



# CS250 Intro to CS II

Spring 2013

# Topics

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- Virtual Functions
- Pure Virtual Functions
- Abstract Classes
- Concrete Classes
- Binding Time, Static Binding, Dynamic Binding
- Overriding vs Redefining
  
- Reading: pp. 907-928
- Problems: pp. 925-928 15.9-15.15 (all very good)

# Abstract Class

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- Consider a base class called Sprite that contains a draw function
  - Avatar, Monster, and Castle are classes that are derived from Sprite, and each one has a unique draw function
  - If some kind of array of Sprite is maintained, a simple draw command can be sent to each object invoking the specific draw method for each object type
  - This is where we are heading

# Abstract Class

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- An abstract class is a class where the programmer never intends to instantiate an object of the abstract class type
  - These classes are typically base classes and are used in an inheritance hierarchy to build more generic derived classes
  - Parts of the abstract class are not implemented in the base class; therefore, this logic must be implemented in the derived class

# Concrete Class

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- A concrete class is any class that can be instantiated
    - An object of a concrete class can be created

Of Sprite, Avatar, Monster, and Castle, which are abstract and which are concrete? Why?

# Pure Virtual Functions

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- A class is made abstract by having one or more pure virtual functions associated with the class as follows:
  - `virtual void functionName () = 0;`
- Each derived class must provide its own draw function that overrides the draw function of the abstract class

# Virtual Functions

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- A virtual function
  - Allows the derived class the ability to override the function and
  - Must have an implementation
- A pure virtual function
  - Requires the derived class to override the function
  - Cannot have an implementation

# Binding Time

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- Binding time - the time at which something becomes known
- Static Binding - binding time that happens during compilation (e.g. a variable's type)
- Dynamic Binding - binding time that happens during runtime (e.g. the heap address of a dynamically allocated memory)



# Redefining vs Overriding

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- A derived class can “redefine” a base class member (static binding)
- A derived class that redefines a virtual function of a base class is said to “override” the base class function (dynamic binding)

# Problem

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On Monday April 29th, we will meet in the CS lab to do a small extreme programming example in your groups.