**Lab 14- Interfaces in Kotlin**

In this exercise, we'll model a scenario related to shapes and their calculations. We'll define multiple interfaces and implement them in different classes.

Task:

Create a new Kotlin file named ShapeLab.kt.

Exercise: Define Interfaces:

Define three interfaces: Shape, TwoDimensionalShape, and ThreeDimensionalShape.

// ShapeLab.kt

interface Shape {

fun area(): Double

}

interface TwoDimensionalShape : Shape {

fun perimeter(): Double

}

interface ThreeDimensionalShape : Shape {

fun volume(): Double

}

**Implement Interfaces:**

Implement the interfaces in classes representing specific shapes. Create classes for Circle, Square, Sphere, and Cuboid.

// ShapeLab.kt

import kotlin.math.PI

class Circle(private val radius: Double) : TwoDimensionalShape {

override fun area(): Double = PI \* radius \* radius

override fun perimeter(): Double = 2 \* PI \* radius

}

class Square(private val sideLength: Double) : TwoDimensionalShape {

override fun area(): Double = sideLength \* sideLength

override fun perimeter(): Double = 4 \* sideLength

}

class Sphere(private val radius: Double) : ThreeDimensionalShape {

override fun area(): Double = 4 \* PI \* radius \* radius

override fun volume(): Double = (4 / 3.0) \* PI \* radius \* radius \* radius

}

class Cuboid(private val length: Double, private val width: Double, private val height: Double) : ThreeDimensionalShape {

override fun area(): Double = 2 \* (length \* width + width \* height + height \* length)

override fun volume(): Double = length \* width \* height

}

**Usage:**

In the main function or another function, create instances of these classes and demonstrate the use of the defined interfaces.

// ShapeLab.kt

fun main() {

val circle = Circle(radius = 5.0)

val square = Square(sideLength = 4.0)

val sphere = Sphere(radius = 3.0)

val cuboid = Cuboid(length = 3.0, width = 4.0, height = 5.0)

println("Circle - Area: ${circle.area()}, Perimeter: ${circle.perimeter()}")

println("Square - Area: ${square.area()}, Perimeter: ${square.perimeter()}")

println("Sphere - Area: ${sphere.area()}, Volume: ${sphere.volume()}")

println("Cuboid - Area: ${cuboid.area()}, Volume: ${cuboid.volume()}")

}

**Run the Program:**

Open a terminal in your project directory.

Run the following command to execute the program:

Observe the output, which demonstrates the use of interfaces for calculating the area, perimeter, and volume of different shapes.

This lab exercise demonstrates the power of interfaces in Kotlin, allowing you to define contracts for different shapes and implement them in various classes. You can extend this exercise by adding more shapes or introducing additional interfaces with specific behavior.