University of North Texas

CSCE 5560 Programming and Project Documentation Quick Guide

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Hacking Project Documentation

Website Setup - SQL Injection Attacks

Catherine Dockendorf

I. APACHE INSTALLATION

Apache HTTP Server is a free and open-source platform web server software.

1. To install Apache, open a terminal and type in the installation command:

sudo apt-get install apache2

```
sec-lab@cas0618:~$ sudo apt-get install apache2
Reading package lists... Done
Building dependency tree
Reading state information... Done
apache2 is already the newest version (2.4.41-4ubuntu3.12).
0 upgraded, 0 newly_installed, 0 to remove and 0 not upgraded.
```

2. Find your ipaddress by typing in the "ifconfig" command which can be executed after installing the net-tools package:

sudo apt-get install net-tools

```
sec-lab@cas0618:~$ sudo apt-get install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
net-tools is already the newest version (1.60+git20180626.aebd88e-1ubuntu1).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

```
sec-lab@cas0618:~$ ifconfig
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
```

In the network settings, change the network adapter setting to Host-Only adapter.Turn on the VM.

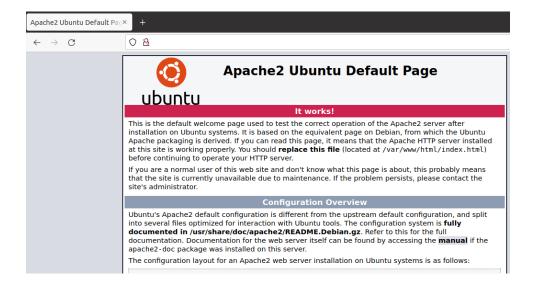
4. Restart Apache and check the status of the running server. Type the command below as a sudo user to restart the web-server:

sudo service apache2 restart

Type the following command to check the status of the server:

systemctl status apache2

5. Type in IP address on the browser to check if the server is running



II. MySQL Installation

As a brief overview, MySQL is an open-source relational database management system. SQL is short for Structured Query Language. It is a powerful database management system used for organizing and retrieving from tables relational structured data.

1. To install MySQL, open terminal and type in these commands:

sudo apt-get install mysql-server

```
sec-lab@cas0618:~$ sudo apt-get install mysql-server
Reading package lists... Done
```

2. Activate MySQL using the following commands:

sudo mysqld

3. Finish up by running the MySQL set up script:

sudo mysql_secure_installation

```
sec-lab@cas0618:-$ sudo mysql_secure_installation

Securing the MySQL server deployment.

Enter password for user root:

VALIDATE PASSWORD COMPONENT can be used to test passwords and improve security. It checks the strength of password and allows the users to set only those passwords which are secure enough. Would you like to setup VALIDATE PASSWORD component?

Press y|Y for Yes, any other key for No:
```

The next prompts will ask for the root password.

ERROR 1819 (HY000): Your password does not satisfy the current policy requirement mysql> ALTER USER 'root'@'localhost' IDENTIFIED WITH mysql_native_password by Query OK, 0 rows affected (0.01 sec)

Continued on next page.

II. MySQL Installation

```
sec-lab@cas0618:~$ sudo mysql_secure_installation
Securing the MySQL server deployment.
Enter password for user root:
The 'validate_password' component is installed on the server.

The subsequent steps will run with the existing configuration
of the component.
Using existing password for root.
Estimated strength of the password: 100 Change the password for root ? ((Press y|Y for Yes, any other key for No) : y
New password:
Sorry, you can't use an empty password here.
New password:
Re-enter new password:
Estimated strength of the password: 100
Do you wish to continue with the password provided?(Press y|Y for Yes, any other key for No): y By default, a MySQL installation has an anonymous user, allowing anyone to log into MySQL without having to have a user account created for them. This is intended only for testing, and to make the installation go a bit smoother.
You should remove them before moving into a production
environment.
Remove anonymous users? (Press y|Y for Yes, any other key for No) :
```

```
Remove anonymous users? (Press y|Y for Yes, any other key for No) : y
Success.
Normally, root should only be allowed to connect from 'localhost'. This ensures that someone cannot guess at
the root password from the network.
Disallow root login remotely? (Press y|Y for Yes, any other key for No) : y
By default, MySQL comes with a database named 'test' that
anyone can access. This is also intended only for testing.
and should be removed before moving into a production
environment.
Remove test database and access to it? (Press y|Y for Yes, any other key for No) : y
 - Dropping test database...
Success.
 - Removing privileges on test database...
Success.
Reloading the privilege tables will ensure that all changes
made so far will take effect immediately.
Reload privilege tables now? (Press y|Y for Yes, any other key for No) : y
Success.
All done!
```

III. PHP Installation

PHP is an open-source web scripting language that is widely used to build dynamic webpages.

1. To install PHP, type the following command on the terminal

sudo apt-get install php7.4 libapache2-mod-php7.4

```
ec-lab@cas0618:~$ sudo apt-get install php7.4 libapache2-mod-php7.4
[sudo] password for sec-lab:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
 php-common php7.4-cli php7.4-common php7.4-json php7.4-opcache
 php7.4-readline
Suggested packages:
 php-pear
The following NEW packages will be installed:
 libapache2-mod-php7.4 php-common php7.4 php7.4-cli php7.4-common p
 php7.4-opcache php7.4-readline
 upgraded, 8 newly installed, 0 to remove and 0 not upgraded.
Need to get 4,027 kB of archives.
After this operation, 18.0 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

sudo nano /etc/apache2/mods-enabled/dir.confcd

2. Add index.php to /etc/apache2/mods-enabled/dir.confcd file.



3. Test and create an info.php file.

sudo nano /var/www/info.php

```
GNU nano 4.8 /var/www/info.php <?php
phpinfo();
?>
```

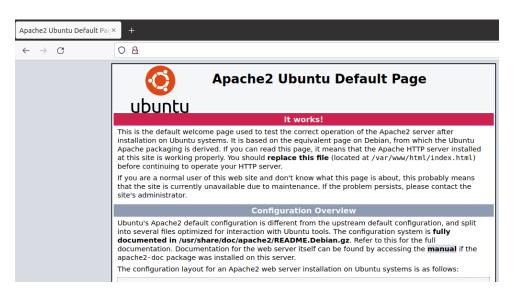
sudo service apache2 restart

IV. APACHE2

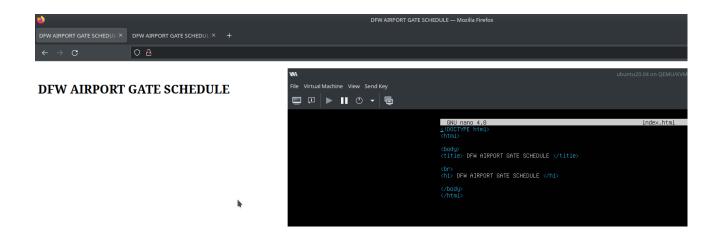
libapache2-mod-php7.4 is a server-side HTML embedded scripting language.

1. To test if the server side is interpreting the HTML correctly, a short but simple HTML snippet was written to replace the default Ubuntu Apache Welcome page:

/var/www/html/index.html



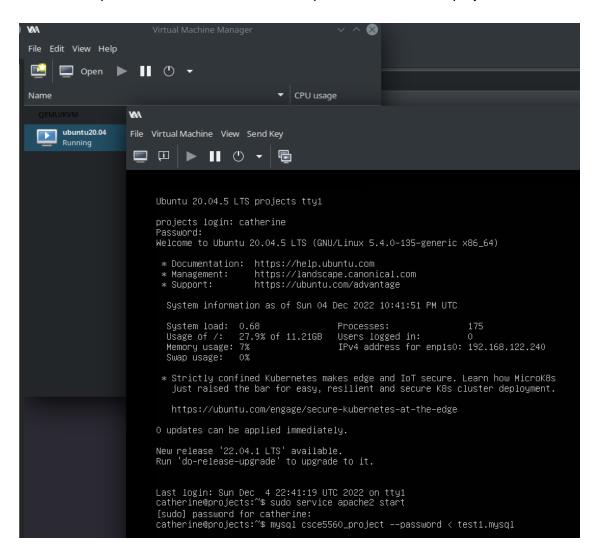
2. Restart the apache2 service and reload the webpage to check if it has deployed. sudo service apache2 restart



The test website succeeds.

V. CREATING THE SQL DATABASE

1. Run the Apache2 service and run SQL script into the csce5560_project database.



The HTML files that were programmed were copied onto the virtual machine via scp:

scp /home/catherine/Desktop/test1.mysql catherine@youripaddress:~/

Then loaded into the csce5560_project mySQL database

catherine@projects:~\$ mysql csce5560_project --password < test1.mysql

VI. VIEWING THE SQL DATABASE

```
File Edit View Bookmarks Settings Help

-> (3, 'Spirit Airlines', 'DFW', 'F23', '2022-04-22T13:00:00.000', 'LAS', 'G33', '2022-04-22T15:00:00.000'),
-> (4, 'American Airlines', 'DFW', 'F23', '2022-04-22T14:00:00.000', 'LAS', 'G33', '2022-04-22T16:00:00.000'),
-> (5, 'American Airlines', 'DFW', 'F23', '2022-04-23T09:00:00.000', 'TPA', 'G33', '2022-04-23T11:00:00.000'),
-> (6, 'United Airlines', 'DFW', 'F23', '2022-04-23T09:00:00.000', 'JFK', 'G33', '2022-04-23T12:00:00.000'),
-> (8, 'American Airlines', 'DFW', 'F23', '2022-04-23T13:00:00.000', 'LAS', 'G33', '2022-04-23T15:00:00.000'),
-> (8, 'American Airlines', 'DFW', 'F23', '2022-04-23T13:00:00.000', 'LAS', 'G33', '2022-04-23T16:00:00.000'),
-> (10, 'United Airlines', 'DFW', 'F23', '2022-04-24T09:00:00.000', 'TPA', 'G33', '2022-04-24T12:00:00.000'),
-> (11, 'Spirit Airlines', 'DFW', 'F23', '2022-04-24T19:00:00.000', 'LAS', 'G33', '2022-04-24T12:00:00.000'),
-> (12, 'American Airlines', 'DFW', 'F23', '2022-04-24T13:00:00.000', 'LAS', 'G33', '2022-04-24T16:00:00.000'),
-> (13, 'American Airlines', 'DFW', 'F23', '2022-04-24T13:00:00.000', 'LAS', 'G33', '2022-04-24T16:00:00.000'),
-> (14, 'United Airlines', 'DFW', 'F23', '2022-04-25T19:00:00.000', 'LAS', 'G33', '2022-04-25T110:00:00.000'),
-> (14, 'United Airlines', 'DFW', 'F23', '2022-04-25T13:00:00.000', 'LAS', 'G33', '2022-04-25T110:00:00.000'),
-> (15, 'Spirit Airlines', 'DFW', 'F23', '2022-04-25T13:00:00.000', 'LAS', 'G33', '2022-04-25T110:00:00.000'),
-> (16, 'American Airlines', 'DFW', 'F23', '2022-04-25T13:00:00.000', 'LAS', 'G33', '2022-04-25T110:00:00.000'),
-> (17, 'American Airlines', 'DFW', 'F23', '2022-04-25T13:00:00.000', 'LAS', 'G33', '2022-04-25T110:00:00.000'),
-> (19, 'Spirit Airlines', 'DFW', 'F23', '2022-04-25T13:00:00.000', 'LAS', 'G33', '2022-04-25T110:00:00.000'),
-> (19, 'Spirit Airlines', 'DFW', 'F23', '2022-04-25T13:00:00.000', 'LAS', 'G33', '2022-04-25T110:00:00.000'),
-> (19, 'Spirit Airlines', 'DFW', 'F23', '2022-04-25T10:00:00.000', 'LAS', 'G33', '2022-04-25T110:00:00.000'),
-> (19, 
   File Edit View Bookmarks Settings Help
mysql> SELECT airline, departure_time from flights where arrival_airport = 'LAX' and departure_airport = 'DFW';
   American Airlines | 2022-04-22 14:00:00
American Airlines | 2022-04-23 14:00:00
American Airlines | 2022-04-24 14:00:00
American Airlines | 2022-04-25 14:00:00
American Airlines | 2022-04-26 14:00:00
5 rows in set (0.00 sec)
mysql> SELECT * from flights where arrival_airport = 'JFK' and departure_airport = 'DFW';
                                                                                                                                                                                    | departure_airport | departure_gate | departure_time
2022-04-22 12:00:00 | F23 | 2022-04-22 09:00:00 | JFK | F23 | 2022-04-22 09:00:00 | JFK | F23 | 2022-04-23 09:00:00 | JFK | F23 | 2022-04-23 09:00:00 | JFK | F23 | 2022-04-24 09:00 | JFK | F23 | 2022-04-24 09:00 | JFK | F23 | 2022-04-24 09:00 | JFK | F23 | 2022-04-25 09:00:00 | JFK | F23 | F23 | 2022-04-25 09:00:00 | JFK | F23 | F
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| 2022-04-26 09:00:00 | JFK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | G33
2022-04-26 12:00:00 |
  nysql> SELECT * from flights where arrival_airport = 'JFK' and departure_airport = 'DFW';
       id | flight_number | airline
                                                                                                                                                                                             | departure_airport | departure_gate | departure_time
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | arrival_airport | arrival_gate | arrival_time
                                                                                   2 | United Airlines | DFW
6 | United Airlines | DFW
10 | United Airlines | DFW
14 | United Airlines | DFW
18 | United Airlines | DFW
                                                                                                                                                                                                                                                                                                                                                                                   | 2022-04-22 09:00:00 | JFK
| 2022-04-23 09:00:00 | JFK
| 2022-04-24 09:00:00 | JFK
| 2022-04-25 09:00:00 | JFK
| 2022-04-26 09:00:00 | JFK
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2022-04-23 12:00:00
2022-04-24 12:00:00
2022-04-25 12:00:00
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14
      18
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      rows in set (0.00 sec)
```

SYNCING FILES INTO /VAR/WWW/HTML/

Lastly, the remaining HTML files were loaded into the /var/www/html/ folder:

```
File Edit View Bookmarks Settings Help

catherine@projects:~$ sudo su -
[sudo] password for catherine:
root@projects:~# ls

snap

root@projects:~# cp /home/catherine/HTML\ Index/* /var/www/html/
root@projects:~# cd /var/www/html/
root@projects:/var/www/html# ls

flight_info.html home.jpg index.html info.php main.css main.js.txt
```

The project file flight info.html overwrote the index.html.

```
root@projects:/var/www/html# mv flight_info.html index.html
root@projects:/var/www/html# ls
home.jpg index.html info.php main.css main.js.txt
root@projects:/var/www/html# systemctl restart apache2
```

Index.html was eventually renamed to index.php so that it may be executed with PHP scripts.

VII. PHP SCRIPTING

```
root@projects:/var/www/html# mysql
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 13
Server version: 8.0.31-Oubuntu0.20.04.2 (Ubuntu)
Copyright (c) 2000, 2022, Oracle and/or its affiliates.
Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
mysql> show databases;
| Database
  csce5560_project
  information_schema
 mysql
  performance_schema
5 rows in set (0.02 sec)
mysql> use csce5560_project;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A
Database changed
```

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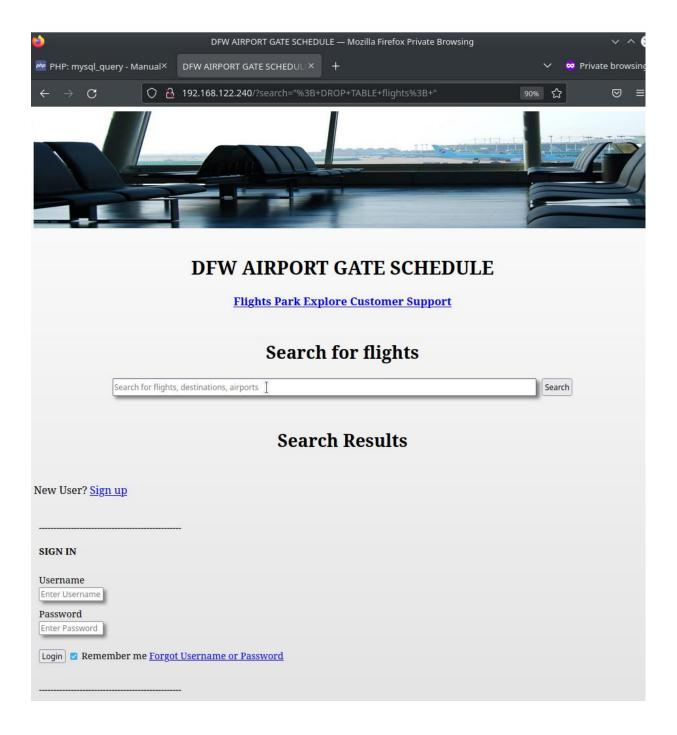
() 192.168.122.240 — Konsole mysql> use csce5560_project; Reading table information for completion of table and column names You can turn off this feature to get a quicker startup with -A Database changed mysql> show tables; Tables_in_csce5560_project flights row in set (0.00 sec) mysql> select * from flights; id | flight_number | airline | departure_airport | departure_gate | departure_time | arrival_airport | arrival_gate | arrival_time 2022-04-22 11:00:00 2022-04-22 12:00:00 2022-04-22 15:00:00 2022-04-22 16:00:00 American Airlines 2022-04-22 08:00:00 | G33 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 2022-04-22 08:00:00
2022-04-22 09:00:00
2022-04-22 13:00:00
2022-04-23 08:00:00
2022-04-23 09:00:00
2022-04-23 13:00:00
2022-04-23 14:00:00
2022-04-24 08:00:00
2022-04-24 09:00:00
2022-04-24 13:00:00
2022-04-24 14:00:00
2022-04-24 14:00:00 United Airlines Spirit Airlines JFK LAS DFW F23 G33 G33 DFW F23 American Airlines F23 DFW LAX G33 American Airlines DFW F23 2022-04-23 11:00:00 TPA G33 2022-04-23 12:00:00 2022-04-23 15:00:00 United Airlines DFW F23 G33 Spirit Airlines DFW F23 LAS G33 2022-04-23 13:00:00 2022-04-23 16:00:00 2022-04-24 11:00:00 2022-04-24 12:00:00 2022-04-24 15:00:00 American Airlines DFW F23 LAX G33 American Airlines United Airlines Spirit Airlines DFW F23 TPA G33 10 DFW F23 JFK G33 F23 11 12 13 14 15 DFW LAS G33 American Airlines DFW F23 LAX G33 2022-04-24 16:00:00 2022-04-24 14:00:00 2022-04-25 08:00:00 2022-04-25 09:00:00 2022-04-25 13:00:00 2022-04-25 14:00:00 2022-04-24 16:00:00 2022-04-25 11:00:00 2022-04-25 12:00:00 2022-04-25 15:00:00 2022-04-25 16:00:00 American Airlines F23 G33 **United Airlines** DFW F23 JFK G33 Spirit Airlines LAS DFW G33 LAX TPA 16 17 18 DFW DFW F23 F23 American Airlines G33 American Airlines 2022-04-26 08:00:00 2022-04-26 11:00:00 G33 United Airlines DFW F23 2022-04-26 09:00:00 JFK 2022-04-26 12:00:00 2022-04-26 15:00:00 G33 19 Spirit Airlines F23 2022-04-26 13:00:00 G33 20 American Airlines 2022-04-26 14:00:00 G33 2022-04-26 16:00:00

20 rows in set (0.00 sec)

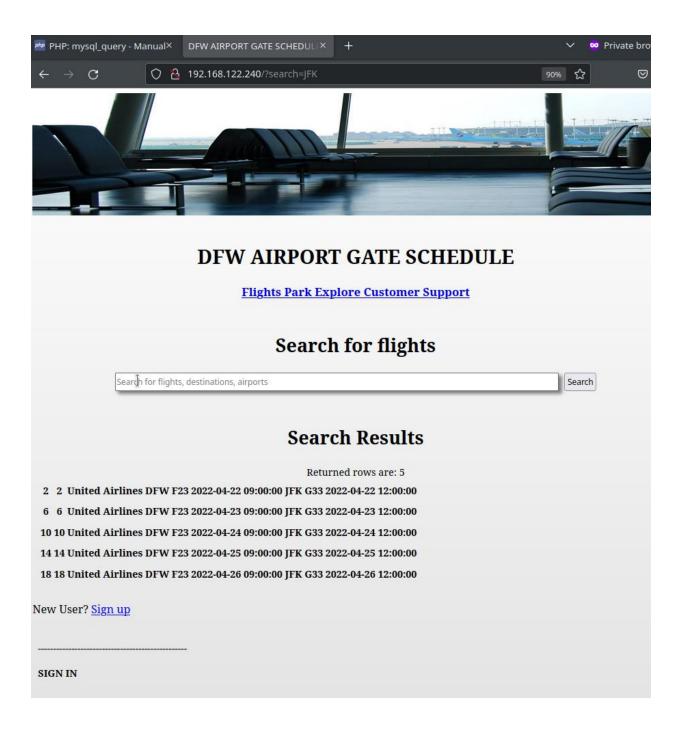
mysql>

VIII. WEBSITE DEPLOYMENT

Once the HTML, SQL and PHP was set-up, the simple website was deployed.

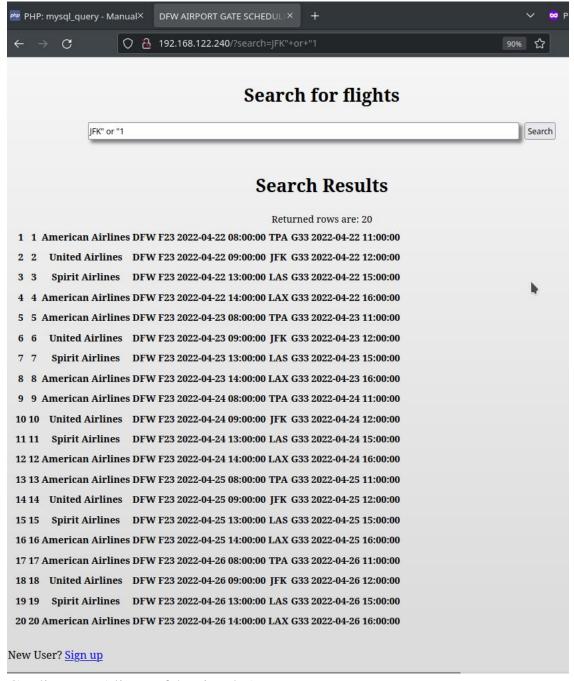


Upon a simple test, the Search function worked which was what we needed for the next part which is the SQL injection attack.



IX. SQL INJECTION ATTACK

As the last part of my contribution, an SQL injection attack was executed where "1=1" would always equate to true and it returned all the search results. If our database had more private information stored such as SSN's, passwords, etc, it would have theoretically been exposed.



Credits: Dr. Ali Zarafshani Lab 1 Document