16 August 2020

CyberEDU write-up: Entry

11 minutes to read

Welcome and welcome back to another CTF writeup. This is my third new series of the week. Today we are going to walk through some of the entry-level challenges on CyberEDU. For your information, the site is hosted by volunteers from the Cyber Security Research Center from Romania (CCSIR) and it is currently free for all. Since CyberEDU is still on a beta version (while writing this post), you might encounter bugs while accessing some of the features on the site. Without further ado, let's get started.

>> [D-CTF 2019] cross-or-zero (10 points)
>> [D-CTF 2019] corrupt-file (10 points)
>> [ECSC 2019] xo.rar (50 points) - pending
>> [ECSC 2019] ping-pong (10 points) - pending

1) [D-CTF 2019] base (10 points)

Link: https://cyberedu.ro/app/challenges/55e16d00-7f21-11ea-99d5-e91c3e9dcacc/

This challenge required the user to complete all three tasks within a limited time frame. Those three tasks are

>> Convert decimal to hex
>> Convert hex to ASCII
>> Convert Octal to ASCII

The simplest way is to create a simple python script with a socket enabled. Please note that the script is not optimized and it is intended for the beginner. If you have a better script, you are welcome to provide one. Also, change the host address and port if necessary.

```
#!/usr/bin/env python3

import socket

#Change it!
HOST = '35.234.92.174'
PORT = 31030

count = 0
```

```
#connect to host and port
sock = socket.socket()
sock.connect((HOST, PORT))

#There are a total of 3 challenges
while count < 3:
    # receive the response, do a flush out if 'input' string is not showing on the response
    response = sock.recv(4096)
    str_response = repr(response)
    if (str_response.find("Input") == -1):
        flush = sock.recv(4096)

    #Extract the data by finding << and >>
    special1 = str_response.find('<') + 2
    special2 = str_response.find('>')

    if (count == 0):
        # Challenge 1: Decimal to hex
        response_trim = str(hex(int(str_response[special1:special2])))

    elif (count == 1):
        #challenge 2: hex to ascii
        response_trim = bytes.fromhex(str_response[special1:special2]).decode("utf-8")

    elif (count == 2):
        ##challenge 3: octal to ascii
        response_trim = ""
```

```
        response_list = str_response[special1:special2].split(' ')
        for i in response_list:
            data = chr(int(i, 8))
            response_trim = response_trim + data

    response_process = response_trim + '\n'
    print(response)
    print(response_trim)
    sock.send(bytes(response_process, 'utf8'))
    count = count + 1

# Receive Flag
response = sock.recv(4096)
print(response)

sock.close()
```

```
root@kali:~/Desktop/cyberedu/entry# python3 solution.py
b'What is the value of <<72731949>> in hex?\nInput: '
0x455cd2d
b'What is the value of <<6f66726d6a76717767666e6e656277627564677a>> in ASCII?\nInput:'
ofrmjvqwgfnnebwbudgz
b'What is the value of <<0155 0151 0153 0143 0166 0142 0151 0142 0156 0166 0152 0147 0162 0160 0151 0161 0170 0152 0156 0163>> in ASCII?\nInput
'
mikcvbibnvjgrpiqxjns
b'DCTF{55cdfe07fa[redacted]}\n'
root@kali:~/Desktop/cyberedu/entry#
```

2) [ECSC 2019] Out of the image (10 points)

Link: https://cyberedu.ro/app/challenges/55d041e0-7f21-11ea-be5e-c9459c7a94df

The task can be easily solved using stegcracker with rockyou.txt as the wordlist.

```
stegcracker pic.jpg /usr/share/wordlists/rockyou.txt
```

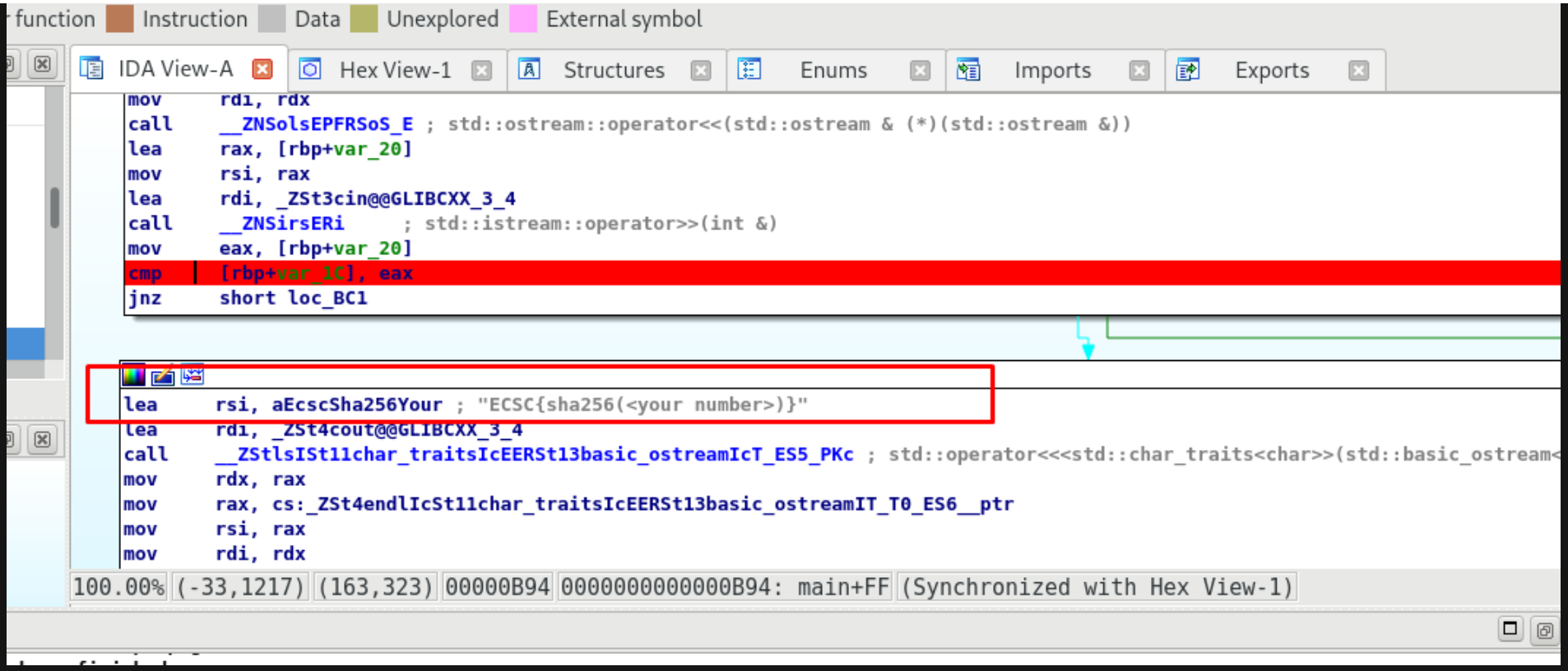
```
root@kali:~/Desktop/cyberedu/entry# stegcracker pic.jpg /usr/share/wordlists/rockyou.txt
StegCracker 2.0.7 - (https://github.com/Paradoxis/StegCracker)
Copyright (c) 2020 - Luke Paris (Paradoxis)

Counting lines in wordlist..
Attacking file 'pic.jpg' with wordlist '/usr/share/wordlists/rockyou.txt'..
Successfully cracked file with password: qw[redacted]
Tried [redacted] passwords
Your file has been written to: pic.jpg.out
qw[redacted]
root@kali:~/Desktop/cyberedu/entry#
```

3) [ECSC 2019] mathematics (10 points)

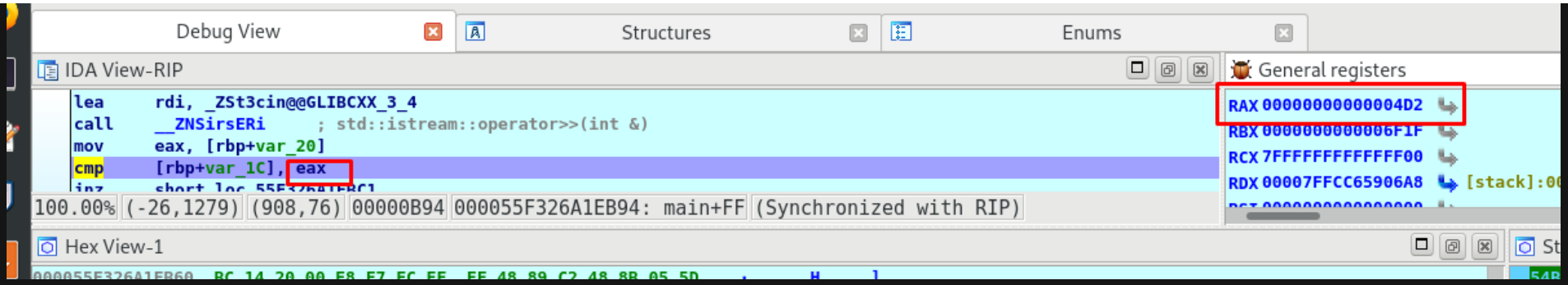
Link: https://cyberedu.ro/app/challenges/55cf2ac0-7f21-11ea-9dac-19639bd852f1

This is my favorite task as it involves with reverse engineering. I'm using ida to complete this task. First of all, let's analyze the branch that lead us to the flag.

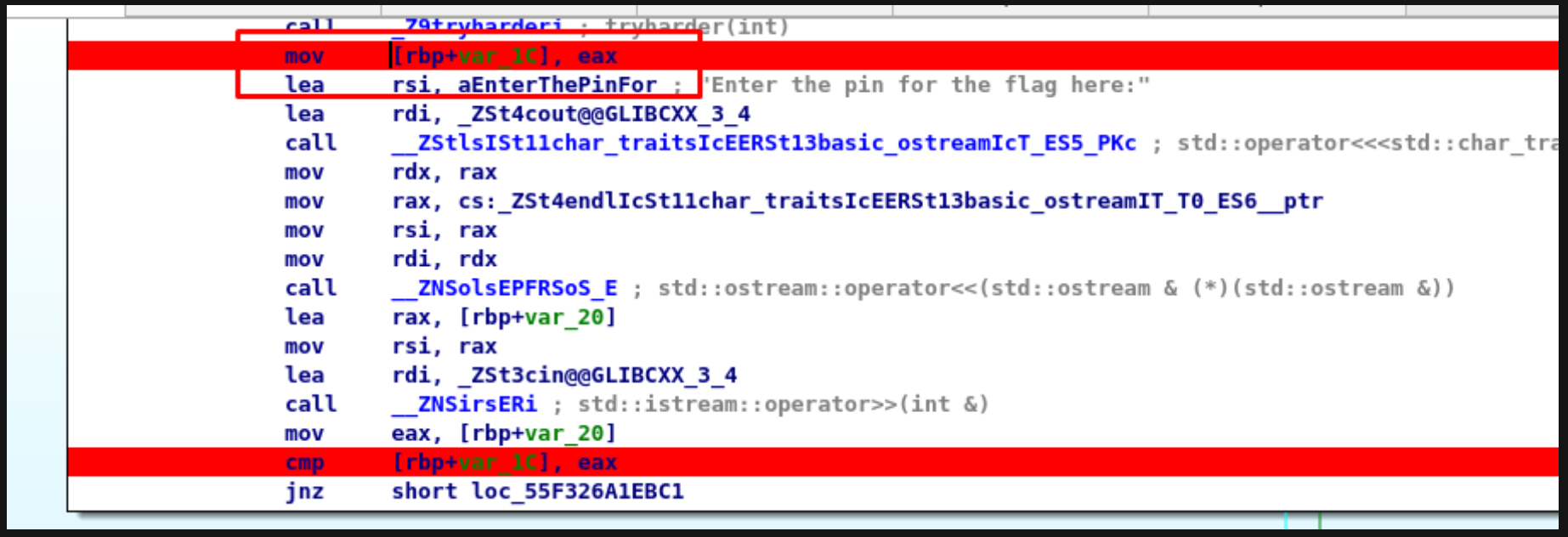


The branch with ECSC{…} is the branch we need. In order to get into the branch, **[rbp+var_1C] must be equal to the eax register**. Hence, we have to put a break-point on the cmp instruction and see what parameter that lead us into it.

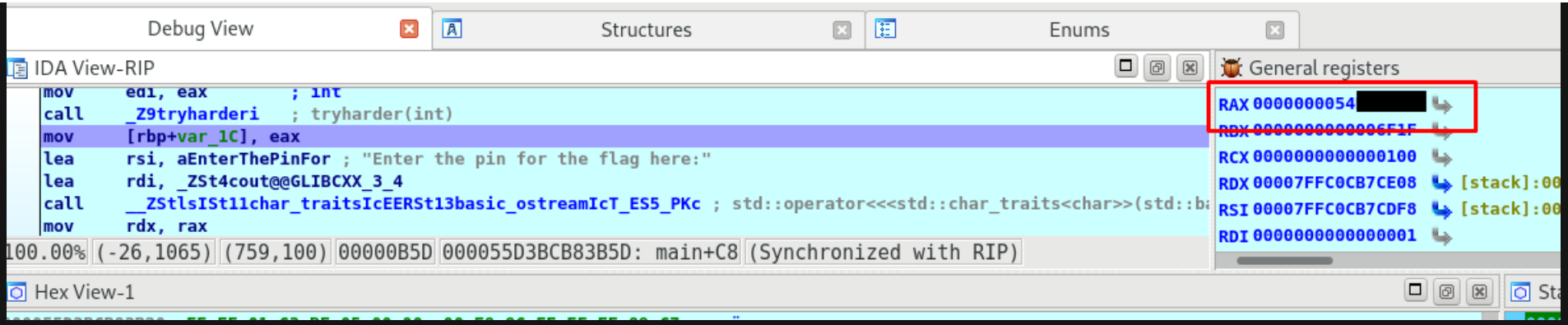
```
Enter the pin for the flag here:
1234
```



Like I expected, the eax register holds the dummy input. For your information, the hex of the decimal number, 1234 is 0x4D2. Our goal right here is to find the value that saved on the rbp+var_1C stack



By looking at the instruction on the further up, we knew that the mov instruction contain the answer we need.



That's it, convert the hex on register eax into decimal number. After that, input the decimal pin into the executable and you should get the answer.

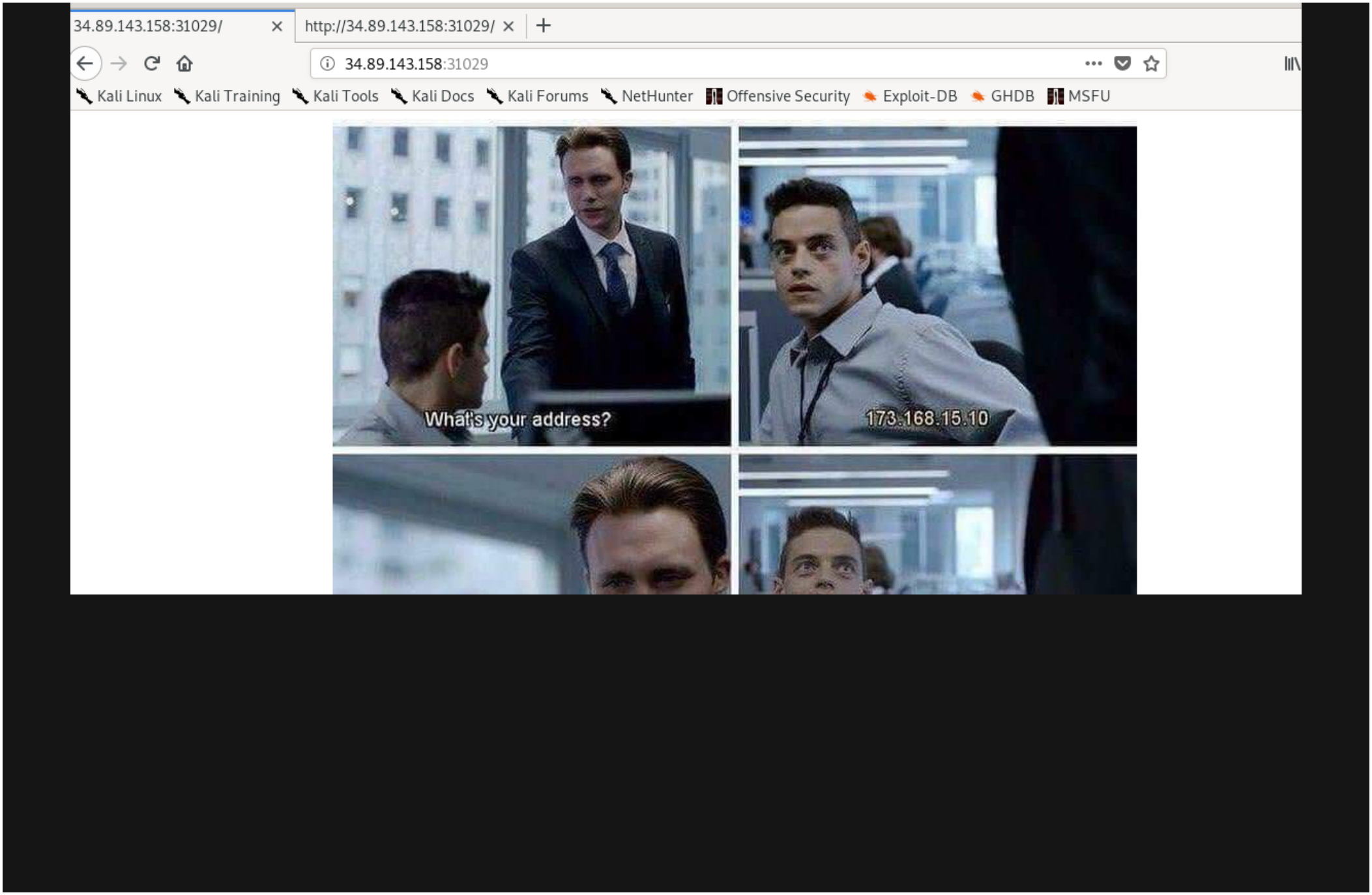
```
root@kali:~/Desktop/cyberedu/entry# ./math.out
Enter the pin for the flag here:
14
ECSC{sha256(<your number>)}
```

Remember to encode the number into sha256 before submitting the flag.

4) [D-CTF 2019] address (10 points)

Link: https://cyberedu.ro/app/challenges/55df47c0-7f21-11ea-b35d-457ba9a78ba1

This is a web-based CTF challenge. Let's take a look on the page and the source code.



Hint on the bottom of the source code, **admin.php**.

Two meme materials on the same site, you got me there. By the way, it seems that only the local able to bypass this page. Guess what, we can spoof our way in using X-forward-for header. There are two ways to solve the task

A) Curl command

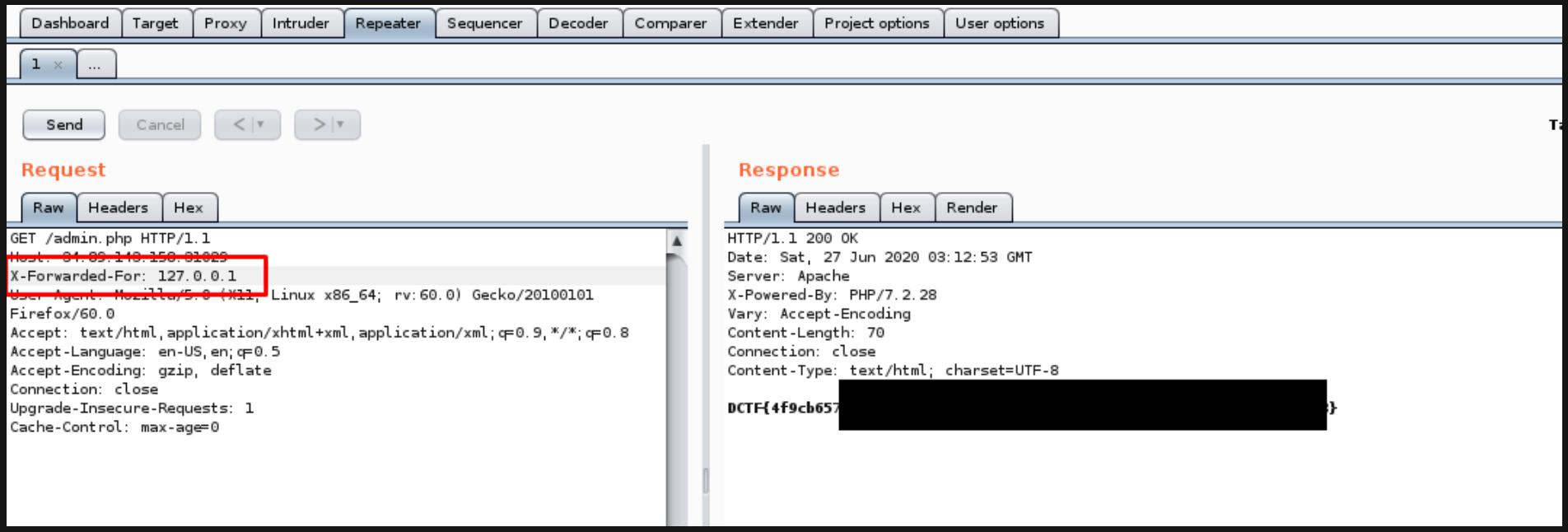
Simply input the following command and you should get the flag. Please change the assigned IP and port.

```
curl -XGET http://<IP:port>/admin.php -H 'X-Forwarded-For: 127.0.0.1'
```

```
root@kali:~/Desktop/cyberedu/entry# curl -XGET http://34.89.143.158:31029/admin.php -H 'X-Forwarded-For: 127.0.0.1'
DCTF{4f9cb657d0c[redacted]}root@kali:~/Desktop/cyberedu/entry#
```

B) Burp suite

You can use repeater mode in burp suite by adding an extra request header (X-Forwarded-For: 127.0.0.1)



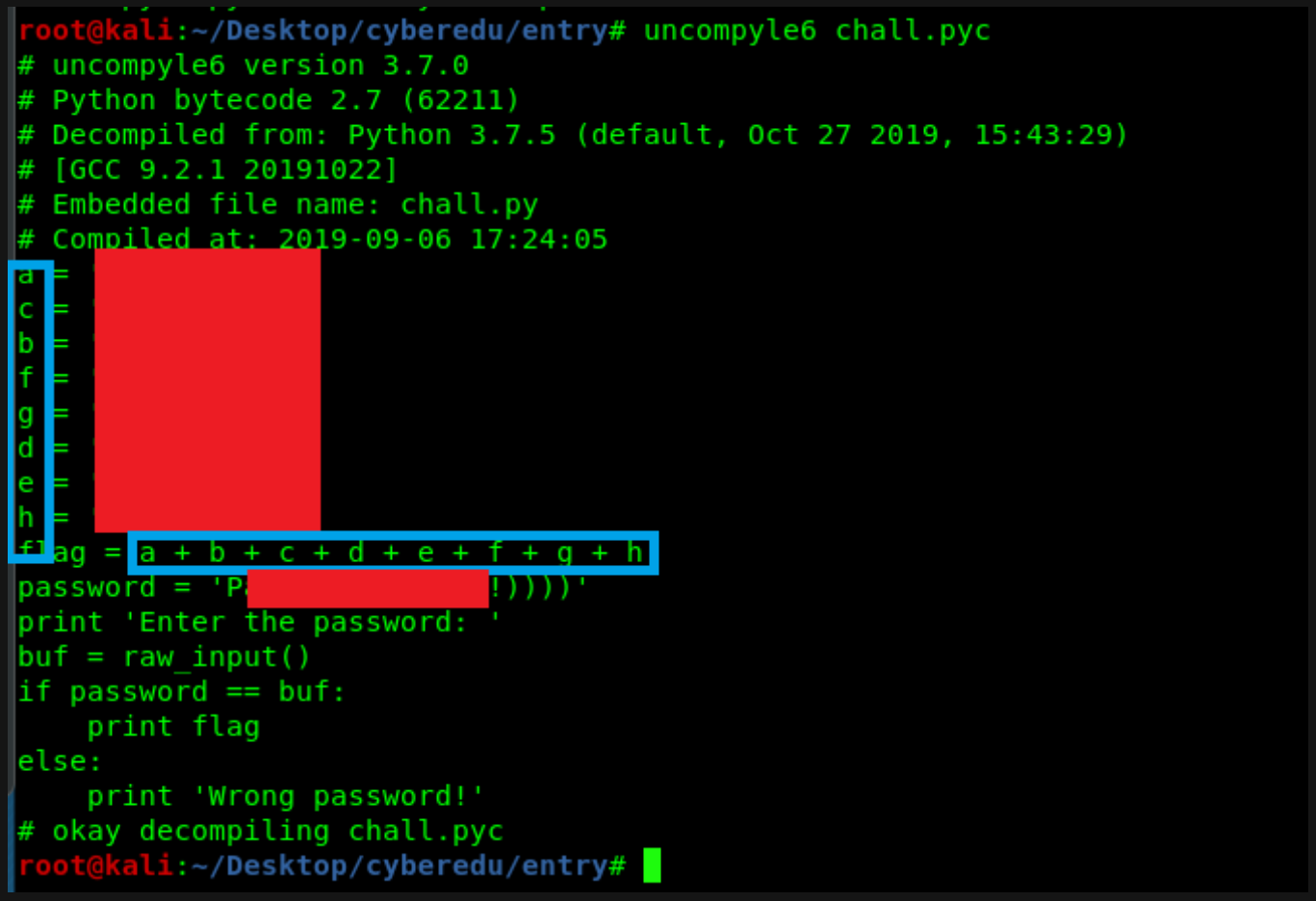
5) [D-CTF 2019] password (10 points)

Link: https://cyberedu.ro/app/challenges/55c17930-7f21-11ea-a774-e3c685b9cb45

First of all, de-compile the executable python file (.pyc) into a normal python file (.py) using the uncomplye6

```
uncompyle6 chall.pyc
```

Read the python file.



You can directly piece up the flag on the screen but the position of the flag is disoriented. The best way to capture the flag is by running the executable with the password.

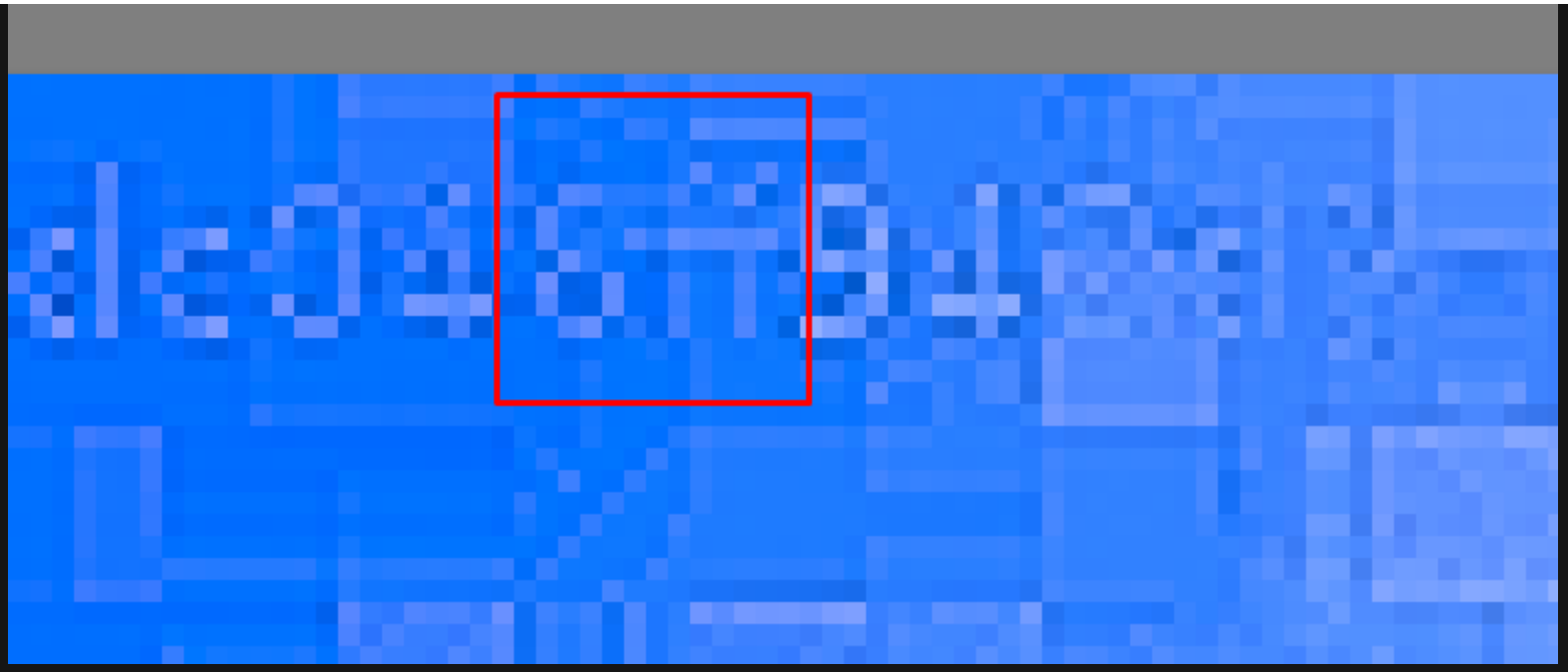
```
root@kali:~/Desktop/cyberedu/entry# ./chall.pyc
Enter the password:
P[redacted])))
DCTF{09fa7ab70e9aa4[redacted]}
```

6) [D-CTF 2019] mountain (10 points)

Link: https://cyberedu.ro/app/challenges/55c03860-7f21-11ea-b4d3-2925e2b578ee

The task can be solved by using stegoveritas or photo editor software such as Adobe Lightroom. The flag is located at the top left of the picture.

However, at the end of the flag, there are 3 letters hardly to be seen by the naked eye. After using my photo editing skill, the 3 letters are ‘6ff’

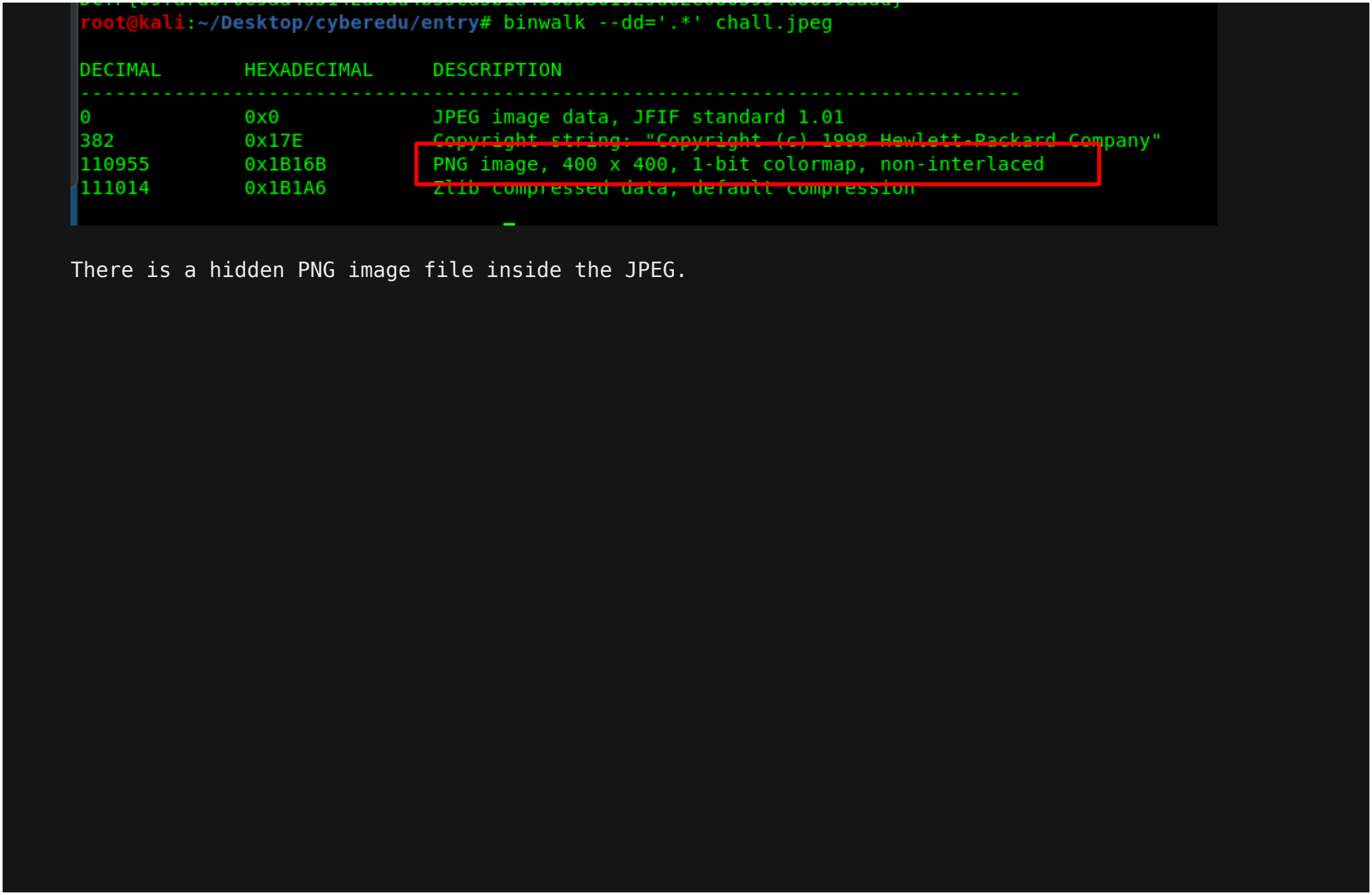


7) [D-CTF 2019] inception (10 points)

Link: https://cyberedu.ro/app/challenges/55bee840-7f21-11ea-9848-99f815545ba1

This is another Stego challenge that can be solved by using binwalk.

```
binwalk --dd='.*' chall.jpeg
```



There is a hidden PNG image file inside the JPEG.

Decode the QR using online tool.

8) [D-CTF 2019] cross-or-zero (10 points)

Link: https://cyberedu.ro/app/challenges/55bdb360-7f21-11ea-af3b-91f50ec4f0b1

Don’t let the downloaded script scare you off. What we need inside the script is the base64 encoded text and the rough idea of the script, that’s all. The entire idea of the script is

```
Encoded text = base64.encode(flag ^ key)
```

Simple huh. Since we have the encoded text, the next thing we need to do is finding the key. Given the first four characters of the flag is **‘DCTF’ or 0x44 0x43 0x54 0x46** in hex. On the other hand, the first four-byte of the decoded base64 text is **0x74 0x73 0x64 0x76**. And now, we can retrieve the key, given that

```
key = base64.decode(Encoded text) ^ flag
```

```
Decoded text:     0x74     0x73     0x64     0x76
Flag:             0x44     0x43     0x54     0x46
------------------------XOR--------------------------
Key:              0x30     0x30     0x30     0x30
```

The key is 2-byte repetitive. We can know draft a python script to retrieve the flag.

```python
import base64

#Encode text and key
enc64 = "dHNkdktTAVUHAABUA1VWVgIHBAlSBAFTBAMFUwECAgcAAAFWAFUFCFMACFFUAwQAVgBSBwQJBVZTAFYGCQYHVQAE
key = 0x30

flag = ''
#decode the base64
dec64 = base64.b64decode(enc64).hex()
print("Decoded text in hex: " + dec64  + "\n")

# XOR the decoded text with the key
for i in range(0, len(dec64), 2):
    x = int(dec64[i:i+2],16)
    flag = flag + chr(x ^ key)

print("Flag: " + flag)
```

```
root@kali:~/Desktop/cyberedu/entry# python3 solution1.py
Decoded text in hex: 747364764b530155070000540355565602070409520401530403055301020207000001560055050853000855
6075500010752094d

Flag: DCTF{c1e700d[redacted]}
```

9) [D-CTF 2019] corrupt-file (10 points)

Link: https://cyberedu.ro/app/challenges/55bc94c0-7f21-11ea-9daa-a3bc85c91e3d/

Download and extract the .docx file. For your information, this is not a .docx file. By using 'file' command, it was actually a .xz file.

```
root@kali:~/Desktop/cyberedu/entry# file flag.docx
flag.docx: XZ compressed data
```

Rename the file into .xz and decompress it.

```
mv flag.docx flag.xz
unxz flag.xz
```

```
root@kali:~/Desktop/cyberedu/entry# mv flag.docx flag.xz
root@kali:~/Desktop/cyberedu/entry# unxz flag.xz
root@kali:~/Desktop/cyberedu/entry# cat flag
flag.txt000644 001750 001750 00000000106 13534421220 013311 0ustar00lucianlucian000000 000000 DCTF{[redacted]0c7c231181970e2b6fde7c60d4
[redacted]17b}root@kali:~/Desktop/cyberedu/entry#
```

Conclusion

That's all for the CyberEDU entry level write-up. Until next time ;)

tags: *backdoor - ctf*

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Vortex

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