UCSDCSE
Computer Science and Engineering

CSE 127

Examining
Buffer Overflow
with GDB

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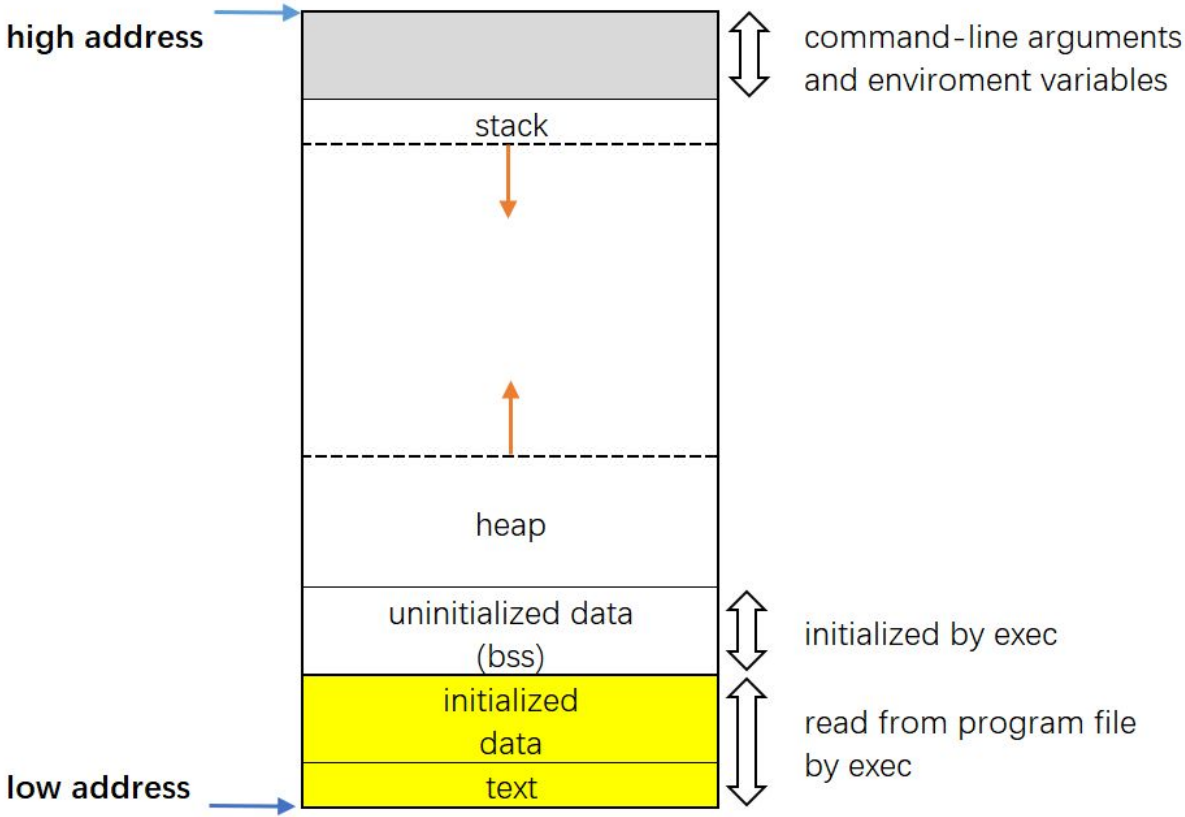
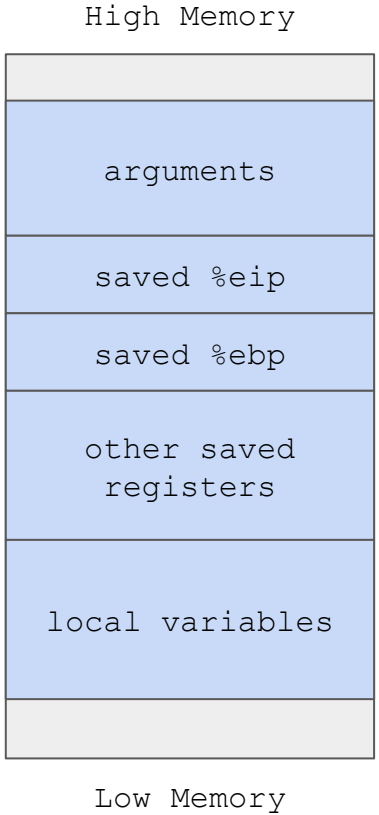
Reminders

- PA1 deadline is tonight by 11:59 PM PDT
- PA2 goes out on Monday and is on Buffer Overflows!

Memory Layout



Stack Layout



`%eip` is a register pointing to the instruction that CPU will execute in next cycle

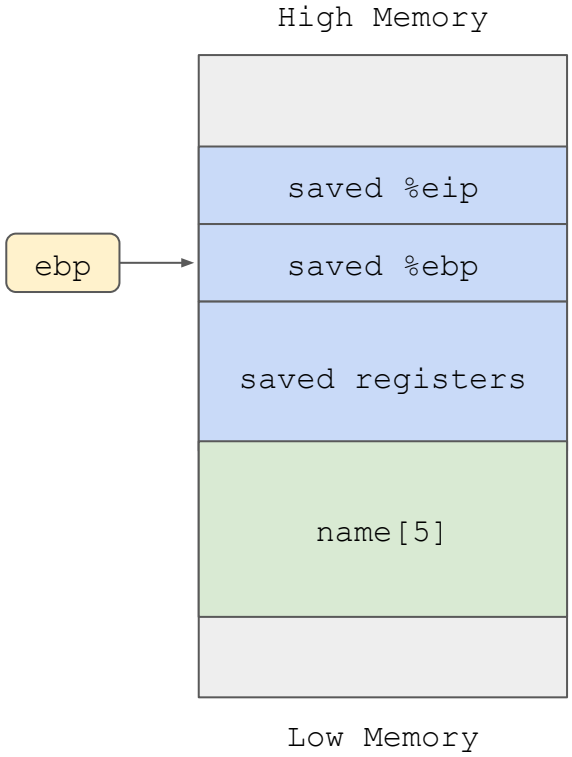
saved `%eip` references to a 4-byte address value stored on stack

saved `%eip` is stored on stack when a function call is made. It has the address of where to resume execution in the caller function

When a function returns, the saved `%eip` value will be popped into the register `%eip` → control will transfer to where saved `%eip` points to

return address == saved return address == saved `%eip` == `%ebp+4`

Basic Buffer Overflow



- How does `gets` copy stdin into `name`?
- When does `gets` stop copying?

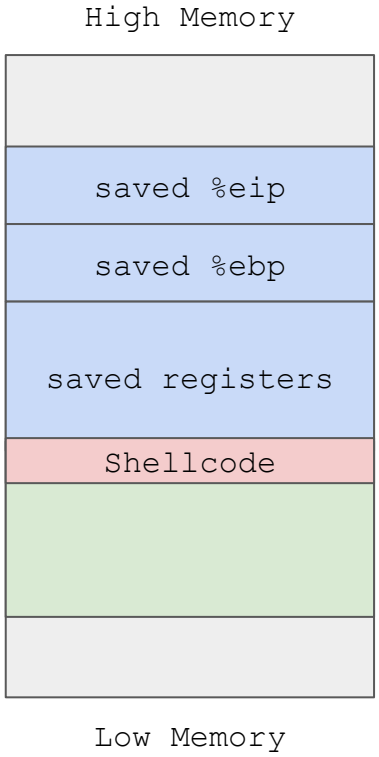
```
int main(int argc, char *argv[])
{
        char name[5];

        gets(name);

        printf("Hi %s!", name);

        exit(0);
}
```

Executing Shell Code



- Where do I place the shellcode?
- How does ensure the shellcode is always executed?

```
int main(int argc, char *argv[])
{
        char name[100];

        gets(name);

        printf("Hi %s!", name);

        exit(0);
}
```

Helpful links

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- https://www.youtube.com/watch?v=1S0aBV-Waeo
- https://www.youtube.com/watch?v=hJ8IwyhqzD4