Assignment No. 7

For this lab assignment you will write a program to represent geometric shapes and some operations that can be performed on them. The idea here is that shapes in higher dimensions inherit data from lower dimensional shapes. For example a cube is a three dimensional square. A sphere is a three dimensional circle and a glome is a four dimensional circle. A cylinder is another kind of three dimensional circle. The circle, sphere, cylinder, and glome all share the attribute radius. The square and cube share the attribute side length. There are various ways to use inheritance to relate these shapes but please follow the inheritance described in the table below.

All shapes inherit getName() from the superclass Shape.

Specification:

Your program will consist of the following classes: Shape, Circle, Square, Cube, Sphere, Cylinder, and Glome and two interfaces Area and Volume. Your classes may only have the class variable specified in the table below and the methods defined in the two interfaces Area and Volume. You will implement the methods specified in the Area and Volume interfaces and have them return the appropriate value for each shape. Class Shape will have a single public method called getName that returns a string.

Class	Class Variable	Constructor	Extends	Implements
Shape	String name	Shape()		
Circle	double radius	Circle(double r, String n)	Shape	Area
Square	double side	Square(double s, String n)	Shape	Area
Cylinder	double height	Cylinder(double h, double r, String n)	Circle	Volume
Sphere	None	Sphere (double r, String n)	Circle	Volume
Cube	None	Cube(double s, String n)	Shape	Volume
Glome	None	Glome(double r, String n)	Shape	Volume

Your program will use the following source files. Do not alter them but feel free to write your own driver to test your program.

Note: the volume of a glome is $0.5(\pi 2)\ r4$ where r is the radius.

Class Diagram