CS 208

Fri, 21 April 2023
C “architecture” (programmer's mental model)

- Local vars
  - int k = 10;
  - char a[10] = "emp";
  - char *p = malloc;

- Global variables

- Heap
  - Malloc'd stuff

- Stack
  - Globals
  - Instructors
x86-64 architecture

Registers

rax [64 bits]
rbx
rcx
rdi
rri
rsi
rsp
rip

Memory

as usual

much slower

fast
extra letter sometimes indicates size of register

```
move  %rax, %rbx
```
Copies value in rax to rbx

```
add  %rax, %rbx
```

\[ rbx = rbx + rax \]

Try to be flexible

Sometimes, order is reversed
History

8-bit 8086

16-bit 80186

32-bit 80386

64-bit ??

Registers

a, b, c, etc.

ax, bx, cx, ...

extended
eax, ebx, ecx, ...

rax, rbx, ...
EFLAGS register

add rax, rbx

$SF = 1$ if sum is negative

$(sign)$

$ZF = 1$ if sum $= 0$

$(Zero)$
CMP  (performs a Subtraction) & sets EFLAGS bits

JG  jump if greater
JE  jump if equal
decisions based on ZF, SF