Lab 7.3.2.4 – Attacking a mySQL Database

This lab has been updated for use on NETLAB+.
www.netdevgroup.com

Objectives

In this lab, you will view a *PCAP* file from a previous attack against a *SQL* database.

Background / Scenario

SQL injection attacks allow malicious hackers to type *SQL* statements in a web site and receive a response from the database. This allows attackers to tamper with current data in the database, spoof identities, and other miscellaneous mischief.

A *PCAP* file has been created for you to view a previous attack against a *SQL* database. In this lab, you will view the *SQL* database attacks and answer the questions.

Part 1: Open the PCAP file and follow the SQL database attacker

You will use *Wireshark*, a common network packet analyzer, to analyze network traffic. After starting *Wireshark*, you will open a previously saved network capture and view a step by step *SQL* injection attack against a *SQL* database.

Step 1: Open Wireshark and load the PCAP file.

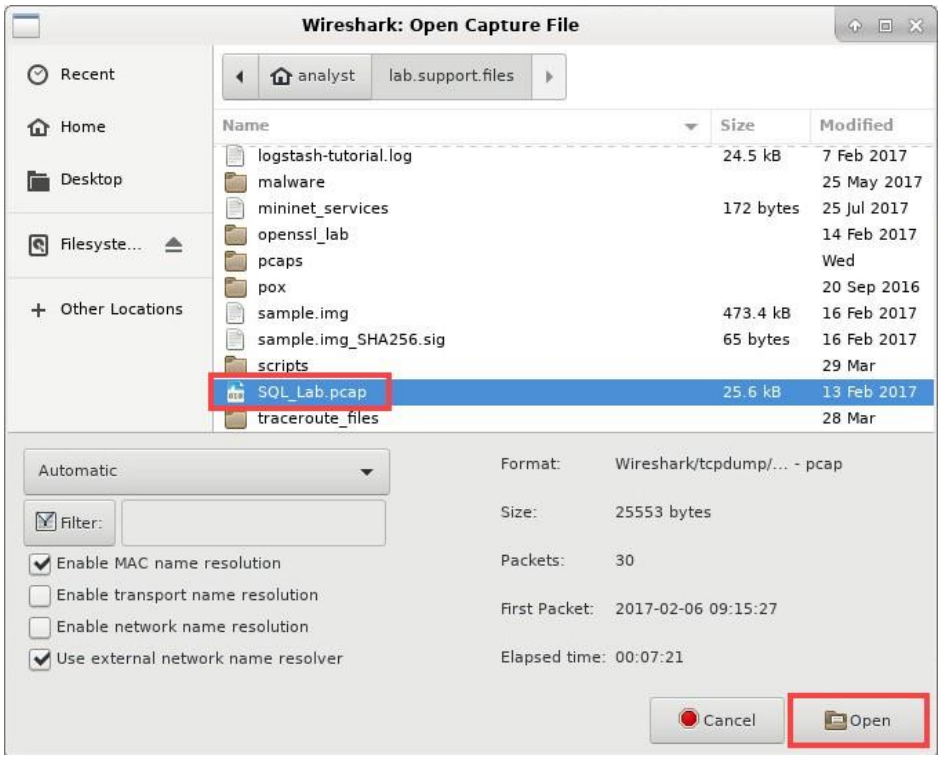
The *Wireshark* application can be opened using a variety of methods on a Linux workstation.

a. Log on to the **CyberOps Workstation** VM as the `analyst`, using the password `cyberops`.

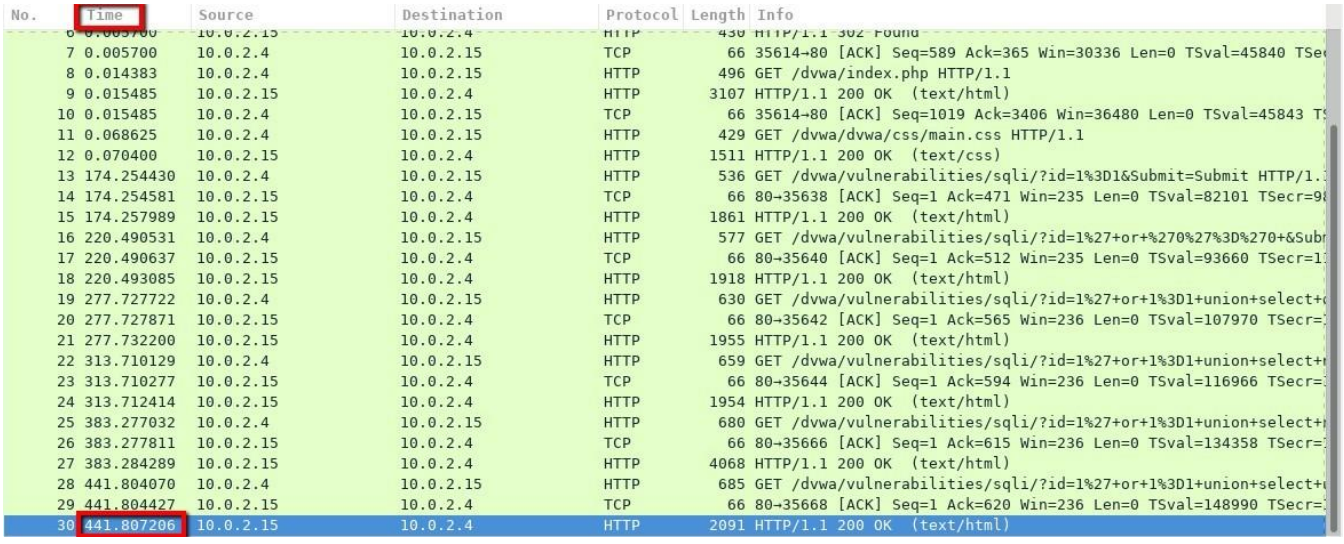
b. Click on **Applications > CyberOPS > Wireshark** on the desktop to launch the *Wireshark* application.

c. In the *Wireshark* application, click **Open** in the middle of the application under *Files*.

Browse through the **/home/analyst/** directory and search for **lab.support.files**. Double-click the **lab.support.files** directory and open the **SQL_Lab.pcap** file.



d. The *PCAP* file opens within *Wireshark* and displays the captured network traffic. This capture file extends over an 8-minute (441 second) period, the duration of this *SQL* injection attack.



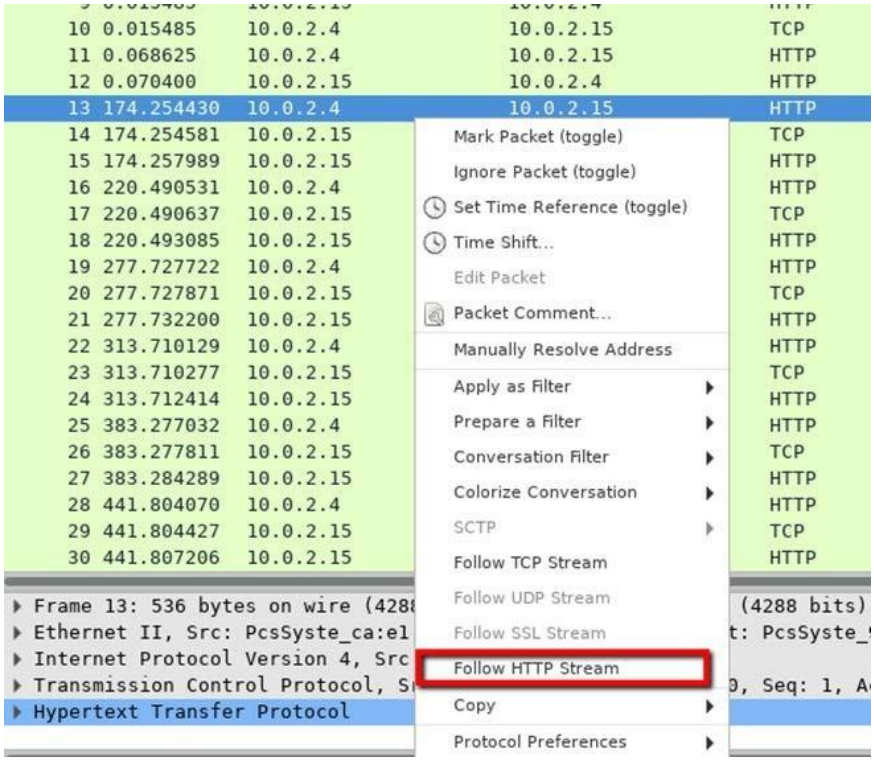
What are the two IP addresses involved in this SQL injection attack based on the information displayed?

The two IP addresses are Destination IP is 10.0.2.4 and Source IP is 10.0.2.15

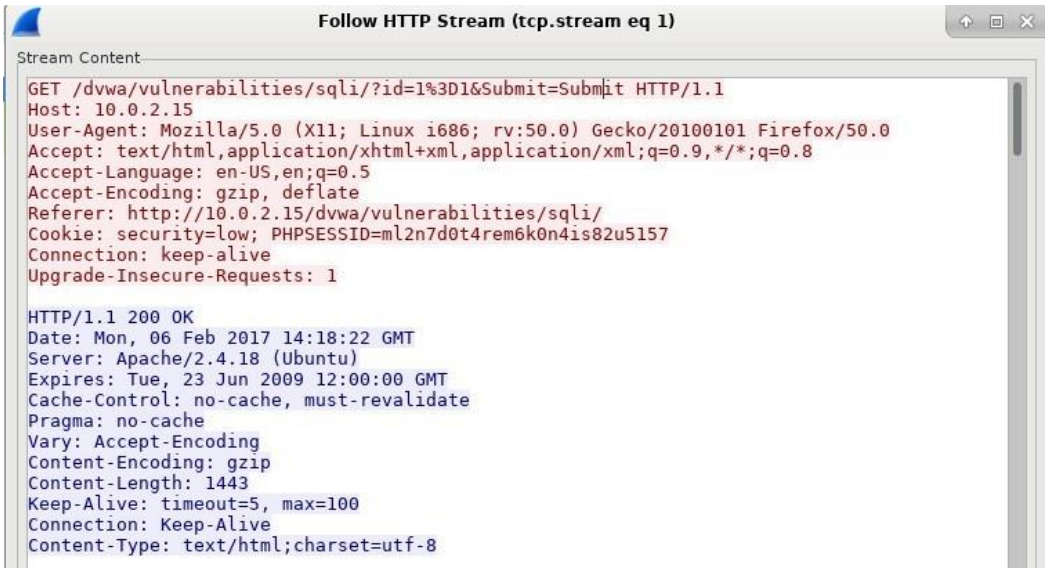
Step 2: View the SQL Injection Attack.

In this step, you will be viewing the beginning of an attack.

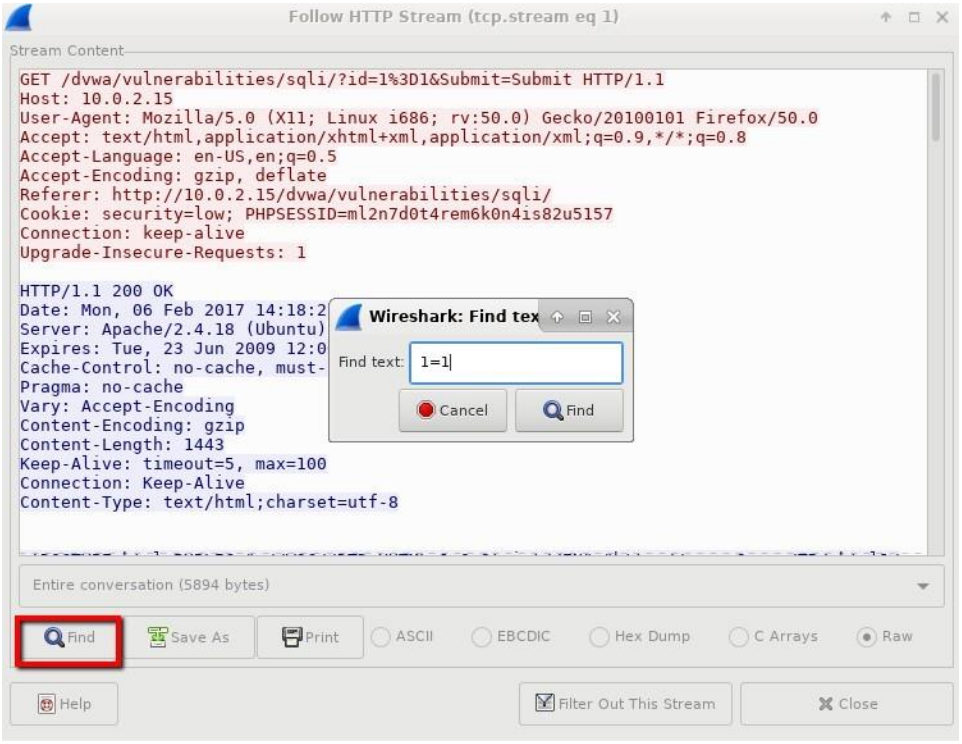
a. Within the *Wireshark* capture, right-click **line item 13** and select **Follow HTTP Stream**. This will be very helpful in following the data stream as the application layer sees it. *Line 13* was chosen because it is a *GET HTTP* request.



The source traffic is shown in red. The source has sent a *GET* request to host *10.0.2.15*. In blue, the destination device is responding back to the source.



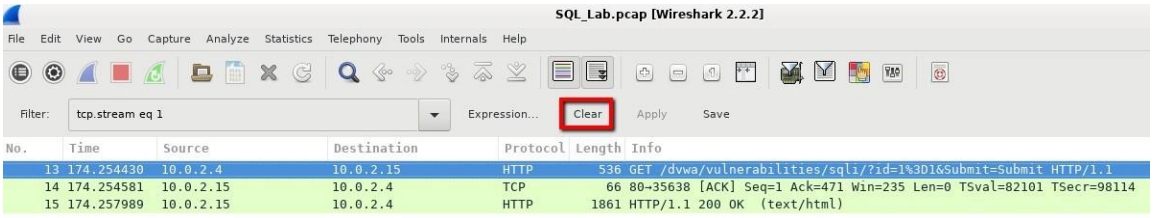
b. Click **Find** and enter 1=1. Search for this entry. When the text is located, click **Cancel** in the Find text search box.



c. The attacker has entered a query (*1=1*) into a *UserID* search box on the target *10.0.2.15* to see if the application is vulnerable to *SQL* injection. Instead of the application responding with a login failure message, it responded with a record from a database. The attacker has verified they can input an SQL command and the database will respond. The search string *1=1* creates an *SQL* statement that will be always true. In the example, it does not matter what is entered into the field, it will always be true.

d. Close the **Follow HTTP Stream** window.

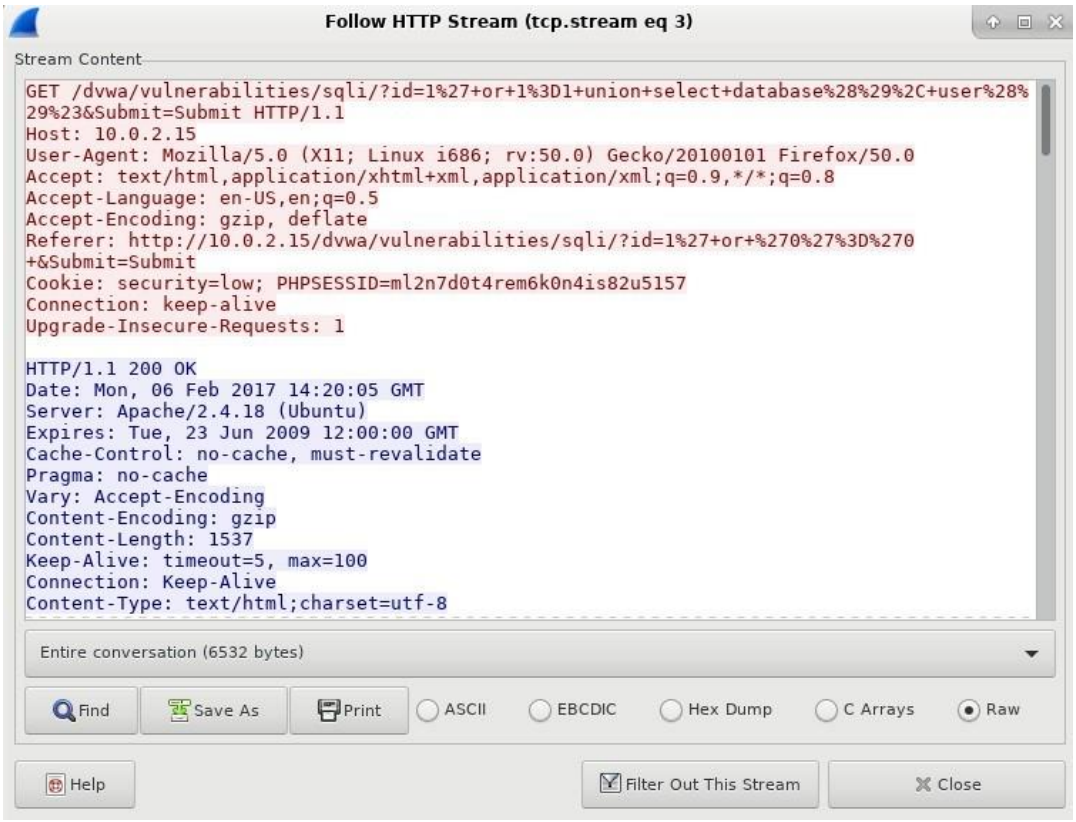
e. Click **Clear** to display the entire Wireshark conversation.



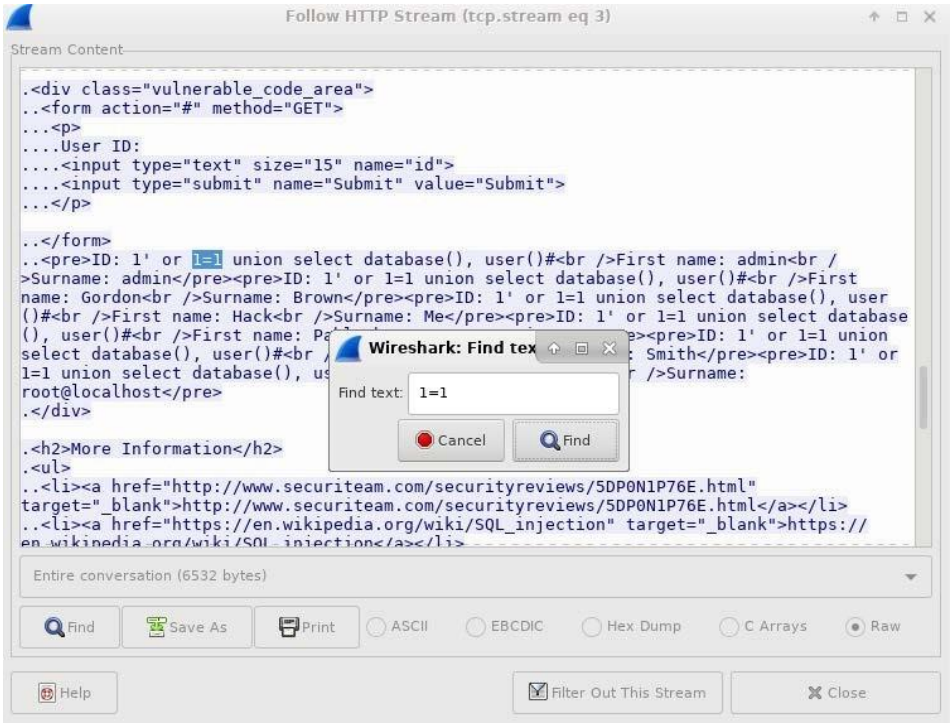
Step 3: The SQL Injection Attack continues...

In this step, you will be viewing the continuation of an attack.

a. Within the *Wireshark* capture, right-click **line item 19**, and select **Follow HTTP Stream**.



b. Click **Find** and enter 1=1. Search for this entry. W hen the text is located, click **Cancel** in the Find text search box.



c. The attacker has entered a query (*1' or 1=1 union select database(), user()#*) into a *UserID* search box on the target *10.0.2.15*. Instead of the application responding with a login failure message, it responded with the following information:

The database name is **dvwa** and the database user is **dvwa@localhost**. There are also multiple user accounts being displayed.

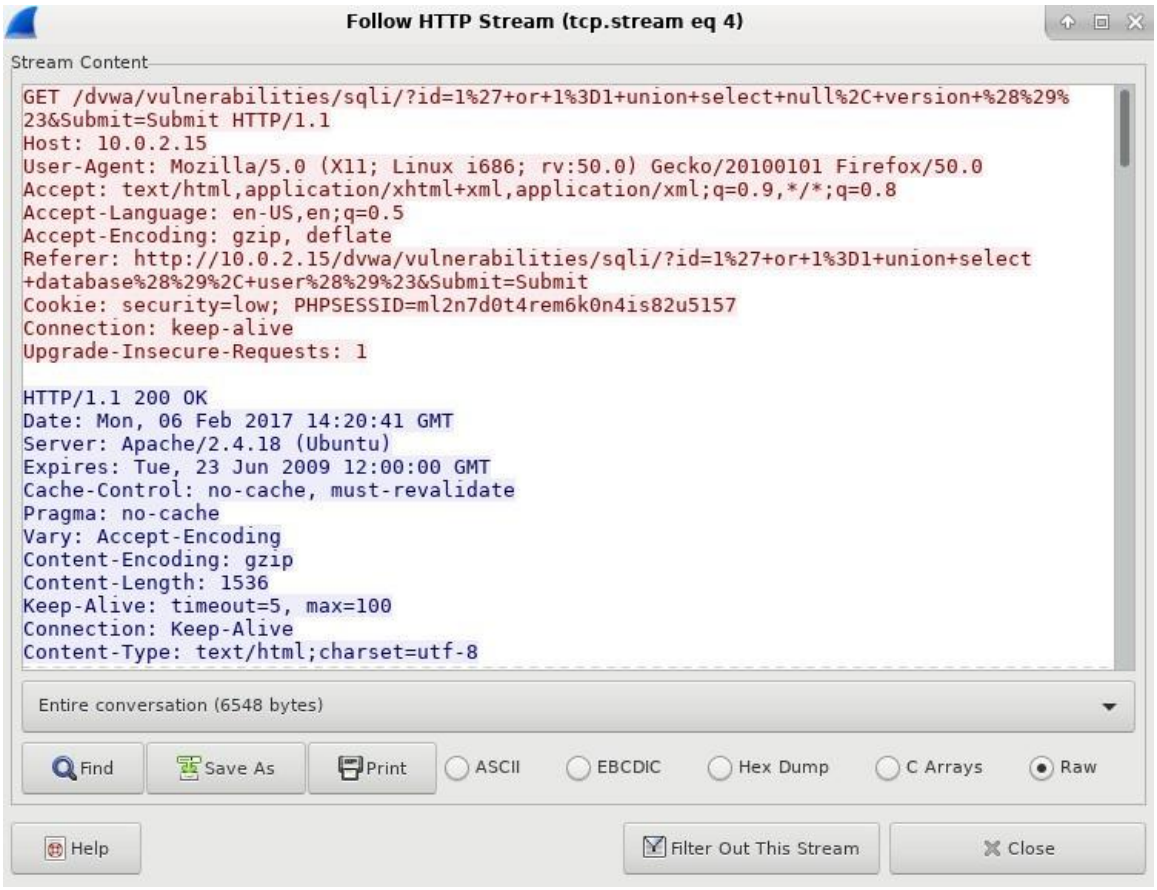
d. Close the **Follow HTTP Stream** window.

e. Click **Clear** to display the entire *Wireshark* conversation.

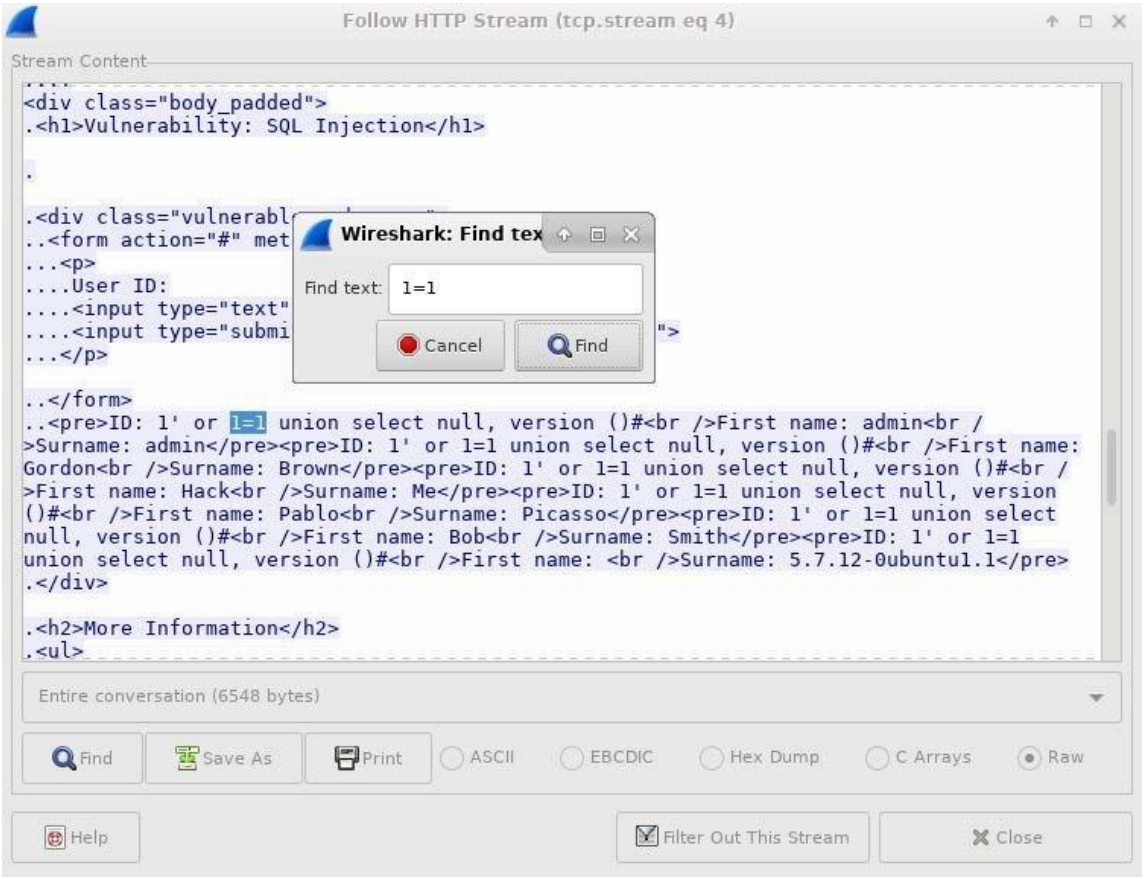
Step 4: The SQL Injection Attack provides system information.

The attacker continues and starts targeting more specific information.

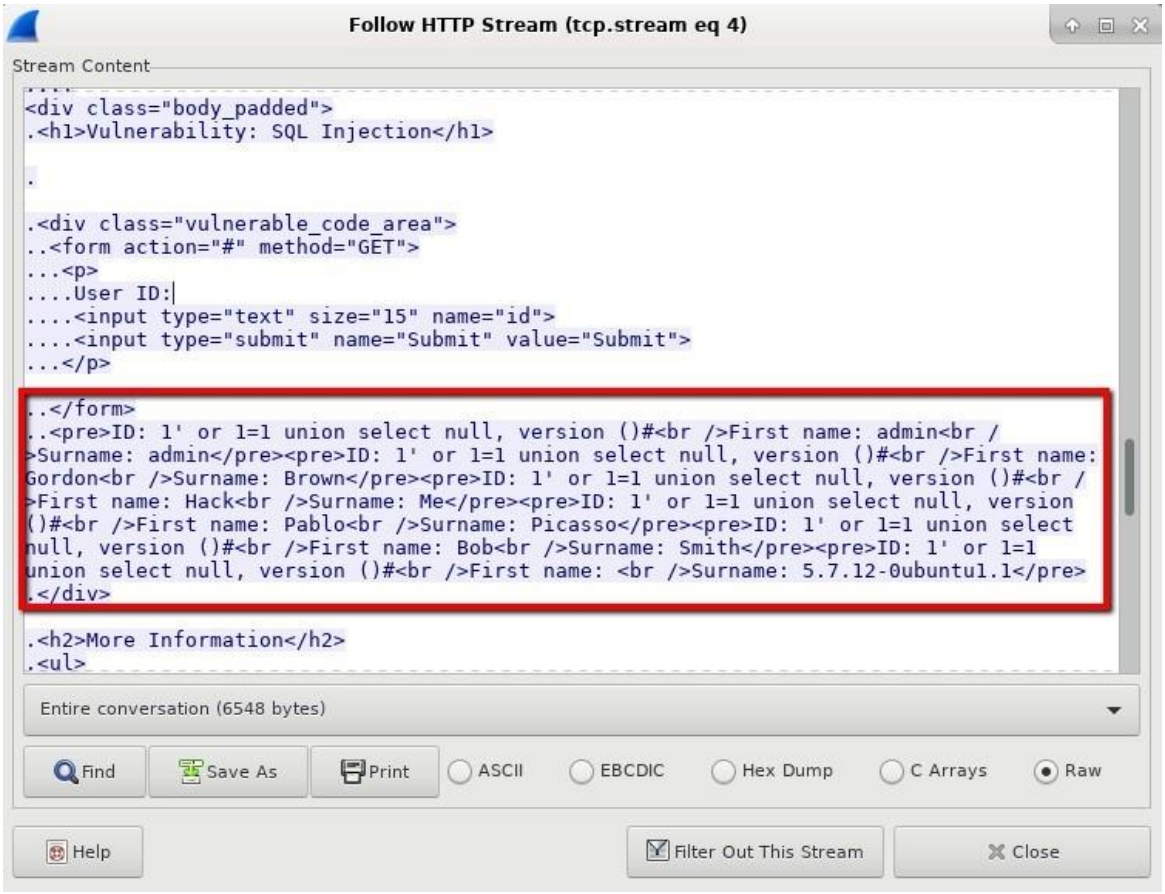
a. Within the *Wireshark* capture, right-click **line item 22** and select **Follow HTTP Stream**. In red, the source traffic is shown and is sending the *GET* request to host *10.0.2.15*. In blue, the destination device is responding back to the source.



b. Click **Find** and type in 1=1. Search for this entry. When the text is located, click **Cancel** in the Find text search box.



c. The attacker has entered a query (*1' or 1=1 union select null, version ()#*) into a *UserID* search box on the target *10.0.2.15* to locate the version identifier.



What is the version?

The Version is 5.7.12-0ubuntu1.1

5.7.12-0ubuntu1.1.

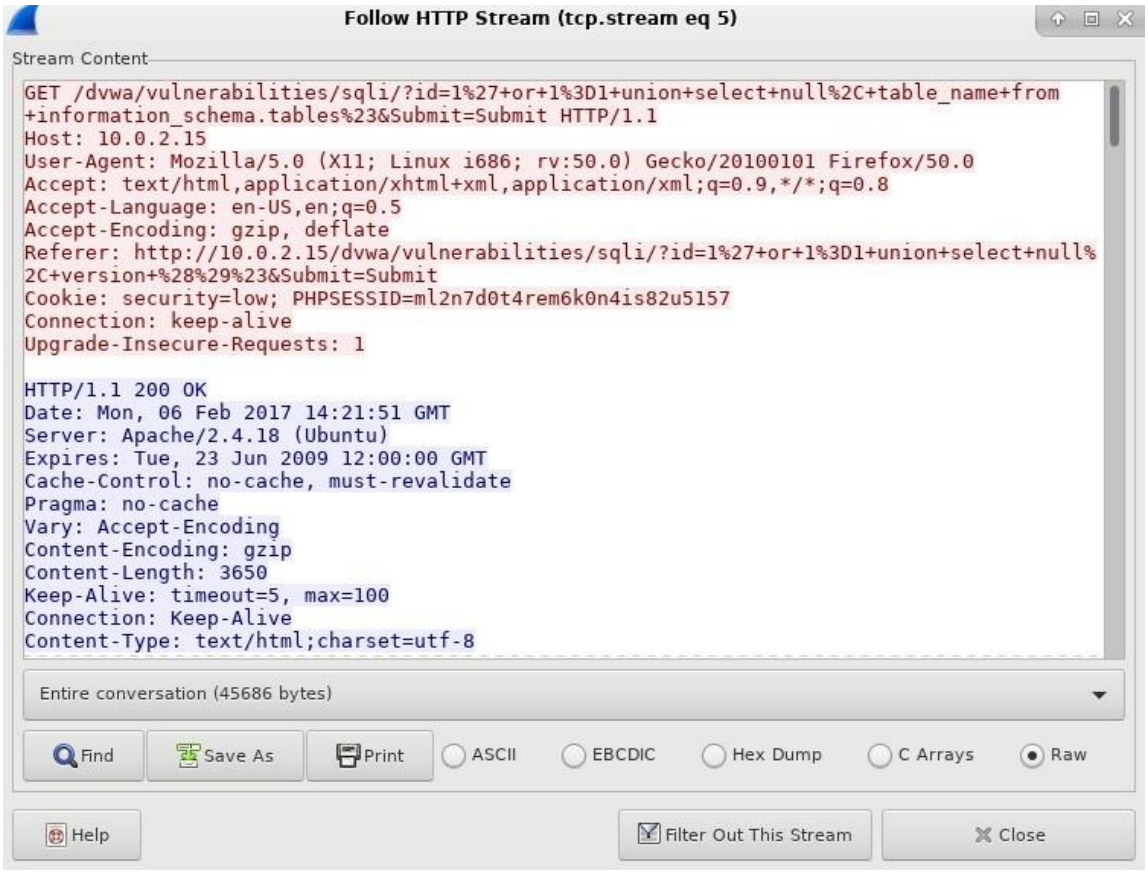
d. Close the **Follow HTTP Stream** window.

e. Click **Clear** to display the entire Wireshark conversation.

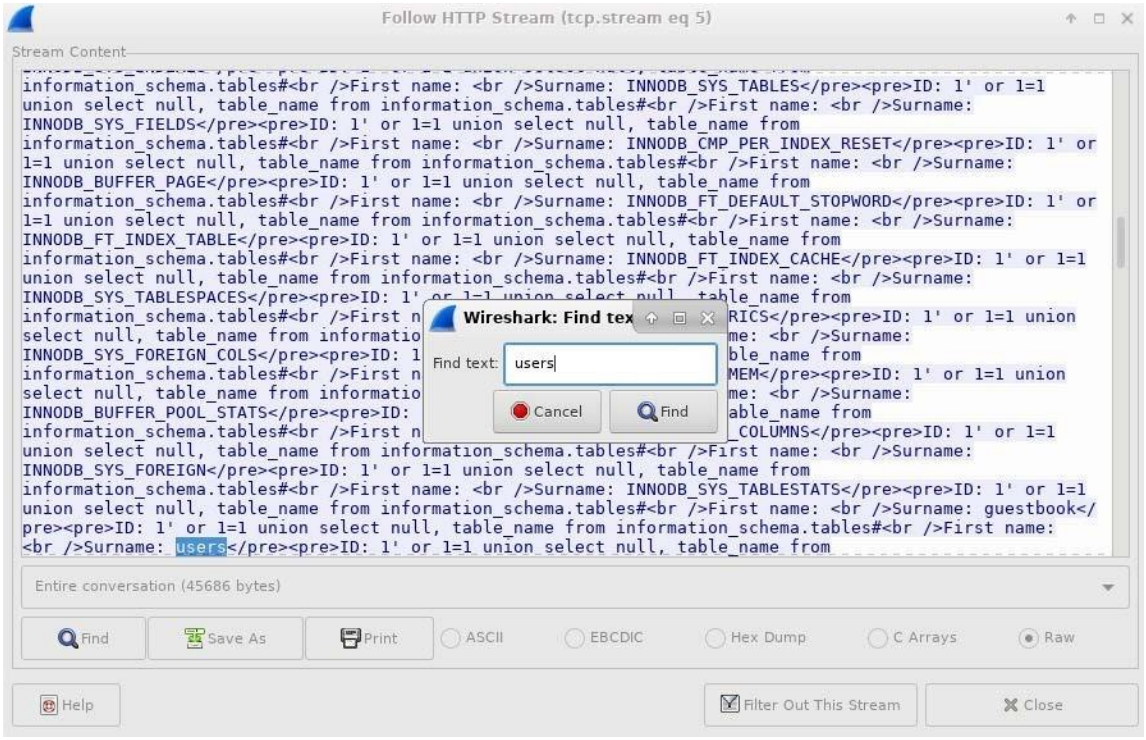
Step 5: The SQL Injection Attack and Table Information.

The attacker knows that there are a large number of *SQL* tables that are full of information. The attacker attempts to find them.

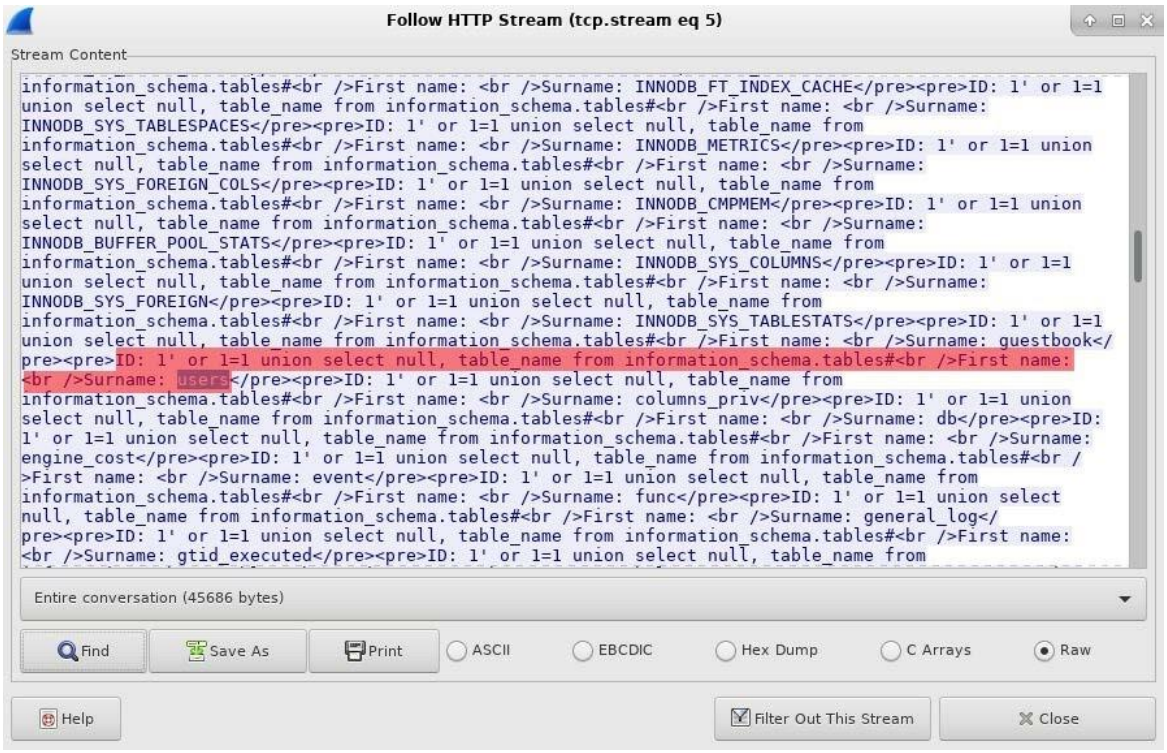
a. Within the *Wireshark* capture, right-click on `line item 25` and select **Follow HTTP Stream**. The source is shown in red. It has sent a *GET* request to host *10.0.2.15*. In blue, the destination device is responding back to the source.



b. Click **Find** and enter **users**. Search for the entry displayed below. When the text is located, click **Cancel** in the *Find* text search box.



c. The attacker has entered a query (*1'or 1=1 union select null, table_name from information_schema.tables#*) into a *UserID* search box on the target *10.0.2.15* to view all the tables in the database. This provides a huge output of many tables, as the attacker specified "null" without any further specifications.



What would the modified command of (**1' OR 1=1 UNION SELECT null, column_name FROM INFORMATION_SCHEMA.columns WHERE table_name='users'**) do for the attacker?

Here it display the output which is filtered by the word "users".

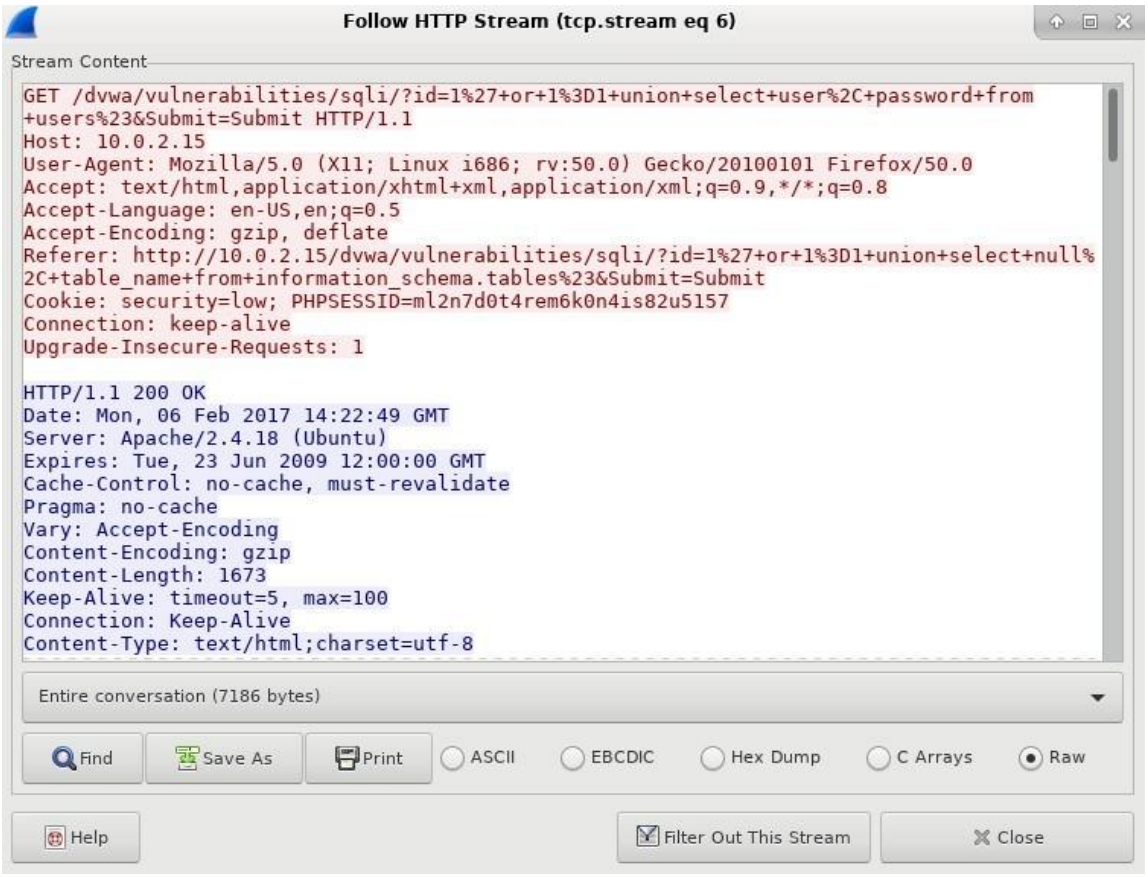
d. Close the **Follow HTTP Stream** window.

e. Click **Clear** to display the entire *Wireshark* conversation.

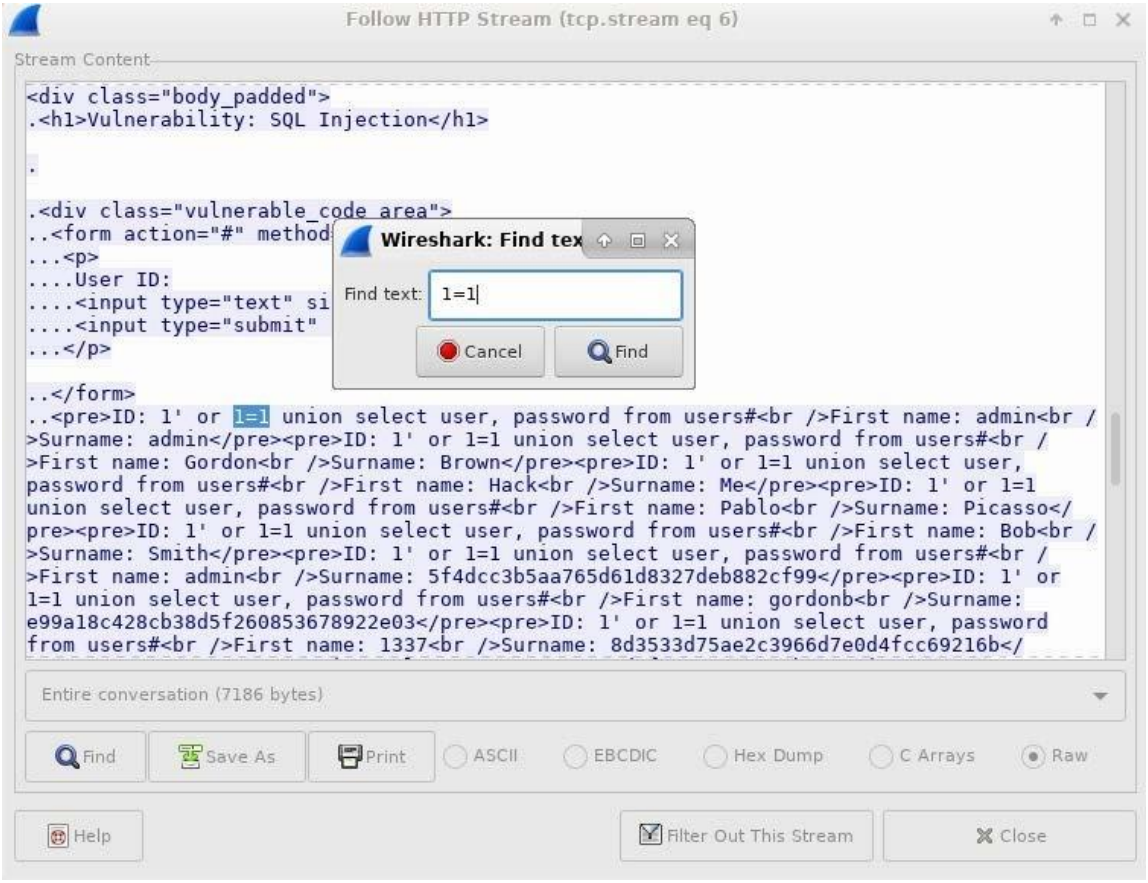
Step 6: The SQL Injection Attack Concludes.

The attack ends with the best prize of all; password hashes.

a. Within the *Wireshark* capture, right-click **line item 28** and select **Follow HTTP Stream**. The source is shown in red. It has sent a *GET* request to host *10.0.2.15*. In blue, the destination device is responding back to the source.



b. Click **Find** and type in 1=1. Search for this entry. When the text is located, click **Cancel** in the *Find* text search box.



The attacker has entered a query (*1'or 1=1 union select user, password from users#*) into a *UserID* search box on the target *10.0.2.15* to pull usernames and password hashes!

Which user has the password hash of *8d3533d75ae2c3966d7e0d4fcc69216b*?

The password is 1337.

Using your host PC, navigate to a website such as https://crackstation.net/, type the password hash into the password hash cracker and get cracking.

What is the plain-text password?

Charley.

c. Close the **Follow HTTP Stream** window. Close any open windows.

Reflection

1. What is the risk of having platforms use the SQL language?

   There are several risks associated with using the SQL language on platforms. Some of them are security risks, performance risks and website maintenance risks.

2. Browse the Internet and perform a search on “prevent SQL injection attacks”. What are 2 methods or steps that can be taken to prevent SQL injection attacks?

   To prevent SQL injection attacks filter user input, monitor SQL statement and use parameters with dynamic SQL.