# Lecture 8 - CS162

1. External Data Files
   - output to a file
   - input from a file
2. Writing programs with structs and external data files
3. Review for the midterm

This lecture assumes we are working with Text! files (human readable material)

Announcements:

* Online Students - check your schedule & plan to take the midterm!

* Everyone - Prog #2 is due Feb 7th

# Midterm - Next Week!

* Today - Review for the midterm

* Inclass Students:

  12-1:50pm Thursday Feb 9th

* Online Students: 2 choices

  #1) 5:30-7:20pm Thursday Feb 9th
  in ASRC Room 001

OR

  #2) 10am-11:50 Saturday Feb 11th

  in CH 71

But... they fill up so plan now!

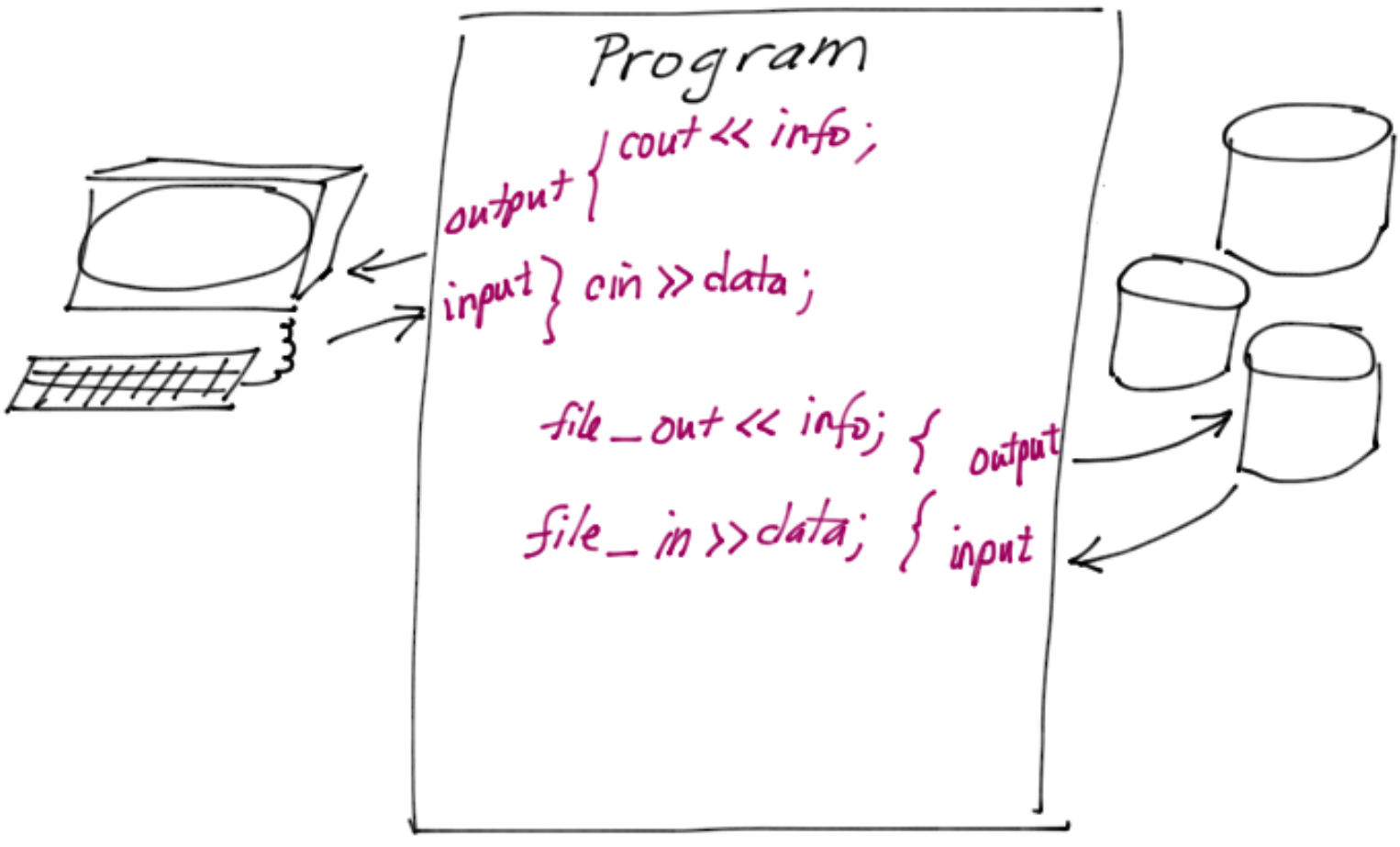
Look at your schedule! If these times don't work, make an appointment @ testing center

# Specifics

1) closed book, closed notes
2) Bring picture ID
3) Bring pencil(s), erasers
4) I supply the paper
5) TO GET YOUR EXAM BACK
    * Pick up in class
    * Pick up in office hours
    * Supply a SELF ADDRESSED Stamped envelope

# Topics on the midterm

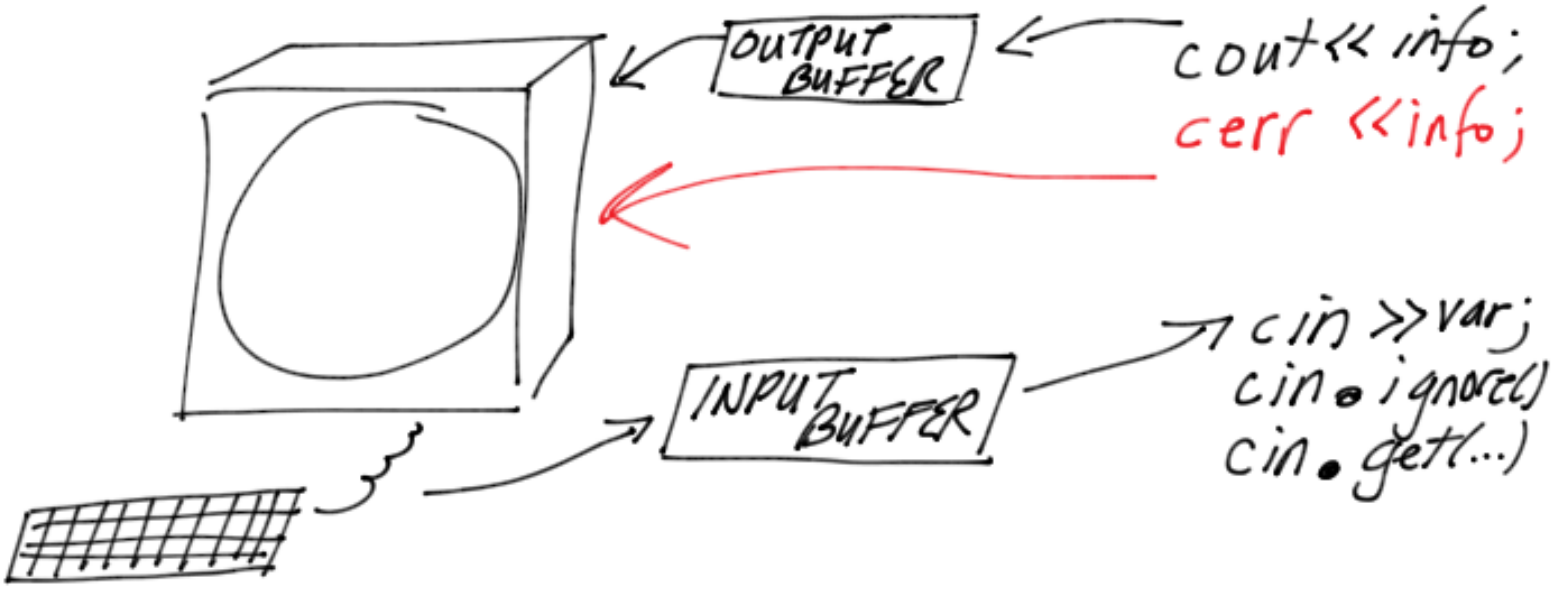
1) data types: int, float, bool, char, arrays
2) I/O: cin >>, cin.get, cin.ignore, cout <<
3) Logicals: && || ← != ⇝ && == ⇝ ||
4) Conditions: if statements
5) Loops: do while, while, for loop
6) Functions: prototypes, pass by value, pass by reference
7) Structures: creating them, passing to functions creating arrays of structures
8) There will be programming questions, short answer, multiple choice & true/false




* Everything we already know about I/O works the same when working with files, except instead of cin & cout we use file variables connected to the desired file.

# Understanding I/O

ostream cout; } global variables defined
istream cin; } in the iostream library



# Applying this to Files

```
#include <fstream>   ← allows us to work with files
```

```
//Next we need file variables (because cin is tied to standard-in and cout is tied to standard-out, and we wouldn't want to change this.
ifstream file_in;   ← FOR INPUT FROM a File
ofstream file_out;  ← FOR OUTPUT TO a file
```

```
//But these variables are not yet connected to any files.
```

# Writing OUT to a file:

```
#include <fstream>
#include <iostream>
using namespace std;
```

} make sure to do this

```
// inside a function

ofstream file_out;          //set up a file variable

file_out.open("filename.extension");   //connects to a file

file_out << name <<endl;
```

---

## Examples

```
file_out.open("inv.dat");
```

vs

```
char filename[31];
cin >>filename;
cin.ignore(100, '\n');
file_out.open(filename);
```

filename: an array of characters

# Important

1. When you open a file for output the contents of the file is **LOST**

2. The code from the previous page will be written at the BEGINNING of the file

3. IF you want to preserve the information that was in the file, then open the file for **APPEND**

```
file_out.open(filename, ios::app);
```

a Literal string or array of characters

append mode

4. Now new information is written after the last item in the file. Make Sure to write a newline or other delimiter so that we can distinguish between the data

# Reading IN from a file

```
#include <fstream>   // etc.
```

Inside a function:

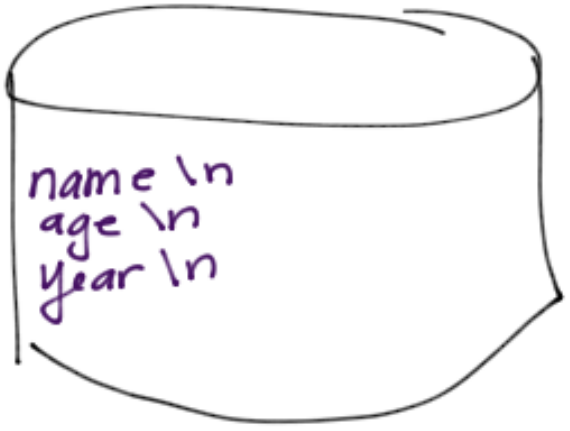
```
ifstream file_in;  // Be careful of the name used

file_in.open(filename);
```

① Always begins reading at the beginning of the file

② Make sure there are delimiters in the file between fields

** there needs to be a way to read information back from the file

Everything we know applies!




```
file_in.get(namearray, size, '\n');
file_in.ignore(100, '\n');

file_in >> age;
file_in.ignore();

file_in >> year;
file_in.ignore();
```

But, when does input end?

— we can't prompt the "file" !!

°° When we try to read from a file and there is nothing there, end of file (a "~~state~~" variable in the fstream Library) gets set.

# Detecting End of File

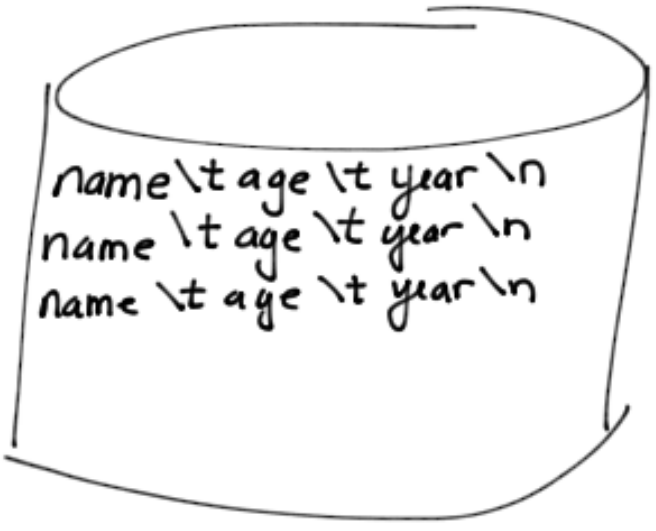
1) We must attempt to read from the file to find out if there is anything in the file to read

2) file_in.eof()

function call

- Returns true if the previous read/input operation failed
- Returns false if the previous read/input was successful
- Therefore, BEFORE you check end of file, make sure to attempt to read FIRST. "Prime the Pump"

# Let's Read from a file!




```
ifstream fin; //file variable
fin.open(filename);
if (fin) //we are connected
{
   fin.get(name,size,'\t');
   fin.ignore(100,'\t');
   while (!fin.eof())
   { //we are not yet at end
     fin >>age; fin.ignore();
     fin >>year;
     fin.ignore(100,'\n');


     //Now prime the pump.....
     // is there another?
     fin.get(anothername, size, '\t');
     fin.ignore(100,'\t');
   }
```

notice

we have more data

handle the data.... display.....

is there another or are we done?

# Adding External Files
## - to our design

- Although a struct allows us to group different kinds of data – there are no operations built-in w/ structs besides member wise copy (=)