Today

A little review
pointers
strings
I/O

CPP: A language within!
Finally, hello world!
Beyond int: floats, doubles

Compound data types:
struct

The Third Type of Memory
The C Library:
A quick tour
void swap(int a, int b) {
    swap(x, y);
}

Stack frame

Stack (valid)
void swap_int(int* a, int* b) {
    int tmp = *a;
    *a = *b;
    *b = tmp;
}

int x, y;
x = 1;
y = 2;
swap_int(&x, &y);

function call passes by value (copy)
swap_int_ptr(int**a, int**a2) {
int* tmp;

tmp = *a1;
*a1 = *a2;
*a2 = tmp;
}

x = 3a;
y = 3b;
swap_int_ptr(3x, 3y);
array[i] += 1
Unix: input/output

- terminal => type:
  - screen

  stdin
  Standard input
  => read to
  get input
  from user

  stdout
  Standard output
  => write to
  show something
  on screen

- third: output => stderr
\[ g = 3f \]
char* argv[]
C

control

layout in
memory

struct hr 5
int age;
int height;
3;

struct hr x;

sizeof(x)
= 8 bytes
struct info {
    int c1, c2, m1, m2, m3;
    int d1, d2, d3, d4;
    char d5, d6;
}

int padding;
Memory that is more flexible than stack

Heap:
allocate/deallocate ourselves
alloc $\Rightarrow$ malloc (of)
dealloc $\Rightarrow$ free (ptr to malloc'd space)

Automatic
$\Rightarrow$ C alloc/dealloc for you

Size (in bytes)
char buffer [MAX]
while (fgets(buffer, MAX, stdin) != NULL)
    reverse[index++] = buffer;

buffer[1000]
reverse
E07 1000
C17 1000
C27 1000