Intro to Pwn

Stack smashing 101

how2pwn

1. Find vuln(s)
2. Exploit the vuln(s)

race condition

1. Find the vuln

it's probably here

`type confusion`

buffer overflo

uninitialized variable□Þ¾ï

integer overflo
w

race condition

format string injectio%n

double free

use after free

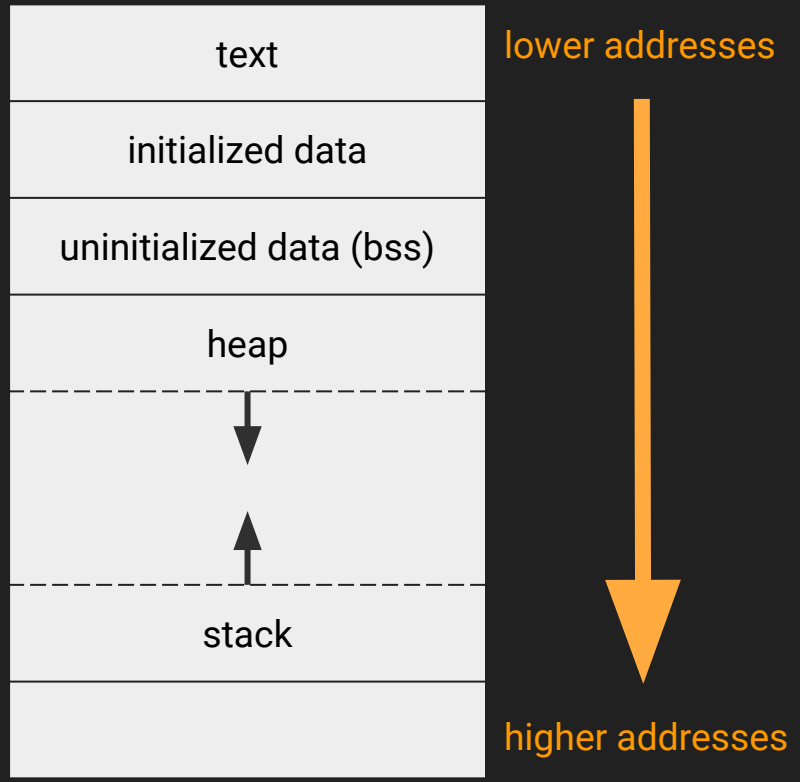
side channel

bof.c

```c
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;
}
```

Memory layout

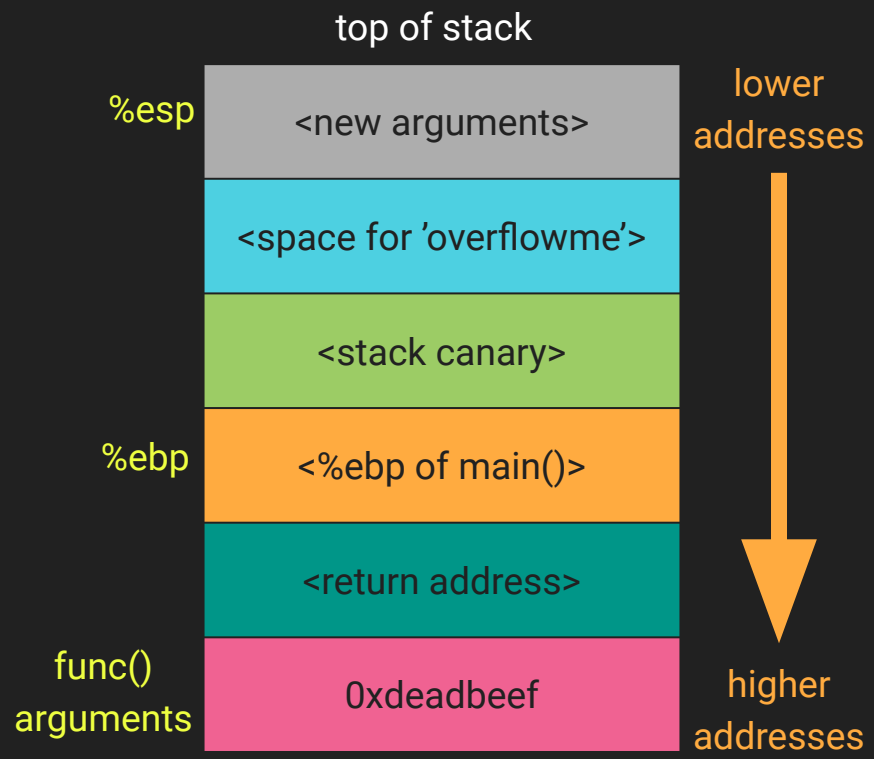
- Text region
  - Executable code
  - Other read-only data
- Data region
  - Static and global variables
- Heap
  - Dynamically allocated memory (`malloc`)
  - Grows toward higher addresses
- Stack
  - Function parameters, return addresses, and local variables
  - Grows toward lower addresses



Stack layout in func()

```
overflowme :
AAAAAAAAAAAAAAAAAAAAAAAAAAAAB
```

```
ac d3 ff ff 00 00 00 00 c2 00 00 00 e6 1e ea f7
ff ff ff ff ce d3 ff ff f8 8b e1 f7 41 41 41 41
41 41 41 41 41 41 41 41 41 41 41 41 41 41 41 41
41 41 41 41 41 41 41 41 41 41 42 00 00 3a 05 24
b0 56 55 56 30 55 55 56 f8 d3 ff ff 9f 56 55 56
ef be ad de 00 d0 ff f7 b9 56 55 56 00 50 fb f7
b0 56 55 56 00 00 00 00 00 00 00 00 63 5a e2 f7
```



Tools

- gdb (https://www.gnu.org/software/gdb/)
  - Debugger that lets you set breakpoints, inspect process memory, and more
  - Not very user friendly
- pwndbg (https://github.com/pwndbg/pwndbg)
  - gdb plugin that makes it more hacker friendly and less sucky
- pwntools (https://github.com/Gallopsled/pwntools)
  - Python library that makes writing and testing exploits much easier
- Binary Ninja (https://binary.ninja)
  - Scriptable GUI disassembler that's way cheaper than IDA Pro
  - Free demo

2. Exploit the vuln

http://sigpwny.com/challenges#bof

`ssh bof@104.248.115.191` (password is “`guest`”)

Useful gdb/pwndbg commands:

- `r` (run the program)
  - `r <<< $(python -c "print '\x41'*31")` (pass 31 A’s to standard input of the program)
- `b func` (set a breakpoint on `func`)
- `stack 32` (dereferences the top 32 words on the stack, pwndbg only)
- `n` (run the next line of code)
- `db $sp 128` (dump 128 bytes starting at the address in %esp)