CS 162, Lecture 9: Intro to the Big 3

October 10, 2018
First: Questions from Lab

• Tell me what material I need to review Friday
• All you should need for recitation that you don’t already have is Destructors
• Today’s lecture is for Assignment 2, and next week’s labs/recitations
The Big 3 - Default Behavior

• **Copy constructor** – Shallow copy, calling the copy constructors of the object's class-type members, and doing a plain assignment of all non-class type (e.g., *int* or pointer) data members.

• **Assignment operator** – Shallow copy, calling the copy assignment operators of the object's class-type members, and doing a plain assignment of all non-class type (e.g. *int* or pointer) data members.

• **Destructor** – Call the destructors of all the object's class-type members.
Shallow Copy vs. Deep Copy

- **Shallow:**
  - Copy the contents of member variables from one object to another
  - Example: Shallow copy of Genre makes a pointer to the same movie array as in the Genre being copied
  - **Does not call new movie() constructor**
  - Default for assignment operator and copy constructor

- **Deep:**
  - Copy what each member variable is pointing to so that you get a separate but identical copy
  - Example: Deep copy of Genre creates new movie array with copies of movies, and makes a pointer to the new array.
  - **Calls new movie() constructor**
  - ^^Specifically, does this because you program it to
Copy Constructor

• Constructor that has one parameter that is of the same type as the class
  • Has to be called by reference (normally const)
  • Allows for distinct copies, changes to one does not impact the other
  • Called automatically in three cases:
    • When a class object is being declared and initialized by another object of same type
    • When a function returns a value of the class type
    • Whenever an argument of the class type is “plugged in” for a call by value parameter
Assignment Operator Overload

- Predefined assignment operator returns a reference
  - Allows us to chain assignments together $a = b = c$
  - Need to make sure the assignment operator returns something of the same type as its left hand side

- Overloading assignment operator
  - Must be a member of the class
Destructor

• Deletes the object
• Will be automatically created if one is not supplied
  • Will not handle dynamic memory
• ~Class_Name(); //no return type, no parameters, only one allowed
• Called when the object goes out of scope
  • When the function ends
  • When the program ends
  • A block containing local variables ends
  • A delete operator is called
Memory Leaks & Default Destructors

• Calling default destructor on genres()
• Deletes ptr to movies[0], but not movie in movies[i]
• How to delete movies[i]?
• Can’t, needed to define Destructor
Note for Assignment 2:

“Searching” in menu class really means iterating on an array and returning a new array with only the options we wanted.

We will cover “real” search-sorting algorithms in the final weeks of class.