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Lab work 2 : Principles of OOP

Exercise 1: Write a Java class "NameCard" and a Java tester class "NameCardTestDrive" to present the corresponding NameCard design:

- Apply the "Encapsulation" concept in your classes
- The tester class should print out the instance NameCard values

Exercise 2: Write a Java class "Cow" and a Java tester class "CowTestDrive" to implement the OOP class design: "Cow"

- Apply the "Encapsulation" concept in your classes
- The moo() method should print out the text "Moo…!"
- The tester class should:
  - Make a Cow object
  - Set the age of the Cow to 4
  - Call the moo() method

Cow
name breed age
moo()

Exercise 3: Write a Java class "Vector" and a Java tester class "VectorTestDrive" to implement the OOP class design: "Vector".

- Apply "Encapsulation" concept in your classes.
- In your tester class "VectorTestDrive":
  - Create and print out information of 2 vectors
  - Calculate and print out the sum, subtraction and multiplication of the two created vectors

Vector
int x int y
add(Vector other) subtract(Vector other) multiply(Vector other)

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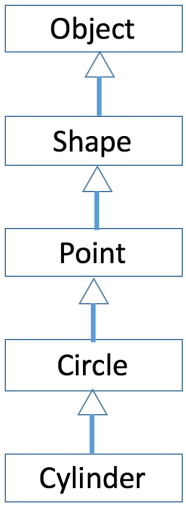
Exercise 4: Design and Implement the following multi-level inheritance structure:



- Object class is the parent class of all classes in Java
- Shape class is an abstract class and is a child of Object class. Shape class contains two regular methods and one abstract method
  - Regular method calArea(): return the area of the shape
  - Regular method calVolume(): return the volume of the shape
  - Abstract method getName(): return the name of the shape
- Point is a regular class and is a child of Shape class.
  - A point is defined by two coordinates (x & y)
  - Point class inherits/overrides regular methods of Shape class and implements abstract method of Shape class
- Circle is a regular class and is a child of Point class
  - A circle is defined by two coordinates (x & y) of the center and radius r
  - Circle class inherits/overrides regular methods of Shape/Point class and implements abstract methods of Shape/Point class
- Cylinder is a regular class and is a child of Circle class
  - A cylinder is defined by two coordinates (x & y) of the center, radius r and height h
  - Cylinder class inherits/overrides regular methods of Shape/Point/Circle class and implements abstract methods of Shape/Point/Circle class

Exercise 5: Develop a "ShapeTestDrive" Java program to check the inheritance relationship of Point, Circle, Cylinder with the Shape class.

- Use polymorphism concept to create an array of objects "Point, Circle and Cylinder"
- Browse created polymorphic array to perform the four following operations for each element of the array:
  - Get name of the object to see if it is a Point or a Circle or a Cylinder
  - Calculate the area of the object
  - Calculate the volume of the object
  - Display name, area and volume of each object to the screen

Note : you need to submit the source codes of your lab works to the google drive folder of the course.