CAN304 Lab 9

Intrusion Detection System – Snort

In this lab, students will learn a typical intrusion detection system (IDS) namely Snort, whereby student will learn how to set detection rules, create alerts and read/analyze the alert results.

Prerequisite

1. You have followed the previous lab for creating Ubuntu VM, and this lab needs 2 VMs
2. Install snort on the Ubuntu VM by using this command-line: **apt-get install snort**

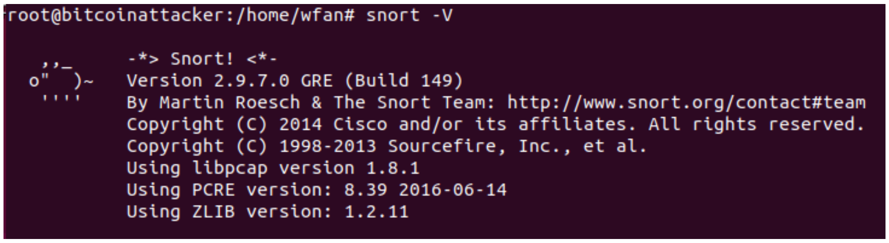
1. Installing dependencies

1.1. Install snort

1) sudo apt-get update
2) sudo apt-get install snort

1.2. if the installation screen ask you to type in the “interface” that snort will listen on, you should type the interface which your VM is using for connecting to the internet. You can check the interface by using the command “**ifconfig**”, in my case, it is “enp0s3” .

1.3. test if snort is installed, just type command “**snort -V**”.



```
root@bitcoinattacker:/home/wfan# snort -V

   ,,_     -*> Snort! <*-
  o"  )~   Version 2.9.7.0 GRE (Build 149)
   ''''    By Martin Roesch & The Snort Team: http://www.snort.org/contact#team
           Copyright (C) 2014 Cisco and/or its affiliates. All rights reserved.
           Copyright (C) 1998-2013 Sourcefire, Inc., et al.
           Using libpcap version 1.8.1
           Using PCRE version: 8.39 2016-06-14
           Using ZLIB version: 1.2.11
```

2. Intrusion Detection System (IDS)

2.1. An intrusion detection system (IDS) is a device or software application that monitors a network or systems for malicious activity or policy violations [1].

2.2. IDS categories:

- Signature-based IDS
  - use well-known signature to detect attack
  - e.g., Snort [2] (we use snort for this lab)
- Anomaly-based IDS
  - use normal behavior reference profile to detect anomaly
  - e.g., Zeek [3]

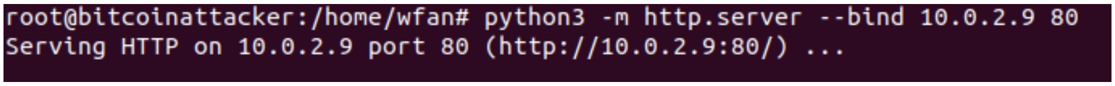
3. Conduct the experiment

3.1. Step 1

Start two VMs, i.e., A and B, and they locate on the same network (e.g., both A and B use “NAT network” of Virtualbox). In my case, VM A uses IP address 10.0.2.9, and VM B uses IP address 10.0.2.4

3.2. Step 2

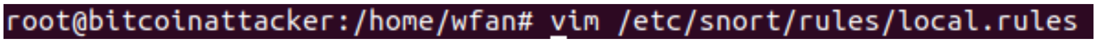
On VM A, open a terminal and create a simple http server by typing the command “**python3 -m http.server --bind 10.0.2.9 80**”



```
root@bitcoinattacker:/home/wfan# python3 -m http.server --bind 10.0.2.9 80
Serving HTTP on 10.0.2.9 port 80 (http://10.0.2.9:80/) ...
```

3.3. Step 3

On VM A, open a new terminal, and type the following command to edit the snort rule file “**vim /etc/snort/rules/local.rules**”

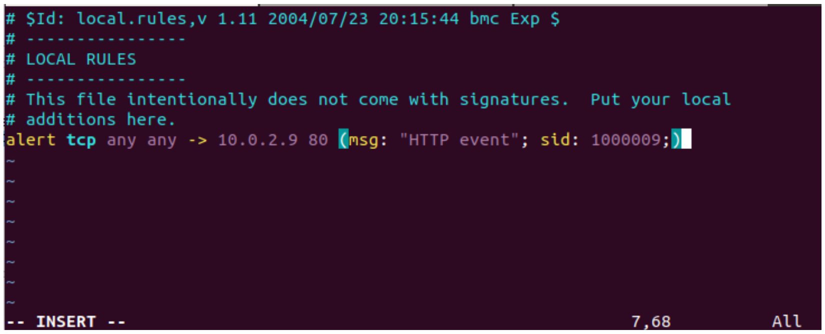


```
root@bitcoinattacker:/home/wfan# vim /etc/snort/rules/local.rules
```

3.4. Step 4

In the vim editor, press “i” button to go to the edit mode (it will show “insert” at the bottom on the terminal), and thereafter you can insert a rule to the snort rule file. Here we insert the following rule:

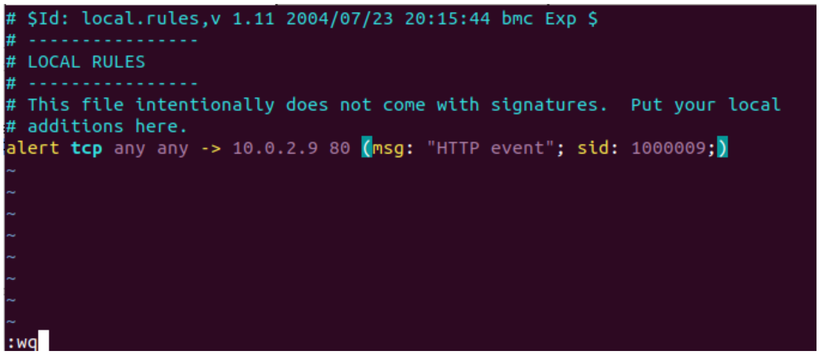
alert tcp any any -> 10.0.2.9 80 (msg: ”HTTP event”; sid: 1000009;)



```
# $Id: local.rules,v 1.11 2004/07/23 20:15:44 bmc Exp $
# ----------------
# LOCAL RULES
# ----------------
# This file intentionally does not come with signatures.  Put your local
# additions here.
alert tcp any any -> 10.0.2.9 80 (msg: "HTTP event"; sid: 1000009;)
~
~
~
~
~
~
~
~
-- INSERT --                                                7,68          All
```

3.5. Step 5

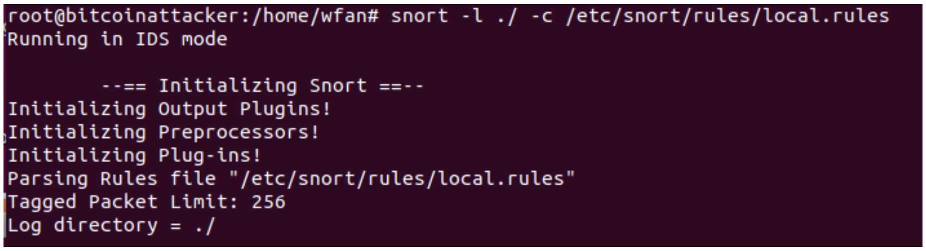
With the vim editor, first, press the “Esc” button on your keyboard; second, press “shift” + “:” button on your keyboard; third, type “wq” after the “:” and press “enter” button to write the inserted rule into the rule file and quit the vim editor. Right after that, you will go back to the terminal.



```
# $Id: local.rules,v 1.11 2004/07/23 20:15:44 bmc Exp $
# ----------------
# LOCAL RULES
# ----------------
# This file intentionally does not come with signatures.  Put your local
# additions here.
alert tcp any any -> 10.0.2.9 80 (msg: "HTTP event"; sid: 1000009;)
~
~
~
~
~
~
~
~
:wq
```

3.6. Step 6:

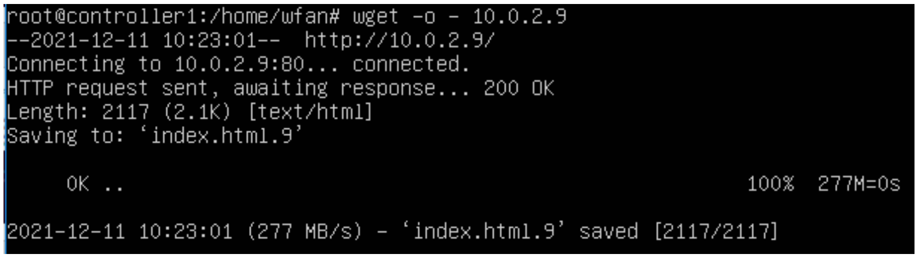
On VM A, once you go back to the terminal, type the following command to run the snort IDS: “**snort -l ./ -c /etc/snort/rules/local.rules**”.



```
root@bitcoinattacker:/home/wfan# snort -l ./ -c /etc/snort/rules/local.rules
Running in IDS mode

        --== Initializing Snort ==--
Initializing Output Plugins!
Initializing Preprocessors!
Initializing Plug-ins!
Parsing Rules file "/etc/snort/rules/local.rules"
Tagged Packet Limit: 256
Log directory = ./
```

3.7. Step 7:

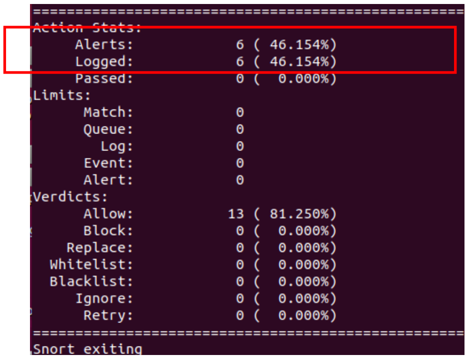
Then go to VM B, execute the command “**wget -o - 10.0.2.9**” again to access the http service running on VM A.



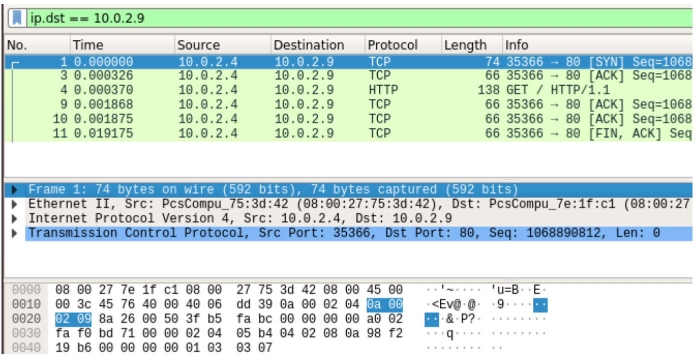
```
root@controller1:/home/wfan# wget -o - 10.0.2.9
--2021-12-11 10:23:01--  http://10.0.2.9/
Connecting to 10.0.2.9:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 2117 (2.1K) [text/html]
Saving to: ‘index.html.9’

     OK ..                                                  100%  277M=0s

2021-12-11 10:23:01 (277 MB/s) - ‘index.html.9’ saved [2117/2117]
```

3.8. Step 8:

Go to VM A, stop snort by press button “Ctrl” + “C”, then you will see it generated six alerts. If you used wireshark on VM A to capture the packets when VM B is accessing VM A’s HTTP service, you can verify that there were actually six inbound TCP segments sent to the IP address 10.0.2.9



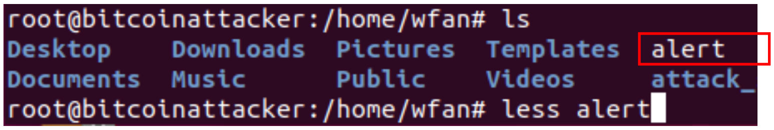
```
===============================================================================
Action Stats:
     Alerts:            6 ( 46.154%)
     Logged:            6 ( 46.154%)
     Passed:            0 (  0.000%)
Limits:
      Match:            0
      Queue:            0
        Log:            0
      Event:            0
      Alert:            0
Verdicts:
      Allow:           13 ( 81.250%)
      Block:            0 (  0.000%)
    Replace:            0 (  0.000%)
  Whitelist:            0 (  0.000%)
  Blacklist:            0 (  0.000%)
     Ignore:            0 (  0.000%)
      Retry:            0 (  0.000%)
===============================================================================
Snort exiting
```



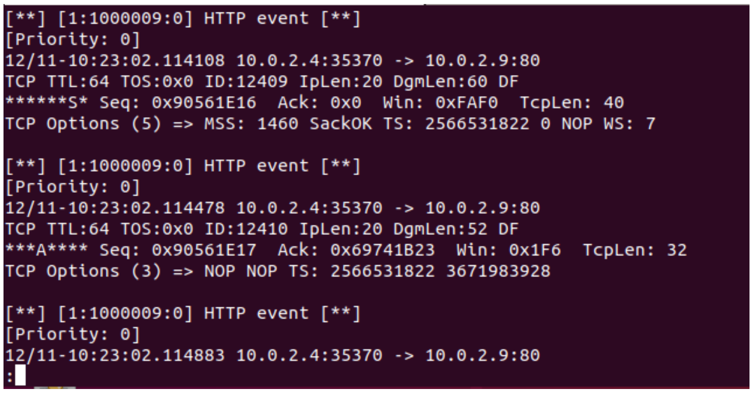
```
ip.dst == 10.0.2.9

No.   Time       Source     Destination  Protocol  Length Info
    1 0.000000   10.0.2.4   10.0.2.9     TCP           74 35366 → 80 [SYN] Seq=1068
    3 0.000326   10.0.2.4   10.0.2.9     TCP           66 35366 → 80 [ACK] Seq=1068
    4 0.000370   10.0.2.4   10.0.2.9     HTTP         138 GET / HTTP/1.1
    9 0.001868   10.0.2.4   10.0.2.9     TCP           66 35366 → 80 [ACK] Seq=1068
   10 0.001875   10.0.2.4   10.0.2.9     TCP           66 35366 → 80 [ACK] Seq=1068
   11 0.019175   10.0.2.4   10.0.2.9     TCP           66 35366 → 80 [FIN, ACK] Seq

▸ Frame 1: 74 bytes on wire (592 bits), 74 bytes captured (592 bits)
▸ Ethernet II, Src: PcsCompu_75:3d:42 (08:00:27:75:3d:42), Dst: PcsCompu_7e:1f:c1 (08:00:27
▸ Internet Protocol Version 4, Src: 10.0.2.4, Dst: 10.0.2.9
▸ Transmission Control Protocol, Src Port: 35366, Dst Port: 80, Seq: 1068890812, Len: 0

0000  08 00 27 7e 1f c1 08 00  27 75 3d 42 08 00 45 00   ··'~····  'u=B··E·
0010  00 3c 45 76 40 00 40 06  dd 39 0a 00 02 04 0a 00   ·<Ev@·@·  ·9······
0020  02 09 8a 26 00 50 3f b5  fa bc 00 00 00 00 a0 02   ···&·P?·  ········
0030  fa f0 bd 71 00 00 02 04  05 b4 04 02 08 0a 98 f2   ···q····  ········
0040  19 b6 00 00 00 00 01 03  03 07                     ········  ··
```

3.9. Step 9:

On VM A, you can also view the alerts via reading the alert log file which is under the current folder. You can use the command “**less alert**” to read detail of the alerts.



```
root@bitcoinattacker:/home/wfan# ls
Desktop     Downloads   Pictures   Templates   alert
Documents   Music       Public     Videos      attack_
root@bitcoinattacker:/home/wfan# less alert
```



```
[**] [1:1000009:0] HTTP event [**]
[Priority: 0]
12/11-10:23:02.114108 10.0.2.4:35370 -> 10.0.2.9:80
TCP TTL:64 TOS:0x0 ID:12409 IpLen:20 DgmLen:60 DF
******S* Seq: 0x90561E16  Ack: 0x0  Win: 0xFAF0  TcpLen: 40
TCP Options (5) => MSS: 1460 SackOK TS: 2566531822 0 NOP WS: 7

[**] [1:1000009:0] HTTP event [**]
[Priority: 0]
12/11-10:23:02.114478 10.0.2.4:35370 -> 10.0.2.9:80
TCP TTL:64 TOS:0x0 ID:12410 IpLen:20 DgmLen:52 DF
***A**** Seq: 0x90561E17  Ack: 0x69741B23  Win: 0x1F6  TcpLen: 32
TCP Options (3) => NOP NOP TS: 2566531822 3671983928

[**] [1:1000009:0] HTTP event [**]
[Priority: 0]
12/11-10:23:02.114883 10.0.2.4:35370 -> 10.0.2.9:80
:
```

Homework:

Follow the aforementioned lab steps, enable snort on VM A, and then use nmap on VM A to scan VM B's http service to see if you can get any result, and also check what alerts snort will generate.

Reference

[1] "What is an Intrusion Detection System (IDS)? | Check Point Software".

[2] https://www.snort.org/

[3] https://zeek.org/