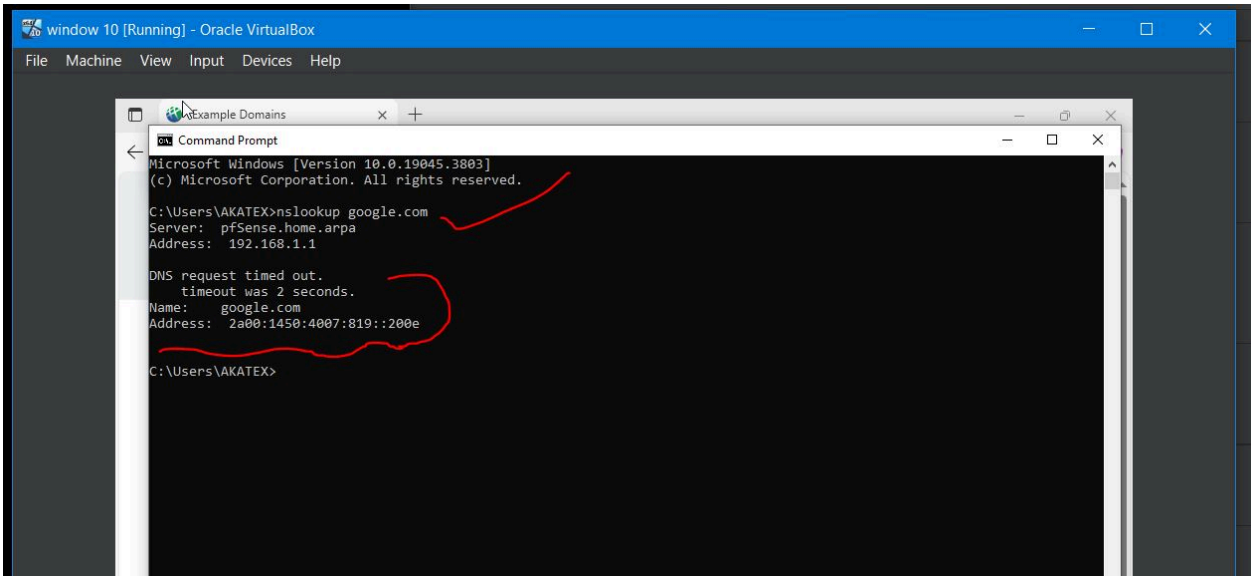


✅ DNS RESOLUTION

Kali:
dig google.com → Returned IP

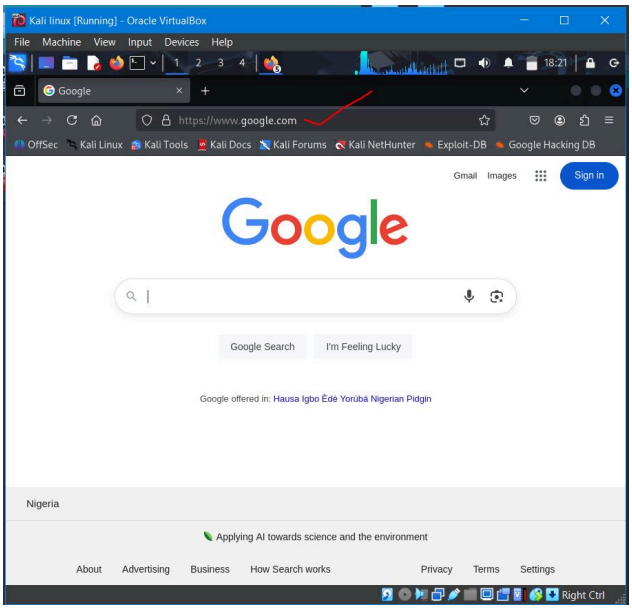


Windows:
nslookup google.com → Returned IPv6 address (success)

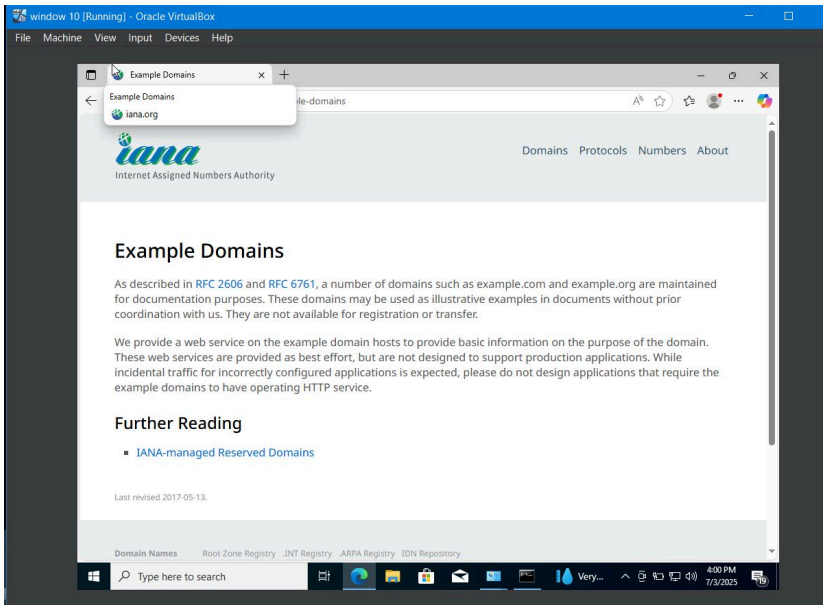


✅ Web Access

OS	Website	Result
Kali	https://google.com	Loaded



Windows	https://example.com	Loaded



🏁 CONCLUSION

You’ve successfully:
Installed and configured pfSense
Routed Kali and Windows VMs through it
Created custom firewall rules (ICMP, DNS)
Verified NAT and DNS functionality
Logged and tested all network paths

Your virtual firewall is fully operational! This setup can now be extended for advanced testing like VLAN segmentation, VPN tunneling, IDS/IPS with Suricata, or full network monitoring.