CS 120 Project 6

Due on Blackboard by Friday, March 30

For this project you will design, implement, test, and use an abstract C++ class with polymorphism.

Design

You will need to do the following:

1. Create an abstract class that has at least two subclasses.
2. The subclasses must override the pure virtual method(s) in the parent class.
3. Create a vector of pointers to the abstract class.
4. The vector must contain pointers to child class objects (a mixture of the 2+ subclasses).
5. You must demonstrate polymorphism by looping through the vector and calling the same method on each element (at least one method that is overridden differently in each child class).
6. You must have a global function that goes through the vector and does a calculation on all the objects. (The polymorphism requirement in the previous step may be satisfied here.)

Example (do not use):

- An abstract Shape class that has children Circle and Rectangle. A function that loops through a vector of Shape pointers and calculates the total area covered by the shapes. A program that allows the user to add, remove, and reorder the vector of shapes.

Implement

Your classes should be declared in header file(s) (with RMEs and other comments) and defined in corresponding .cpp file(s).

You may reuse classes from previous projects if appropriate.

Test

To make sure your classes are working the way you designed, include a testing.cpp file that has a main function and tests all of your classes thoroughly.

Use

Use your classes to have a fully-functioning program in main.cpp. The program should be interactive. The more effort you put in, the more you will impress the graders and get a good grade.

Grading

The project is out of 80 points.

Design and Style

- 3 pts Are there at least four files and does each file have the correct code?
- 4 pts Are there sufficient comments and/or writings to explain what each method accomplishes and what each field represents? Are methods const when they should be?
- 4 pts Do the files follow the style guidelines from class? Are they readable? Do the names make sense?
- 8 pts Is there evidence of a well-thought-out design? Does each method have a clear purpose? Is this the best way to implement the class given the functionality goals?
- 4 pts Are the methods and fields members of the correct class? Does it make sense for the parent class to have the pure virtual method(s) declared?

Implementation

- 5 pts Does the program compile and run?
- 12 pts Are three classes implemented: an abstract parent class and two subclasses?
- 4 pts Are keywords "virtual" and "override" used where appropriate?
- 5 pts Is there a vector of pointers to the abstract class? Does it contain pointers to objects of the two child classes?
- 5 pts Is polymorphism demonstrated by looping through the vector and calling a parent class method on each element that is overridden in each child class?
- 4 pts Is there a global function that performs a calculation on a vector of objects?

Testing

- 4 pts Is every method tested (directly or indirectly)?
- 8 pts Does testing cover all possible cases?

Program

- 10 pts Is the program fully functional? Does the functionality make sense to use with the classes? Is it interactive?