Polymorphism and Virtual Functions

Polymorphism in Action

- Point the pointer to a Point object to a Circle object
  - Is this possible?
  - Why?
- Invoke the print member function using this pointer
  - What is the output?

Polymorphism in Action

- Assigning the address of a derived class object to a base class pointer is allowed
- The derived class is an object of its base class
- However the functions of the base class will be invoked rather than the members of the derived class

Derived & Base Class Pointers

- Point the pointer to a Circle object to a Point object
  - Is this possible?
  - Why?

Derived & Base Class Pointers

- The compiler does not allow you to assign a base class object to a derived class pointer
- Imagine if we could assign a Circle pointer to a Point object
  - What would happen if we invoked the setRadius member function?

Derived & Base Class Pointers

- We know that we can make a base class pointer point to a derived class object
  - Give an example
- What would happen if we tried to call a derived class member function using this pointer?
  - Give an example
  - Do you think it is valid

Virtual Functions

```
Point *pPoint;
Circle c( 120, 89, 2.7 );
pPoint = &c;
pPoint->print( );
```

- Which print function is going to be called when executing the last statement above?

Virtual Functions

- In the previous example, the print function in the base class is called rather than the print function in the derived class
- The data type of the *pointer* determined which class's functionality to invoke
- With virtual functions, the type of the *object being pointed to*, not the type of the pointer determines which function to call

The How of Virtual Functions

- Declare the function in the base class as virtual
- Now, when you write a function with the same name in the derived class, the new function will override the base class function
- Thus, function in the object being pointed to will be called, and not the function in the pointer

Summary

- We covered virtual functions
- We covered:
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