



King Fahd University of Petroleum & Minerals
College of Computer Sciences and Engineering

Information and Computer Science Department

SWE 316: Software Design & Architecture (201)

Assignment # 1

Due Date: October 22, 2020

Consider solid figures, namely, Cylinder and Rectangular Prism. Each one of them has a height. A Cylinder has a base that is a circle with radius. A Rectangular Prism has a base that is a rectangle with length and width. Using polymorphism, design the necessary interface(s), abstract class(es), and/or concrete class(es) that implement the family of solid figures and offer the necessary method(s) to allow comparing any two solid figures to check if they have the same volume. Enforce as much *Information Hiding* as possible. (Hint: volume = height * Base Area; Circle Area = $\pi * radius^2$; Rectangle Area = length * width).

1. Draw the class model of your program.
2. Implement your design using Java programming language. Furthermore, write four test cases to validate your program. You must follow the program construction techniques such as formatting, indentation, variable names etc.
3. Discuss maintainability, scalability, and performance perspective of your design.
4. Reverse Engineer: you must do this step after completing the implementation of your software (i.e. Step 2).
 - a. Download and install ESSModel (<http://essmodel.sourceforge.net/>)
 - b. Click File → Open Folder and then find the location of your current work c.
 - c. ESSModel will read your Java files and create a class diagram of them.
 - d. Compare the class diagram that you got from this step with the one that you have created in the design phase.
 - e. Are there any differences? Did your design change while implementation? In your opinion, what are reasons for having these differences?

Submission guidelines:

1. This is an individual assignment. The submission will be via Blackboard.
2. **The report should include a cover page showing course name, assignment number, date of submission, your name and ID.**
3. Class diagrams, program code, and output should all be included in the report.
4. Code should be formatted properly. For example,
 - a. Write the code in Notepad++
 - b. To format the code choose Menu → Language → Java
 - c. Click Plugins → NppExport → Copy RTF to clipboard
 - d. Paste it in Word document.
5. Include the following table in your cover page

Task	Grade	Your Grade
Class Diagram	30	
Implementation and	40	

test cases		
Maintainability, scalability and performance of your design	20	
Reverse Engineering	10	
Total		