2018巅峰极客writeup（Misc）

原创

Mistsatan 于 2018-07-30 10:00:56 发布 1749 收藏

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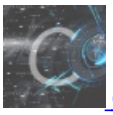


原文地址：https://mistsatan.github.io/articles/2018-Peakgeek-Writeup-Misc.html

作为一个渣渣，带着去看各路神仙打架的想法报名了这次的“巅峰极客”CTF比赛，7.21第一场线上赛果然从头水到尾。。。
为了方便之后巩固，把近几天学习大佬们的writeup过程中总结整理的内容记录下来，第一次写成博客。

> 我只是个搬运工，以下是众大佬们的writeup：
>
> - 白帽100
> - 双螺旋
> - 无糖
> - 还有一个
> - 最后一个

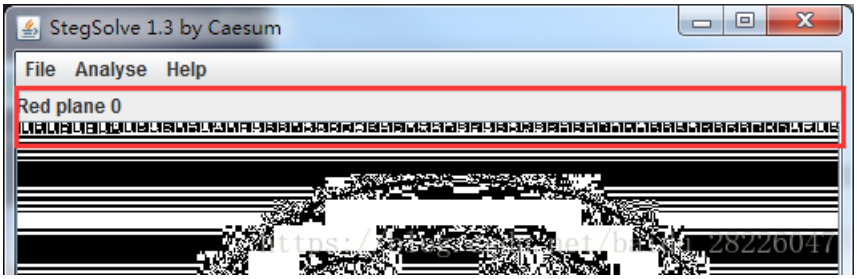
Misc

1.warmup - 100pt

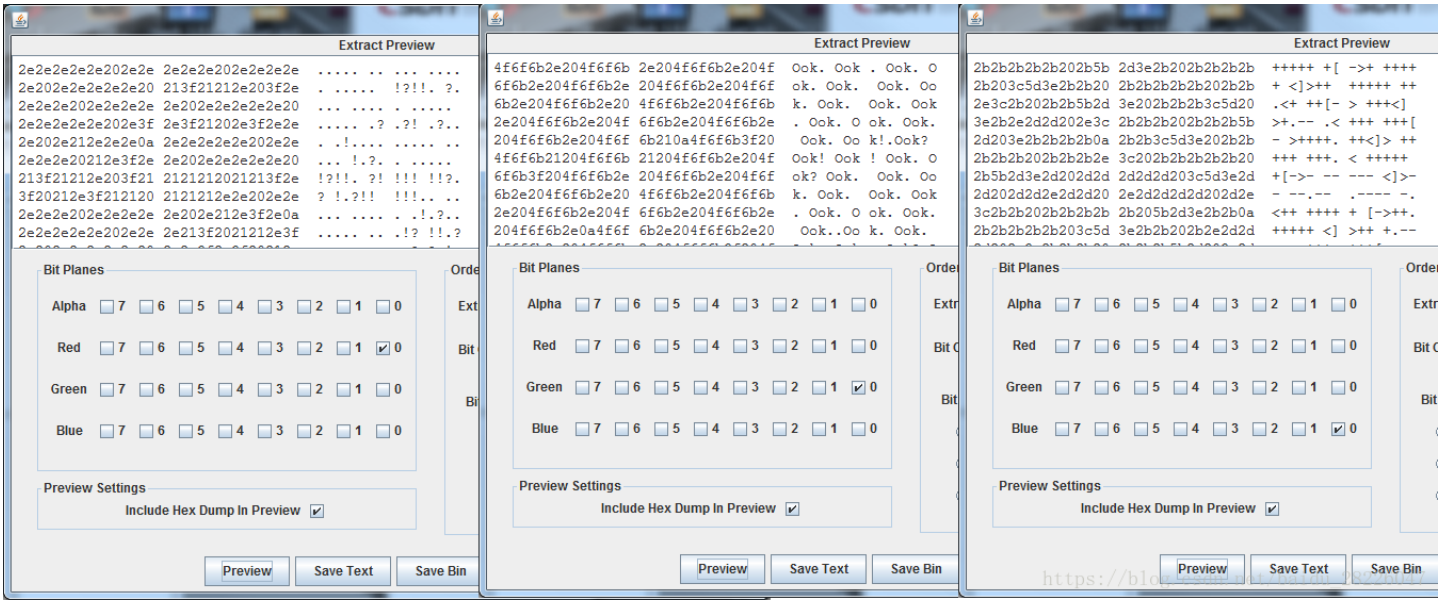
首先拿到一张图片warmup.bmp，用Stegsolve打开：

```
java -jar Stegsolve.jar
```

经大佬们发现，RGB三个通道的LSB都是明显有数据在的（我眼瞎，当时翻来覆去好几遍真没看出来）：



分别查看各个通道的LSB，发现了存放的数据是用Ook!和brainfuck加密的：



分别将三块数据保存出来，用这个网站在线解密，得到以下三部分内容，拼起来就是flag：

- flag{db640436-
- 7839-4050-8339
- -75a972fc553c

flag{db640436-7839-4050-8339-75a972fc553c}

2.loli - 150pt

拿到一张图片1.png，看起来像二维码，用工具扫描，得到一个提示255：

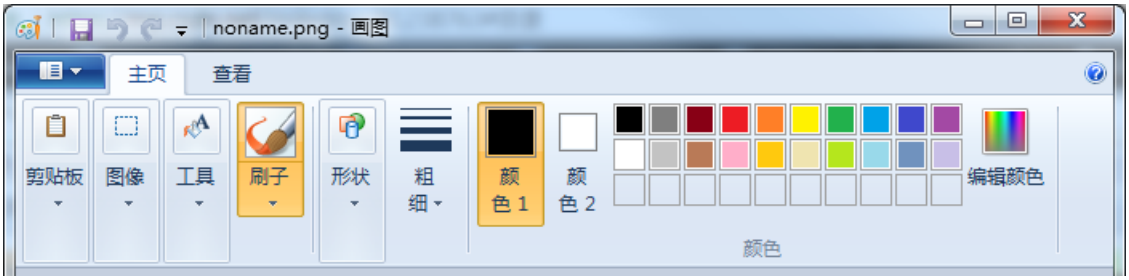
根据另一个提示0xFF，将1.png放到WinHex中，0xFF异或整个文件，在得到的文件末尾看到字符串“black and white”：

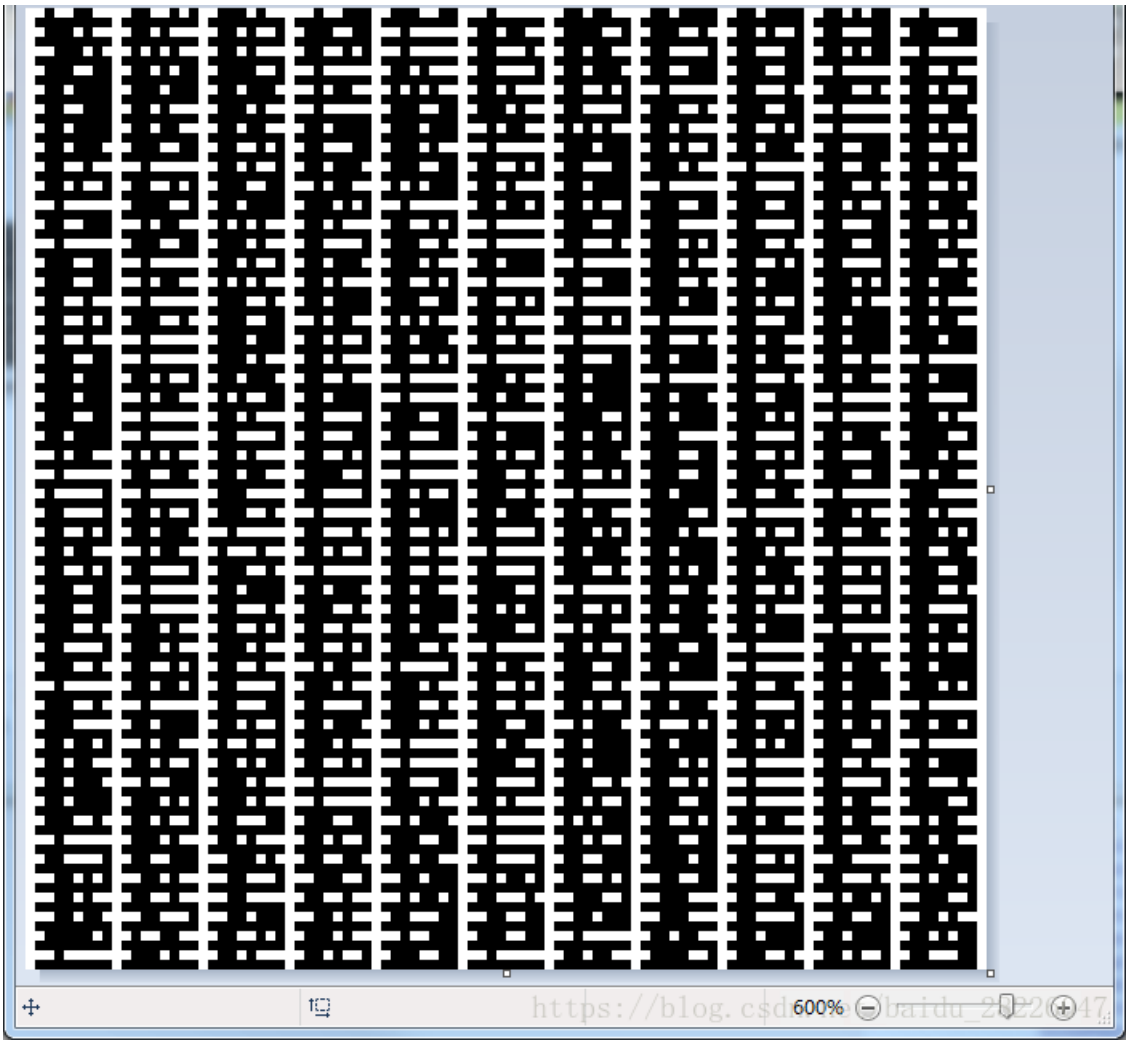
Offset	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0034F850	7F	BB	33	58	FE	33	44	33	90	2F	63	18	E1	30	77	A3	»3Xþ3D3 /c á0w£
0034F860	05	25	FA	88	B8	40	AF	72	18	7D	0A	1A	46	79	F3	87	%ú^¸@¯r } Fyó‡
0034F870	C8	1B	D6	F2	8B	4B	74	41	37	B0	3B	56	B3	F1	B9	48	È Öò‹KtA7°;V³ñ¹H
0034F880	7C	16	02	94	BE	D2	66	1A	D0	A1	A2	51	C6	F2	C9	9B	| ”¾Òf Ð¡¢QÆòÉ›
0034F890	3F	C4	2B	6B	A4	0C	8C	22	E1	9D	2F	2B	A2	54	F5	E5	?Ä+k¤ Œ"á /+¢Tõå
0034F8A0	F2	4B	DF	56	65	09	F2	3A	D6	A3	59	57	20	7C	37	04	òKßVe ò:Ö£YW |7
0034F8B0	1B	98	20	E2	B9	6E	01	57	B1	4F	F6	49	AD	E8	E5	3C	˜ â¹n W±OöI-èå<
0034F8C0	1F	34	A8	E6	43	07	A8	C7	CE	29	56	66	0F	34	B2	66	4¨æC ¨ÇÎ)Vf 4²f
0034F8D0	D1	AE	86	EF	86	30	AA	72	FB	A9	B7	BF	5A	31	24	D2	Ñ®†ï†0ªrû©·¿Z1$Ò
0034F8E0	E6	93	37	7F	E8	2F	8E	EE	3F	EE	42	D3	6D	37	00	00	æ“7 è/Ži?îBÓm7
0034F8F0	00	00	49	45	4E	44	AE	42	60	82	00	00	00	00	00	00	IEND®B`,
0034F900	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
0034F910	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
0034F920	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
0034F930	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
0034F940	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
0034F950	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
0034F960	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
0034F970	00	00	00	00	62	6C	61	63	6B	20	61	6E	64	20	77	68	black and wh
0034F980	69	74	65														ite

用binwalk查看得到的文件，发现其中包含了一个图片：

```
DECIMAL       HEXADECIMAL     DESCRIPTION
--------------------------------------------------------------------------------
3470094       0x34F30E        PNG image, 100 x 100, 8-bit/color RGB, non-interlaced
3470135       0x34F337        Zlib compressed data, default compression
```

根据隐藏图片的偏移，用WinHex将图片提取出来，能够看到，图片中，按照行来看，以8个像素点（黑/白）为一组，每一组之间用白点来分隔，根据前面“black and white”提示，不难联想到应该是二进制流转换成字符：





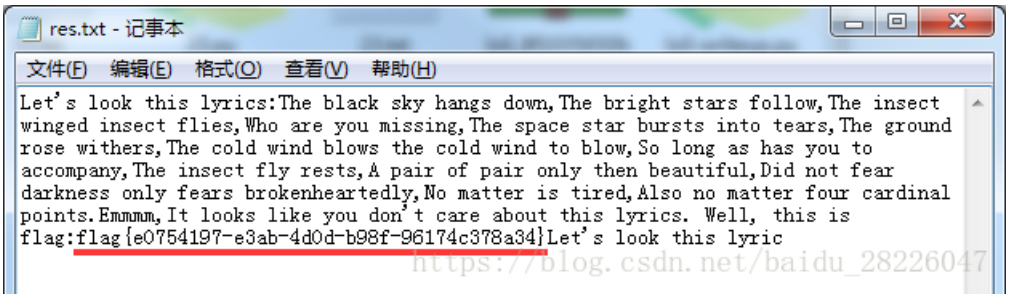
参考各大佬的writeup，写出脚本如下：

```python
from PIL import Image

def getBinaryToChar():
    count = 0
    ans = ""
    binStr = ""
    # 转换成灰度图像（黑点0，白点255）
    img = Image.open('./noname.png').convert('L')
    # 遍历像素点（按行读）
    width, height = img.size
    for h in range(height - 1): # 是否-1均可，最后一行是11个0111111111
        for w in range(width - 1):  # 需要-1，最后一列全是0
            pixel = img.getpixel((w, h))
            if pixel == 0:
                color = 1   # 黑点置1
            else:
                color = 0   # 白点置0
            # 9个点一组，构成0xxxxxxxx
            count += 1
            ans += str(color)
            if count == 9:
                if ans != "011111111":
                    binStr += chr(int(ans,2))
                count = 0
                ans = ""
    return binStr

if __name__ == '__main__':
    strr = getBinaryToChar()
    print strr
    with open('res.txt', 'wb') as f:
        f.write(strr)
```

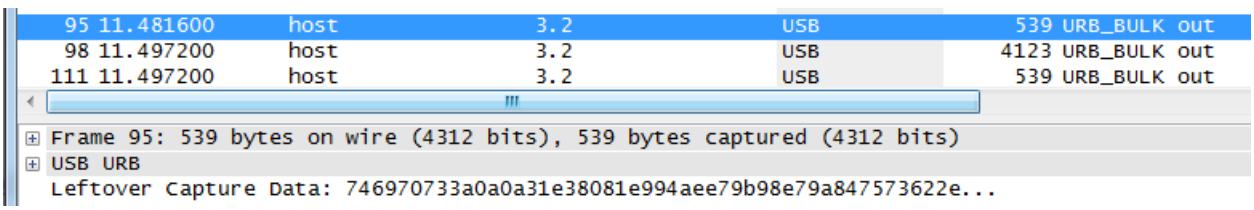
打开得到的res.txt，看到flag：



flag{e0754197-e3ab-4d0d-b98f-96174c378a34}

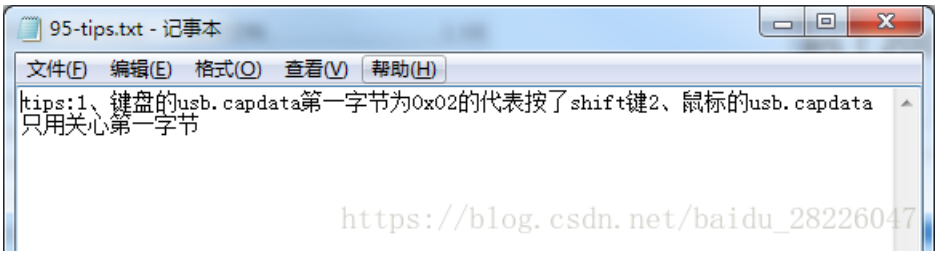
3.flows - 200pt

拿到一个pcap包，用wireshark打开，发现是USB协议。
按照协议排序，一个个点击查看包内容，发现有个包（95）里面疑似有tips：



```
0000   1b 00 10 8b bc 06 80 fa   ff ff 00 00 00 00 09 00   ........ ........
0010   00 02 00 03 00 02 03 00   02 00 00 74 69 70 73 3a   ........ ...tips:
0020   0a 0a 31 e3 80 81 e9 94   ae e7 9b 98 e7 9a 84 75   ..1..... .......u
0030   73 62 2e 63 61 70 64 61   74 61 e7 ac ac e4 b8 80   sb.capda ta......
0040   e5 ad 97 e8 8a 82 e4 b8   ba 30 78 30 32 e7 9a 84   ........ .0x02...
0050   e4 bb a3 e8 a1 a8 e6 8c   89 e4 ba 86 73 68 69 66   ........ ....shif
0060   74 e9 94 ae 0a 32 e3 80   81 e9 bc a0 e6 a0 87 e7   t....2.. ........
0070   9a 84 75 73 62 2e 63 61   70 64 61 74 61 e5 8f aa   ..usb.ca pdata...
0080   e7 94 a8 e5 85 b3 e5 bf   83 e7 ac ac e4 b8 80 e5   ........ ........
0090   ad 97 e8 8a 82 00 00 00   00 00 00 00 00 00 00 00   ........ ........
```


将数据另存到txt中，打开可以看到两个提示：



继续查看包，发现两个长度比较大的包很可疑（55和74）：

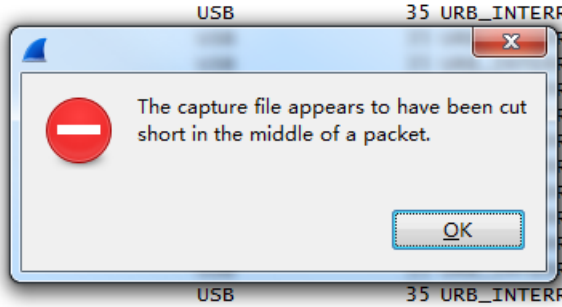
No.	Time	Source	Destination	Protocol	Length	Info
55	11.294400	host	3.2	USB	11803	URB_BULK out
74	11.466000	host	3.2	USB	10267	URB_BULK out
89	11.481600	host	3.2	USB	8219	URB_BULK out
68	11.466000	host	3.2	USB	8219	URB_BULK out
49	11.278800	host	3.2	USB	8219	URB_BULK out
98	11.497200	host	3.2	USB	4123	URB_BULK out

分别将数据另存出来，用010打开，看到这两个文件头都是D4C3B2A1，就是pcap文件：

```
          0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F   0123456789ABCDEF
0000h:  D4 C3 B2 A1 02 00 04 00 00 00 00 00 00 00 00 00   ÔÃ²¡............
0010h:  FF FF 00 00 F9 00 00 00 9D 3F 4F 5B A8 04 03 00   ÿÿ..ù....?O[¨...
0020h:  25 00 00 00 25 00 00 00 1B 00 10 10 DA 05 80 FA   %...%.......Ú.€ú
0030h:  FF FF 00 00 00 00 09 00 01 01 00 01 00 81 01 0A   ÿÿ..............
```


修改后缀为.pcap，用wireshark打开，有效数据存放在leftover capture data这里：

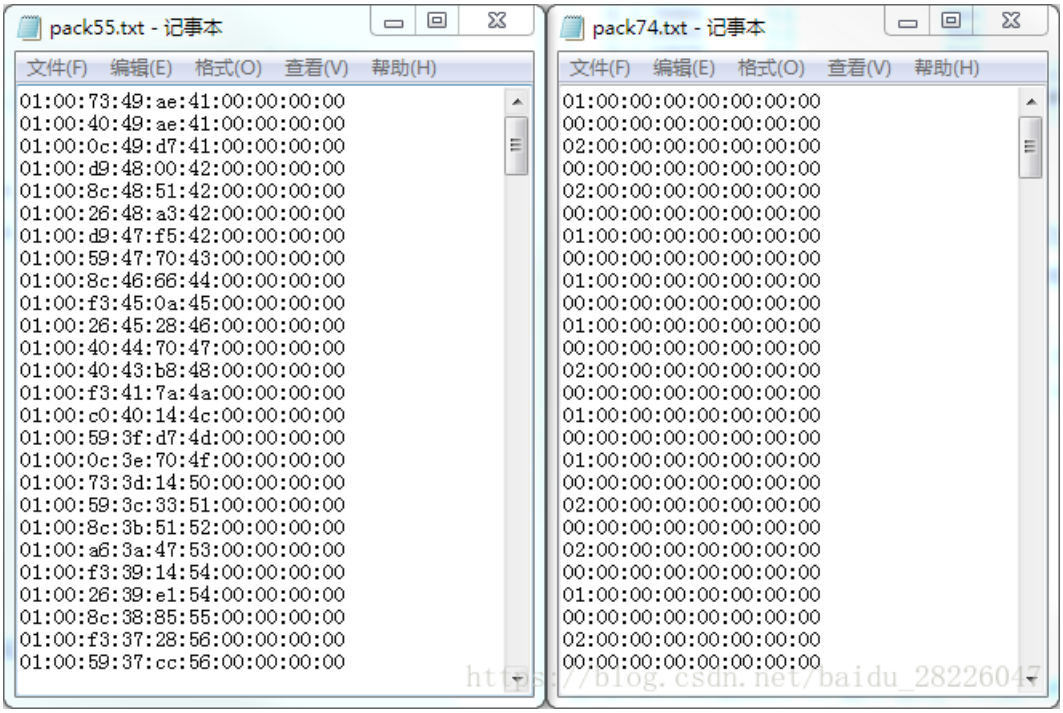
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	3.1	host	USB	35	URB_INTERRUPT in
2	0.093600	3.1	host	USB	35	URB_INTERRUPT in
3	0.483600	3.1	host	USB	35	URB_INTERRUPT in
4	0.592800	3.1	host	USB	35	URB_INTERRUPT in
5	0.702000	3.1	host	USB	35	URB_INTERRUPT in
6	0.826800	3.1	host	USB	35	URB_INTERRUPT in
7	1.092000	3.1	host	USB	35	URB_INTERRUPT in
8	1.185600	3.1	host	USB	35	URB_INTERRUPT in
9	1.606800	3.1	host	USB	35	URB_INTERRUPT in
10	1.700400	3.1	host	USB	35	URB_INTERRUPT in
11	1.840800	3.1	host	USB	35	URB_INTERRUPT in
12	1.965600	3.1	host	USB	35	URB_INTERRUPT in
13	2.277600	3.1	host	USB	35	URB_INTERRUPT in
14	2.402400	3.1	host	USB	35	URB_INTERRUPT in
15	2.605200	3.1	host	USB	35	URB_INTERRUPT in
16	2.714400	3.1	host	USB	35	URB_INTERRUPT in
17	3.182400	3.1	host	USB	35	URB_INTERRUPT in
18	3.276000	3.1	host	USB	35	URB_INTERRUPT in
19	3.588000	3.1	host	USB	35	URB_INTERRUPT in
20	3.681600	3.1	host	USB	35	URB_INTERRUPT in
21	3.790800	3.1	host	USB	35	URB_INTERRUPT in
22	3.900000	3.1	host	USB	35	URB_INTERRUPT in
23	4.118400	3.1	host	USB	35	URB_INTERRUPT in




```
⊞ Frame 1: 35 bytes on wire (280 bits), 35 bytes captured (280 bits)
⊞ USB URB
  Leftover Capture Data: 0100000000000000
```

用wireshark自带的tshark把leftover capture data的内容提取出来：
【tshark命令行详细参见这里】

```
tshark -r pack55.pcap -T fields -e usb.capdata > pack55.txt
tshark -r pack74.pcap -T fields -e usb.capdata > pack74.txt
```



接下来就需要从txt文件中过滤出键盘击键和鼠标相关的流量：
【这里主要参考这位大佬的博客以及这个博客】

- 键盘数据包的数据长度为8个字节。每次key stroke都会产生一个keyboard event usb packet（所以第一个tips所说第一个字节为02表示按下了Left Shift键）

> **Byte1**
> |–bit0: Left Control是否按下，按下为1
> |–bit1: Left Shift 是否按下，按下为1
> |–bit2: Left Alt 是否按下，按下为1
> |–bit3: Left GUI 是否按下，按下为1
> |–bit4: Right Control是否按下，按下为1
> |–bit5: Right Shift 是否按下，按下为1
> |–bit6: Right Alt 是否按下，按下为1
> |–bit7: Right GUI 是否按下，按下为1
> **Byte2** 暂不清楚，有的地方说是保留位
> **Byte3-Byte8** 这六个为普通按键，击键信息集中在第3个字节

- 鼠标数据包的数据长度为4个字节。鼠标移动时表现为连续性，与键盘击键的离散性不一样，不过实际上鼠标动作所产生的数据包也是离散的

> **Byte1** 代表按键，当取0x00时，代表没有按键、为0x01时，代表按左键，为0x02时，代表当前按键为右键
> **Byte2** 可以看成是一个signed byte类型，其最高位为符号位，当这个值为正时，代表鼠标水平右移多少像素，为负时，代表水平左移多少像素
> **Byte3** 与第二字节类似，代表垂直上下移动的偏移

第一个包pack55.txt为键盘数据包，需要按照对应关系将键盘按键输出出来，根据第一个tips，注意第一个字节为02表示按了shift键，在大佬的脚本基础上稍作修改，脚本如下：

```
mappings = { 0x04:"a", 0x05:"b", 0x06:"c", 0x07:"d", 0x08:"e",
             0x09:"f", 0x0A:"g", 0x0B:"h", 0x0C:"i", 0x0D:"j",
             0x0E:"k", 0x0F:"l", 0x10:"m", 0x11:"n", 0x12:"o",
             0x13:"p", 0x14:"q", 0x15:"r", 0x16:"s", 0x17:"t",
             0x18:"u", 0x19:"v", 0x1A:"w", 0x1B:"x", 0x1C:"y",
             0x1D:"z", 0x1E:"1", 0x1F:"2", 0x20:"3", 0x21:"4",
             0x22:"5", 0x23:"6", 0x24:"7", 0x25:"8", 0x26:"9",
             0x27:"0", 0x28:"\n",0x29:"[ESC]", 0x2A:"\b", 0X2B:"\t",
             0x2C:" ", 0x2D:"-", 0x2E:"=", 0x2F:"[", 0x30:"]",
             0x31:"\\",0x32:"`", 0x33:";", 0x34:"'", 0x36:",",
             0x37:".", 0x38:"/" }

mappings_shift = { 0x04:"A", 0x05:"B", 0x06:"C", 0x07:"D", 0x08:"E",
                   0x09:"F", 0x0A:"G", 0x0B:"H", 0x0C:"I", 0x0D:"J",
                   0x0E:"K", 0x0F:"L", 0x10:"M", 0x11:"N", 0x12:"O",
                   0x13:"P", 0x14:"Q", 0x15:"R", 0x16:"S", 0x17:"T",
                   0x18:"U", 0x19:"V", 0x1A:"W", 0x1B:"X", 0x1C:"Y",
                   0x1D:"Z", 0x1E:"!", 0x1F:"@", 0x20:"#", 0x21:"$",
                   0x22:"%", 0x23:"^", 0x24:"&", 0x25:"*", 0x26:"(",
                   0x27:")", 0x28:"\r",0x29:"[ESC]", 0x2A:"\b", 0X2B:"\t",
                   0x2C:" ", 0x2D:"_", 0x2E:"+", 0x2F:"{", 0x30:"}",
                   0x31:"|", 0x32:"~", 0x33:":", 0x34:"\"",0x36:"<",
                   0x37:">", 0x38:"?" }

def keyboard_extract():
    output = ""
    keys = open('pack55.txt')
    for line in keys:
        if len(line)!= 24:
            continue
        list = line.split(":")
        if list[2]=='00':
            continue
        num = int(list[2],16)
        if num in mappings:
            if list[0] == '02':
                output += mappings_shift[num]
            elif list[0] == '00':
                output += mappings[num]
        else:
            output += '[unknown]'
    keys.close()
    print output

if __name__ == '__main__':
    keyboard_extract()
```

第二个包pack74.txt为鼠标数据包，按照第二个tips，只关注第一个字节，猜测01表示0，02表示1，将其提取出来，脚本如下：

```python
import re

def bin2str(bin):
    str = ''
    mo = len(bin)%8
    if (mo):
        bin= '0'*(8-mo) + bin
    chars = re.findall(r'.{8}',bin)
    for char in chars:
        str += chr(int(char, 2))
    return str

def mouse_extract():
    binstr = ""
    keys = open('pack74.txt')
    for line in keys:
        list = line.split(":")
        if list[0]=='00':
            continue
        elif list[0] == '01':
            binstr += "0"
        elif list[0]=='02':
            binstr += "1"
    str = bin2str(binstr)
    keys.close()
    print str

if __name__ == '__main__':
    mouse_extract()
```

分别运行以上两个脚本，得到两个字符串，拼起来就是flag了：

- flag{u5b_key
- bo4rd_m0use}

flag{u5b_keybo4rd_m0use}
