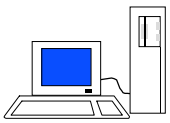
Global Variable

A variable that is "visible" to all functions
(provides a way to get around limitations
imposed by scope rules)

```
#include <stdio.h>
#define NUM_STUDENTS 150
int funnygrades[NUM_STUDENTS];
void update_grades();
void main()
{
 funnygrades[0]=150;
 init_grades();
}
void init_grades()
{ int i;
    for(i=1; i < NUM_STUDENTS;i++)
     {
        funnygrades[i] =10;
     }
}
```

Your view of the computer:

- login
- start emacs
- type your program (`test.c`)
- `lcc test.c`
  (file `a.out` gets added to your directory)
- you type `a.out` at the prompt to run the program

Lecture 4:

What's Inside the Computer ?

Bits and Bytes

- "Bit": Unit of memory that can be in one of 2 states: "ON" or "OFF."
  OFF represents 0; ON represents 1
- "Byte": Sequence of 8 bits.

2^8 = 256 possible values for a byte.

- ASCII coding: Represent every character by a byte.
  "65"= A, "66"= B, ... "90"= Z, "97" = a, "10"=\n

COS126/128: Spring'96

Operating System: a continuously running program that makes the computer's resources available to the user.

Examples: DOS, Windows 3.x, Windows '95.

Macintosh

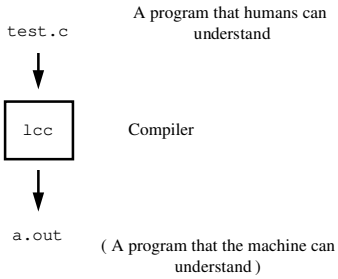
Unix, Linux,...

OS/2 Warp

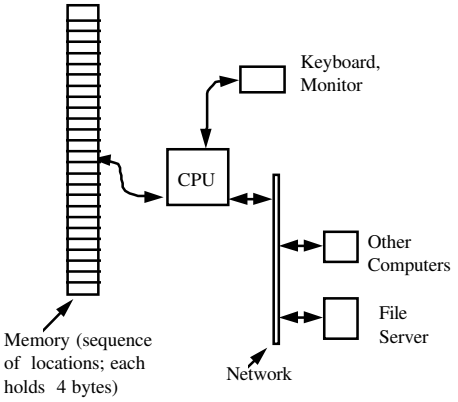
100,000s of lines of code inside every one of these !

What are `lcc` and `a.out`?

Compiler: A program that translates one computer language to another.



The computers in the lab: simplistic view

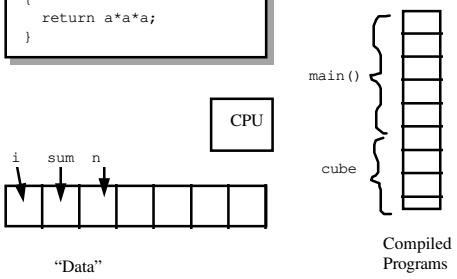


Note: CPU "time-shares" between the operating system and various user programs

How a.out "executes"

(simplistic picture)

```
#include <stdio.h>
int cube(int)
void main()
{
  int i, sum=0, n=50;
  for(i=1; i<= n; i++)
    sum = sum + cube(i);
}
int cube(int a)
{
  return a*a*a;
}
```



"Data"

Compiled Programs

- Integers usually represented by 4 bytes.
  Roughly speaking, 1 bit for sign; 31 bits for value.
  (2^{31} is approximately 2 billion)
- Floating point number: integer + location of decimal. (warning: simplistic picture)

Next Time:

TOY MACHINE

(a fairly realistic view of the computer's innards)

Imaginary machine, similar to
- early computers
- today's microprocessers