Computer Security

05r. Assignment 4 discussion

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Assignment 4 hints

Level 0 Goal:

- Overflow the buffer to change the return address on the stack
- When the function *getbuf* returns, make it go to *smoke*

First, we need to find the address of the *smoke* function

- Two ways to do this:

1. Use the *nm* (display name list) command to dump the symbol table

```
$ nm bufbomb | grep smoke
```

1. Use gdb and print the value of *smoke*

```
$ gdb bufbomb
(gdb) print smoke
```

Assignment 4 hints: level 0

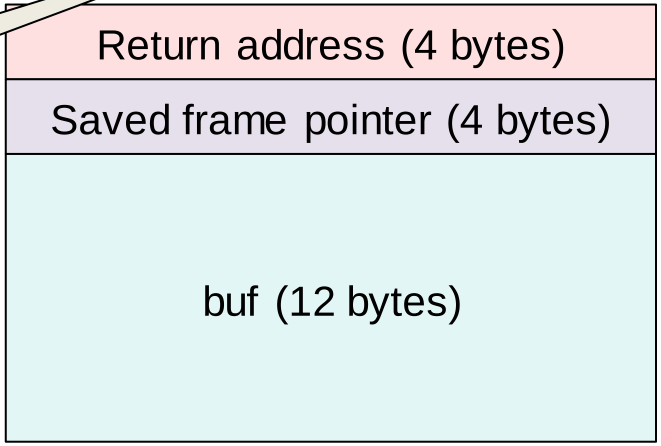
Now create the exploit string:

- Fill the 12 bytes of the buffer
- Fill 4 more bytes to overwrite the saved %ebp register (frame pointer)
- Write the return address to overwrite the saved return address
- Create a file (e.g., exploit-0.txt) with contents:

```
00 11 22 33 44 55 66 77 88 99 aa bb 1a 1b 1c 1d RR RR RR RR
```

This could be anything – just fill the buffer – but let's pick something we can easily recognize in gdb

RR RR RR RR is the return address



Run it

```
$ cat exploit-0.txt | ./sendstring > exploit-0
$ bufbomb < exploit-0
```

Intel uses little endian encodings

The address `0x12345678`

Will be written to the buffer as

```
  0x78  0x56  0x34  0x12
```

Make sure it’s in the right order in your buffer.

What if it doesn’t work?

You’ll have to debug

```
$ gdb bufbomb
```

– start the debugger

```
(gdb) break getbuf
```

– set a breakpoint at getbuf

```
(gdb) run –t your_net_id < exploit-0
```

– run the program to the breakpoint

```
Breakpoint 1, 0x08048aa8 in getbuf ()
```

What if it doesn’t work?

```
(gdb) disas          - disassemble the current function
   0x08048aa2 <+0>:  push   %ebp
   0x08048aa3 <+1>:  mov    %esp,%ebp
   0x08048aa5 <+3>:  sub    $0x10,%esp
=> 0x08048aa8 <+6>:  lea    -0xc(%ebp),%eax
   0x08048aab <+9>:  mov    %eax,(%esp)
   0x08048aae <+12>: call    0x8048bf1 <Gets>
   0x08048ab3 <+17>: mov     $0x1,%eax
   0x08048ab8 <+22>: leave
   0x08048ab9 <+23>: ret
End of assembler dump.
(gdb) break *0x08048ab3     – set a break after call Gets
(gdb) c              – run to the next breakpoint
(gdb) x/20b $sp      – print 20 bytes at the stack pointer
   (buf starts after the first four bytes)
```

See if the data in the buffer is what you expected

Levels 1 hint

- You will need to give *fizz* a parameter
- This means that you will need to add extra data after the address of *fizz* to modify what’s on the stack when *getbuf* returns
- But think carefully about what the stack should look like

Level 2 hint

- You will need to write code to set `global_int` to cookie
- You can easily find the value of `global_int` via gdb
- But you also need to find the start of the buffer (buf)
- You can find this by looking at the stack pointer in *getbuf* and figure out where *getbuf* allocates `buf` (look at the disassembly
  … or set a breakpoint in *Gets* and look around there

Level 2 hint

- To set the buffer, you'll need to write a few lines of assembly code
- If you don't know it, you can figure it out
  - Write a small C function that simply sets a global into to the value
  - Compile it with `cc –S t.c`
  - That creates an assembler file `t.s`
  - Look through it. You'll see the instruction that sets a value. You'll also see how you can push something on the stack and how you can return
- The exploit code will go at the start of your buffer
  - So the return address that you overwrite will have to be an address to the start of the buffer

The end