CS 161, Lecture n-1: Structs and Objects
Objects

• The world is filled with them
• Often made of mixed types
• Examples:

- Book → title, pages, authors
- Protein bar → nutritional, rating
- Videogame
- Car
Structs – Objects without functionality

• Structs are user defined types that have multiple types

```c
struct book {
    char* title;
    int num_authors;
    char** authors;
    int num_pages;
};
```

```c
book text_book;
text_book.num_pages = 500;
```
Use of Structs

• Can use the same way as any other type

```c
book* bookshelf = new book[10];
for(int i=0; i<10; i++) {
    bookshelf[i].num_pages = 100;
    strcpy(bookshelf[i].title, "Place holder");
    bookshelf[i].authors = new char*[2];
    for(int j=0; j<2; j++)
        bookshelf[i].authors[j] = new char[256];
}
```
```cpp
#include <iostream>
#include <string>

using namespace std;

struct book {
    int pages;
    string title;
    int num_authors;
    string* authors;
};

void print_book(book b) {
    cout << "Title: " << b.title << endl;
    for(int i=0; i<b.num_authors; i++) {
        cout << "Author " << i+1 << ": " << b.authors[i] << endl;
    }
    cout << "Pages: " << b.pages << endl;
}

void pop_book(book* b) {
```
```cpp
void pop_book(book* b) {
    cout << "What is the title? ";
    getline(cin, b->title);
    cout << "How many authors? ";
    cin >> b->num_authors;
    cin.ignore();
    cin.clear();
    b->authors = new string[b->num_authors];
    for(int i=0; i<b->num_authors; i++) {
        cout << "Who is author " << i+1 << "? ";
        getline(cin, b->authors[i]);
    }
    cout << "How many pages? ";
    cin >> b->pages;
}

int main () {

    book my_book;
    /*my_book.pages = 319;
    my_book.title = "Once Upon and Algorithm";
    my_book.num_authors = 1;*/
```
```c
int main () {

    book my_book;
    /*my_book.pages = 319;
    my_book.title = "Once Upon and Algorithm";
    my_book.num_authors = 1;
    my_book.authors = new string;
    my_book.authors[0] = "Martin Erwig";*/

    pop_book(&my_book);

    /*cout << "Title: " << my_book.title << endl;
    cout << "Authors: " << my_book.authors[0] << endl;
    cout << "Pages: " << my_book.pages << endl;*/

    print_book(my_book);

    return 0;
}
```