

Lab 6: Introduction to Zeek Scripting

2.1 Starting a new instance of Zeek.

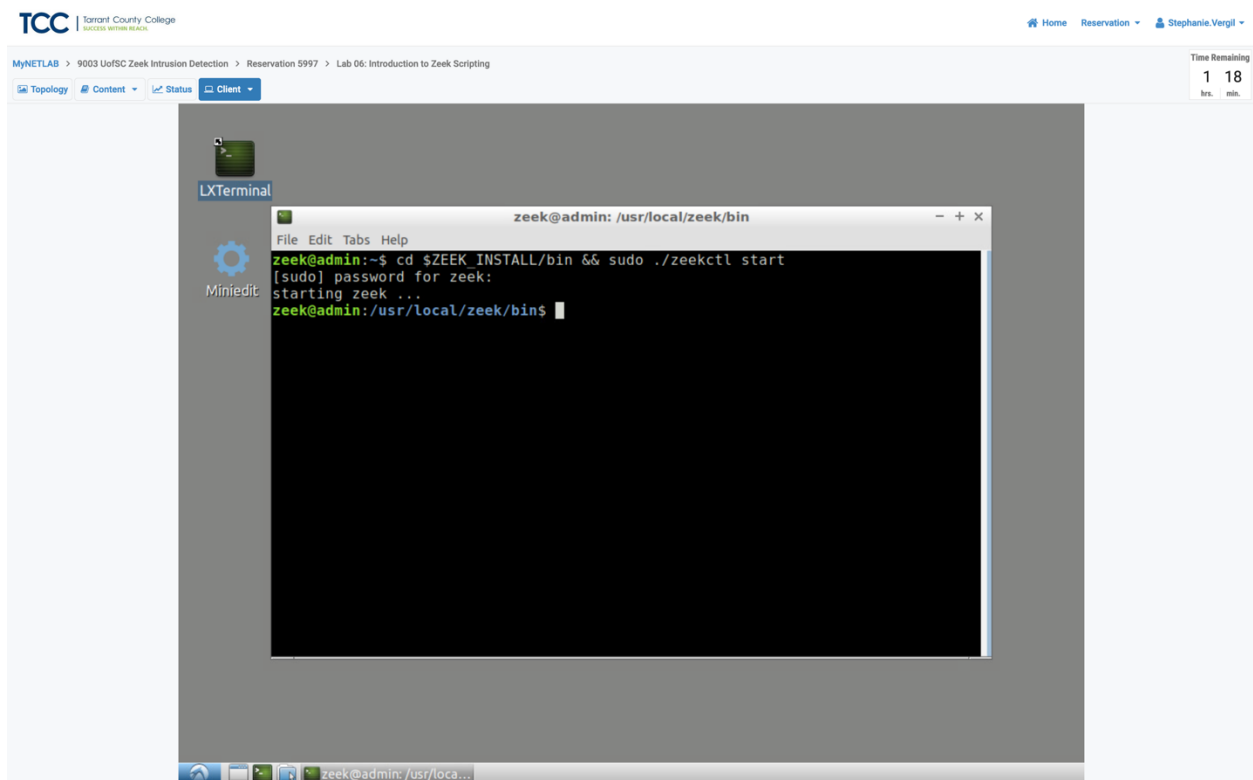
Step 1. Click on client button to launch the client machine.

Step 2. Located at the desktop from the client's machine launch LXTerminal by double clicking.

Step 3. To begin running Zeek, execute the following command in your terminal:

```
cd $ZEEK_INSTALL/bin && sudo ./zeekctl start
```

This command navigates to Zeek's default installation directory and utilizes the Zeekctl tool to initiate a new instance.



2.2 Executing a UDP Zeek script

Step 1. To navigate to the Lab-Scripts directory enter the following command:

```
cd ~/Zeek-Labs/Lab-Scripts/
```

In this directory, all scripts can be accessed, modified, and viewed.

Step 2. Enter the following command to display the content of the lab6_sec2-2.zEEK:

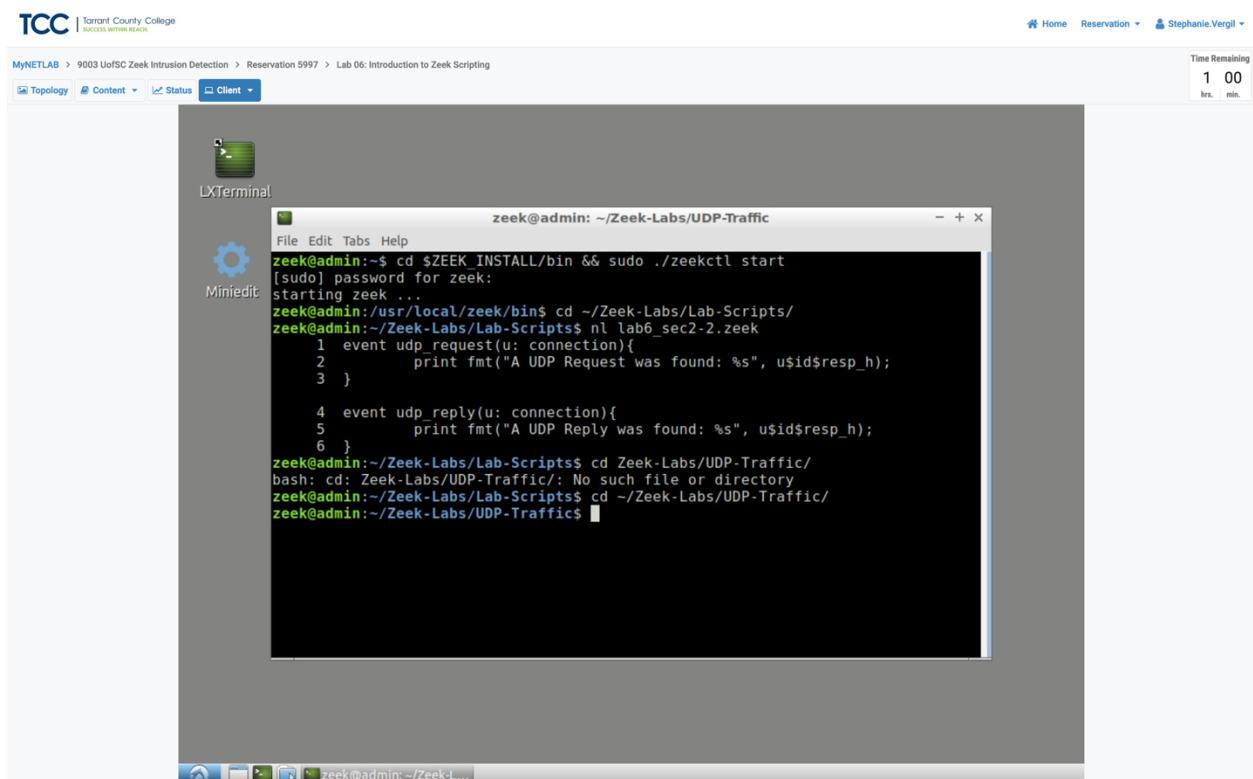
```
nl lab6_sec2-2.zEEK
```

The nl command shows the line numbers in the file.

1. Triggers on processing UDP Request packets, storing related header details in 'u'.
2. Prints a string with '%s' for variable position, using 'u\$id\$resp_h' to get destination IP.
3. Ends 'udp_request' event.
4. Activates on processing UDP Reply packets, storing header info in 'u'.
5. Prints string, fetching destination IP with 'u\$id\$resp_h'.
6. Ends 'udp_reply' event.

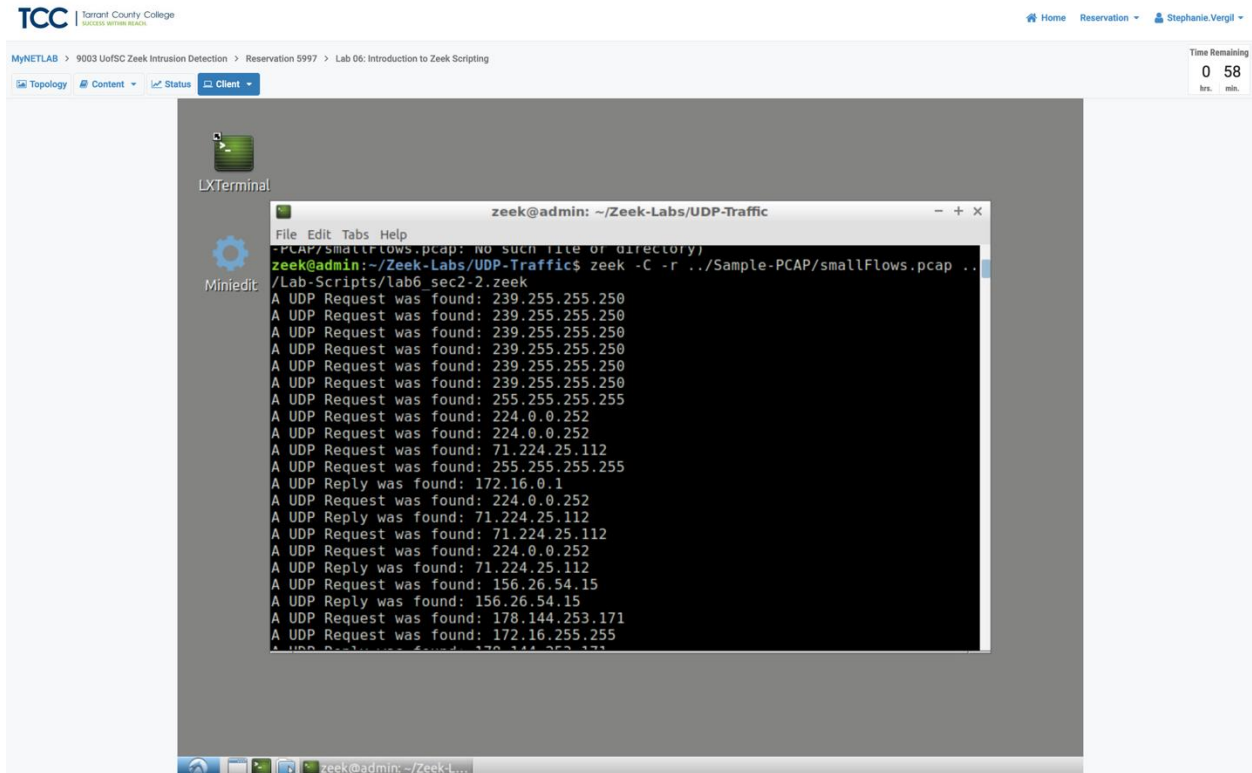
Step 3. To navigate to the UDP-Traffic workspace directory enter the following command:

```
cd Zeek-Labs/UDP-Traffic/
```



Step 4. Enter the following command to process a packet capture file using the Zeek script. You may also use tab key to autocomplete the longer paths.

```
zeek -C -r ../Sample-PCAP/smallFlows.pcap ../Lab-Scripts/lab6_sec2-2.zEEK
```



When we look at the captured data, the script shows stuff on the screen because we didn't set up anything special. When it sees certain events related to UDP packets, it tells us about them.

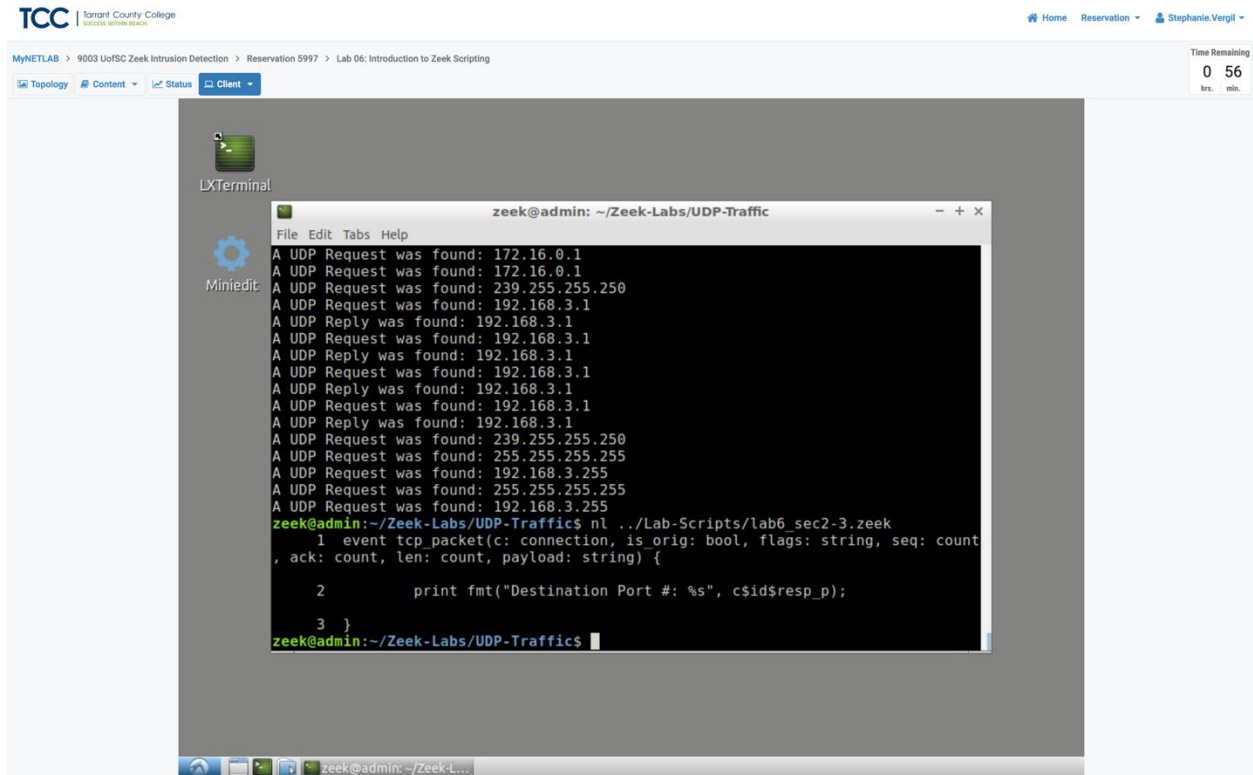
2.3 Executing a TCP Zeek script

Step 1. Enter the following command to display the content of the lab6_sec2-3.zeek :

```
nl ../Lab-Scripts/lab6_sec2-3.zeek
```

When a packet with a TCP header is handled, the script gathers information about the packet and stores it using the 'u' variable. Other TCP-related details are also collected in the same way.

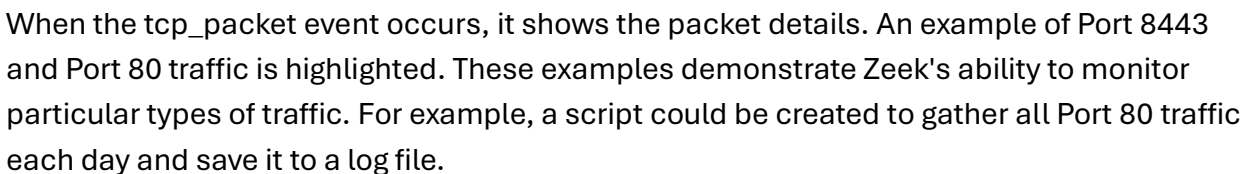
It displays a specific message. '%s' serves as a placeholder for variable information within the string. Here, 'u\$id\$resp_h' is used to retrieve the destination address.



Step 2. Enter the following command to process a packet capture file using the Zeek script:

```
zeek -C -r ../Sample-PCAP/smallFlows.pcap ../Lab-Scripts/lab6_sec2-3.zeek
```

This will produce the following output on the screenshot below.

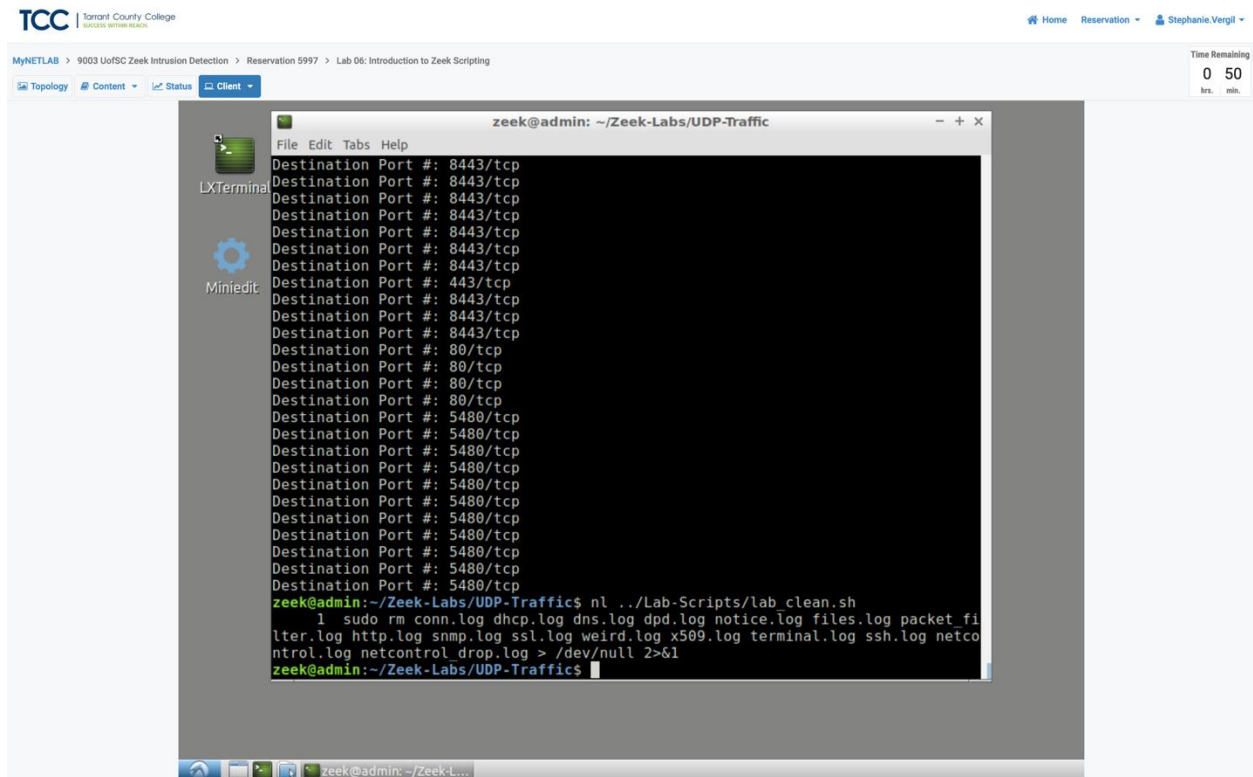


Zeek log streams control where an event's output goes and how it looks. You can add new streams, change default ones, or delete them. Before we move forward, you'll need to clean up the lab workspace directory.

```
nl ../Lab-Scripts/lab_clean.sh
```

The shell script removes a set of files that Zeek typically generates during processing with its default log streams. Running this script will delete any log files previously generated in the directory. Output messages from executing this script won't appear in the Terminal;

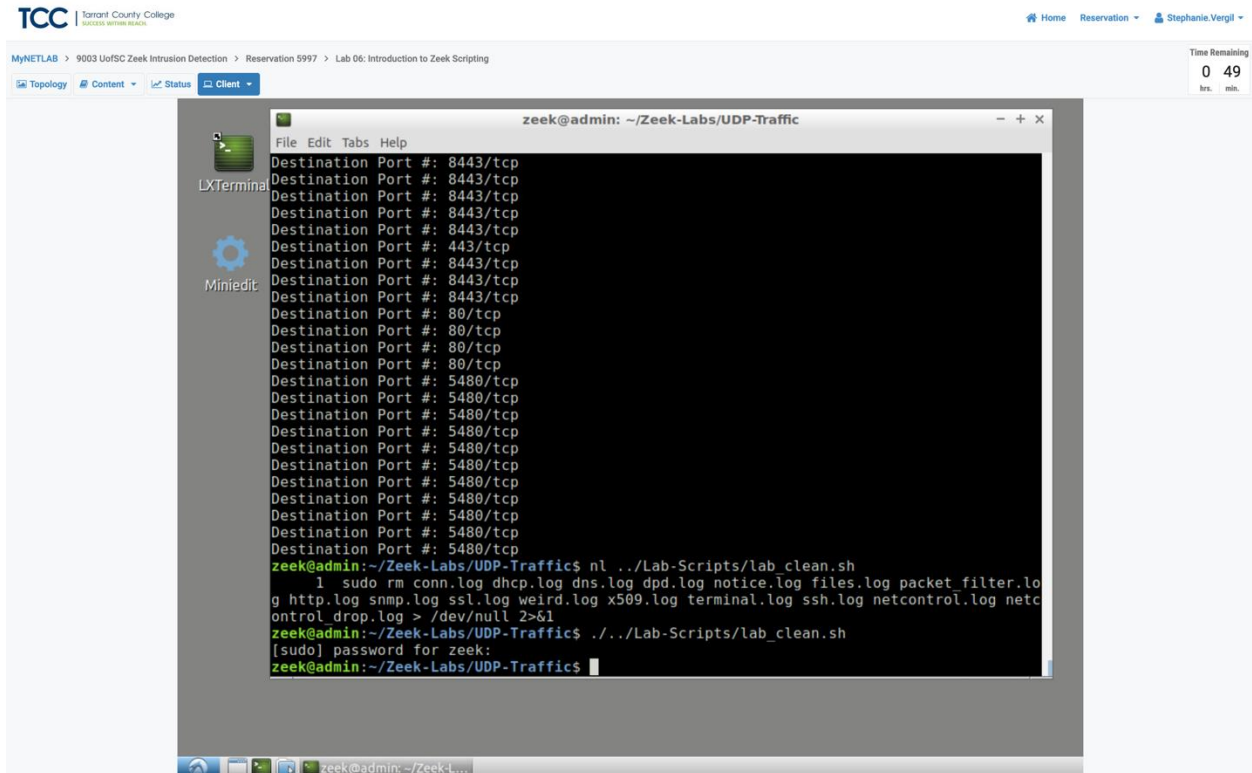
instead, the code "> /dev/null 2>&1" directs errors and notices to a null folder, effectively suppressing them.



Step 2. Enter the following command to execute the lab_clean.sh shell script:

```
../Lab-Scripts/lab_clean.sh
```

Enter password when prompt to continue.



3.1 Renaming the conn.log stream

In this example, we'll change the name of the conn.log file to UpdatedConn.log. Renaming log streams can aid in organizing files, particularly if a log file has been altered from its original purpose.

Step 1. Enter the following command to display the contents of the lab6_sec3-1.zeek :

```
nl ../Lab-Scripts/lab6_sec3-1.zeek
```

The screenshot shows a virtual machine environment with a desktop containing icons for LXTerminal, Minidit, and a gear icon. A terminal window titled 'zeek@admin: ~/Zeek-Labs/UDP-Traffic' is open, displaying the following content:

```

File Edit Tabs Help
Destination Port #: 80/tcp
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
zeek@admin:~/Zeek-Labs/UDP-Traffic$ nl ../Lab-Scripts/lab_clean.sh
1 sudo rm conn.log dhcp.log dns.log dpd.log notice.log files.log packet_filter.log
g http.log snmp.log ssl.log weird.log x509.log terminal.log ssh.log netcontrol.log netc
ontrol drop.log > /dev/null 2>&1
zeek@admin:~/Zeek-Labs/UDP-Traffic$ ../Lab-Scripts/lab_clean.sh
[sudo] password for zeek:
zeek@admin:~/Zeek-Labs/UDP-Traffic$ nl ../Lab-Scripts/lab6_sec3-1.zeek
nl: command not found
zeek@admin:~/Zeek-Labs/UDP-Traffic$ nl ../Lab-Scripts/lab6_sec3-1.zeek
1 event zeek_init(){
2
3     local update = Log::get_filter(Conn::LOG, "default");
4     update$path = "UpdatedConn";
5     Log::add_filter(Conn::LOG, update);
6 }

zeek@admin:~/Zeek-Labs/UDP-Traffic$

```

On the left side of the terminal window, there is a sidebar with icons for LXTerminal and Minidit. The Minidit icon is highlighted, indicating it is the active application. The terminal window shows the execution of a script to clean up log files and then the execution of a Zeek script. The script defines a local variable 'update' and adds a filter to the active log streams. The script is explained as follows. Each number represents the respective line number:

The script is explained as follows. Each number represents the respective line number:

1. Activates when Zeek is initialized.
3. Defines a local variable named "update" with the default Conn::LOG filter.
4. Specifies the path of the "update" variable as UpdatedConn.log.
5. Adds the new filter to the active log streams.
6. Concludes the zeek_init event.

Step 2. Enter the following command to process a packet capture file using the Zeek script:

```
zeek -C -r ../Sample-PCAP/smallFlows.pcap ../Lab-Scripts/lab6_sec3-1.zeek
```

Step 3. Enter the following command to list the generated log files in the current directory:

```
ls
```

Note the UpdatedConn.log, highlighted by the orange box. Since we did not change any formatting, it is an exact replica of the original conn.log file.

The screenshot shows a terminal window titled "zeek@admin: ~/Zeek-Labs/UDP-Traffic". The terminal output is as follows:

```

File Edit Tabs Help
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
Destination Port #: 5480/tcp
zeek@admin:~/Zeek-Labs/UDP-Traffic$ nl ../Lab-Scripts/lab_clean.sh
1 sudo rm conn.log dhcp.log dns.log dpd.log notice.log files.log packet filter.log
2 http.log snmp.log ssl.log weird.log x509.log terminal.log ssh.log netcontrol.log netc
3 ontrol drop.log > /dev/null 2>&1
zeek@admin:~/Zeek-Labs/UDP-Traffic$ ../Lab-Scripts/lab_clean.sh
[sudo] password for zeek:
nl: command not found
zeek@admin:~/Zeek-Labs/UDP-Traffic$ nl ../Lab-Scripts/lab6_sec3-1.zeek
1 event zeek_init(){
2
3     local update = Log::get_filter(Conn::LOG, "default");
4     updatespath = "UpdatedConn.log";
5     Log::add_filter(Conn::LOG, update);
6 }

zeek@admin:~/Zeek-Labs/UDP-Traffic$ zeek zeek -C -r ../Sample-PCAP/smallFlows.pcap ../L
ab-Scripts/lab6_sec3-1.zeek
fatal error: can't find zeek
zeek@admin:~/Zeek-Labs/UDP-Traffic$ zeek -C -r ../Sample-PCAP/smallFlows.pcap ../Lab-S
cripts/lab6_sec3-1.zeek
zeek@admin:~/Zeek-Labs/UDP-Traffic$ ls
dhcp.log dpd.log http.log snmp.log UpdatedConn.log x509.log
dns.log files.log packet filter.log ssl.log weird.log
zeek@admin:~/Zeek-Labs/UDP-Traffic$

```

3.2 Updating the conn.log stream.

In this example, we're altering the conn.log file to produce an additional conn-http.log file. This adjustment divides the contents of conn.log between two log files, which proves helpful in organizing particular events—like segregating UDP traffic from TCP traffic, or separating reply messages from requests.

Step 1. Enter the following command to execute the included lab_clean.sh shell script:

```
../Lab-Scripts/lab_clean.sh
```

Step 2. Enter the following command to display the content of of lab6_sec3-1.zeek Zeek script using the nl command:

```
nl ../Lab-Scripts/lab6_sec3-2.zeek
```

```

zeek@admin: ~/Zeek-Labs/UDP-Traffic
File Edit Tabs Help
3      local update = Log::get_filter(Conn::LOG, "default");
4      update$path = "UpdatedConn";
5      Log::add_filter(Conn::LOG, update);
6  }

zeek@admin:~/Zeek-Labs/UDP-Traffic$ zeek zeek -C -r ../Sample-PCAP/smallFlows.pcap ../L
ab-Scripts/lab6_sec3-1.zeek
fatal error: can't find zeek
zeek@admin:~/Zeek-Labs/UDP-Traffic$ zeek -C -r ../Sample-PCAP/smallFlows.pcap ../Lab-Sc
ripts/lab6_sec3-1.zeek
zeek@admin:~/Zeek-Labs/UDP-Traffic$ ls
dhcp.log dpd.log  http.log  snmp.log UpdatedConn.log x509.log
dns.log  files.log packet filter.log ssl.log  weird.log
zeek@admin:~/Zeek-Labs/UDP-Traffic$ ../Lab-Scripts/lab_clean.sh
zeek@admin:~/Zeek-Labs/UDP-Traffic$ nl ../Lab-Scripts/lab6_sec3-2.zeek
1  function http_only(rec: Conn::Info) : bool {
2
3      return rec?$service && rec$service == "http";
4  }
5  event zeek_init(){
6      local filter: Log::Filter = [$name="http-only", $path="conn-http", $pre
d=http_only];
7      Log::add_filter(Conn::LOG, filter);
8  }
zeek@admin:~/Zeek-Labs/UDP-Traffic$

```

The script is explained as follows. Each number represents the respective line number:

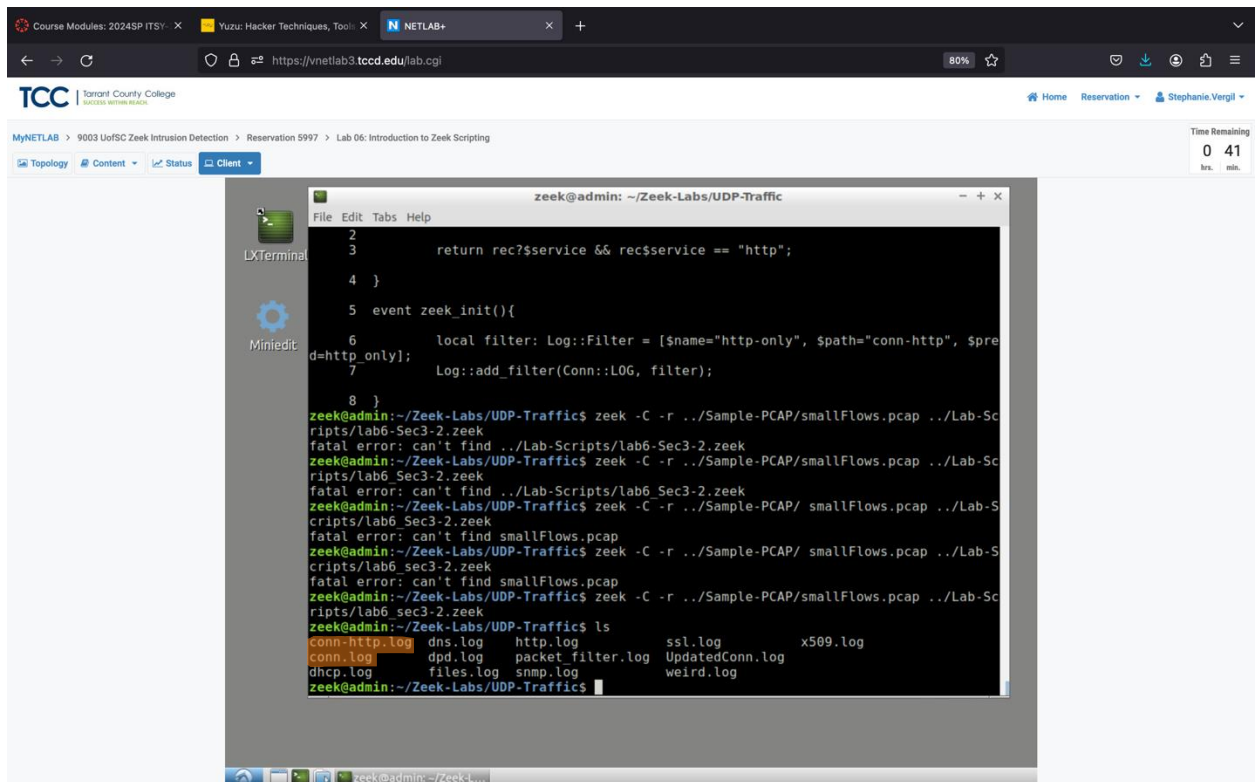
1. Boolean function that has the parameter rec, an instance of Conn::Info. 3. Returns True if the service stored in rec is the HTTP protocol.
4. End of the function.
5. Event zeek_init is activated when Zeek is first initialized.
6. Creates a local filter with http related naming and pathing.
7. Appends the new filter to the active log streams.
8. End of the zeek_init event.

Step 3. Enter the following command to process a packet capture file using the Zeek script:

```
zeek -C -r ../Sample-PCAP/ smallFlows.pcap ../Lab-Scripts/lab6_sec3-2.zeek
```

Step 4. Enter the following command to list the generated log files in the current directory:

```
ls
```



Note: The conn-http.log file in the first column. This file will maintain the same formatting as the conn.log file but will exclusively contain HTTP traffic. These files are highlighted within the orange box in the following image.

3.3 Closing the current instance of Zeek

Closing the current Zeek instance is essential once you've completed the lab. Leaving an active instance running and shutting down the computer can lead to Zeek shutting down improperly, potentially causing errors in future instances.

Step 1. To Stop Zeek enter the following command on the terminal:

```
cd $ZEEK_INSTALL/bin && sudo ./zeekctl stop
```

The screenshot shows a web browser window with the URL `https://vnetlab3.tccd.edu/lab.cgi`. The page header includes the TCC logo and navigation links. The main content area displays a lab titled "Introduction to Zeek Scripting". A terminal window is open, showing the following commands and output:

```

zeek@admin: /usr/local/zeek/bin
4 }
5 event zeek_init(){
6     local filter: Log::Filter = [$name="http-only", $path="conn-http", $pre
7     Log::add_filter(Conn::LOG, filter);
8 }
zeek@admin:~/Zeek-Labs/UDP-Traffic$ zeek -C -r ../Sample-PCAP/smallFlows.pcap ../Lab-Sc
ripts/lab6-Sec3-2.zeek
fatal error: can't find ../Lab-Scripts/lab6-Sec3-2.zeek
zeek@admin:~/Zeek-Labs/UDP-Traffic$ zeek -C -r ../Sample-PCAP/smallFlows.pcap ../Lab-Sc
ripts/lab6_Sec3-2.zeek
fatal error: can't find ../Lab-Scripts/lab6_Sec3-2.zeek
zeek@admin:~/Zeek-Labs/UDP-Traffic$ zeek -C -r ../Sample-PCAP/ smallFlows.pcap ../Lab-S
cripts/lab6_Sec3-2.zeek
fatal error: can't find smallFlows.pcap
zeek@admin:~/Zeek-Labs/UDP-Traffic$ zeek -C -r ../Sample-PCAP/ smallFlows.pcap ../Lab-S
cripts/lab6_sec3-2.zeek
fatal error: can't find smallFlows.pcap
zeek@admin:~/Zeek-Labs/UDP-Traffic$ zeek -C -r ../Sample-PCAP/smallFlows.pcap ../Lab-S
cripts/lab6_sec3-2.zeek
zeek@admin:~/Zeek-Labs/UDP-Traffic$ ls
conn-http.log  dns.log      http.log      ssl.log       x509.log
conn.log       dpd.log      packet_filter.log UpdatedConn.log
dhcp.log       files.log    snmp.log      weird.log
zeek@admin:~/Zeek-Labs/UDP-Traffic$ cd $ZEEK_INSTALL/bin && sudo ./zeekctl stop
stopping zeek ...
zeek@admin: /usr/local/zeek/bin$

```

Zeek scripts allow for customization of output log streams. Beyond simply renaming files, scripts enable the splitting of files to generate more protocol or event-specific log files. Zeek scripts serve as the foundation for establishing an organized workspace for storing and parsing generated log files.