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Assignment 6 – Packages

Q1: Create a package named 'shapes' with the following three java classes. Create class for geometric shapes like Square, Triangle and Circle. The classes should contain the methods to calculate area and perimeter. Use this package to find area and perimeter of different shapes as chosen by the user.

Package files:

```
/*package shape – class square*/
package myjava.shapes;

public class Square {
	//attributes
	double side;

	//constructor
	public Square() {
		side = 1; //unit square
		}
	public Square (double s) {
		side = s;
		}

	//member functions
	public double calcArea() {
		return side*side;
		}
	public double calcPerimeter() {
		return 4*side;
		}
	}
```

```
/*package shape – class triangle*/
package myjava.shapes;

import java.lang.Math;

public class Triangle {
	//attributes
	double side_a, side_b, side_c;

	//constructor
	public Triangle() {
		side_a = 1; //equilateral triangle of side 1
		side_b = 1;
		side_c = 1;
		}
```

```
	public Triangle (double a, double b, double c) {
		side_a = a;
		side_b = b;
		side_c = c;
		}

	//member functions
	public double calcArea() {
		double s = ((side_a + side_b + side_c)/2);
		return Math.sqrt( s*(s-side_a)*(s-side_b)*(s-side_c) );
		}
	public double calcPerimeter() {
		return side_a + side_b + side_c;
		}
	}

/*package shape – class circle*/
package myjava.shapes;

public class Circle {
	//attributes
	double radius;

	//constructor
	public Circle() {
		radius = 1; //unit circle
		}
	public Circle (double r) {
		radius = r;
		}

	//member functions
	public double calcArea() {
		return 3.14*radius*radius;
		}
	public double calcPerimeter() {
		return 2*3.14*radius;
		}
	}
```

Code:

```
//program to test the shapes package
import java.util.Scanner;
import myjava.shapes.*;

public class TestShapes {
	public static void main (String arg[]) {
		Scanner sc = new Scanner(System.in);
```

```
        int ch;
        System.out.print("Enter choice -- 1:Square 2:Triangle 3:Circle -- : ");
        ch = sc.nextInt();
        switch(ch) {
                case 1: {
                        double length;
                        System.out.println("__SQUARE__");
                        System.out.print("Enter length of side: ");
                        length = sc.nextDouble();
                        //call constructor to instantiate class square
                        Square sq = new Square(length);
                        System.out.println("Area: " + sq.calcArea());
                        System.out.println("Perimeter: " + sq.calcPerimeter());
                        break;
                        }
                case 2: {
                        double a, b, c;
                        System.out.println("__TRIANGLE__");
                        System.out.println("Enter lengths of sides: ");
                        a = sc.nextDouble();
                        b = sc.nextDouble();
                        c = sc.nextDouble();
                        //call constructor to instantiate class square
                        Triangle tr = new Triangle(a,b,c);
                        System.out.println("Area: " + tr.calcArea());
                        System.out.println("Perimeter: " + tr.calcPerimeter());
                        break;
                        }
                case 3: {
                        double rad;
                        System.out.println("__CIRCLE__");
                        System.out.print("Enter radius of circle: ");
                        rad = sc.nextDouble();
                        //call constructor to instantiate class square
                        Circle c = new Circle(rad);
                        System.out.println("Area: " + c.calcArea());
                        System.out.println("Perimeter: " + c.calcPerimeter());
                        break;
                        }
                default: System.out.println("Invalid option!");
                }
        }
}
```

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Output:

```
kri@kri-ubuntu:~/workspace$ javac TestShapes.java myjava/shapes/*.java
kri@kri-ubuntu:~/workspace$ java TestShapes
Enter choice -- 1:Square 2:Triangle 3:Circle -- : 1
__SQUARE__
Enter length of side: 4
Area: 16.0
Perimeter: 16.0
kri@kri-ubuntu:~/workspace$ java TestShapes
Enter choice -- 1:Square 2:Triangle 3:Circle -- : 2
__TRIANGLE__
Enter lengths of sides:
3
5
4
Area: 6.0
Perimeter: 12.0
kri@kri-ubuntu:~/workspace$ java TestShapes
Enter choice -- 1:Square 2:Triangle 3:Circle -- : 3
__CIRCLE__
Enter radius of circle: 3
Area: 28.259999999999998
Perimeter: 18.84
```

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Q2: Create a package named 'mypack.converter' with the following java classes. Implement distance converter (meter to KM, miles to KM and vice versa) in DistanceConverter class, time converter (hours to minutes, minute to seconds and vice versa) in TimeConverter class. Write the main program to access these classes outside the package.

Package files:

```
/*package converter - class DistanceConverter*/
package mypack.converter;

public class TimeConverter {
	//member functions
	public double secsToMins (double sec) {
		return sec/60;
		}
	public double minsToSecs (double min) {
		return min*60;
		}
	public double hoursToMins (double hr) {
		return hr*60;
		}
	public double minsToHours (double min) {
		return min/60;
		}
	}
```

```
/*package converter - class DistanceConverter*/
package mypack.converter;

public class DistanceConverter {
	//member functions
	public double metersToKms (double m) {
		return m/1000;
		}
	public double kmsToMeters (double km) {
		return km*1000;
		}
	public double milesToKms (double mil) {
		return 1.609344*mil;
		}
	public double kmsToMiles (double km) {
		return 0.621371192*km;
		}
	}
```

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Code:

```
//program to test the converter package
import java.util.Scanner;
import mypack.converter.*;

public class TestConverter {
	public static void main (String arg[]) {
		Scanner sc = new Scanner(System.in);

		int ch;
		System.out.print("Enter choice -- 1:Distance 2:Time -- : ");
		ch = sc.nextInt();
		switch(ch) {
			case 1: {
				double ms,kms,mils;
				System.out.println("__DISTANCE__");
				//call constructor to instantiate class DistanceConverter
				DistanceConverter dc = new DistanceConverter();
				System.out.print("Enter meters: ");
				ms = sc.nextDouble();
				System.out.println("\tKms: " + dc.metersToKms(ms) + "  Miles: " +
dc.kmsToMiles(dc.metersToKms(ms)));
				System.out.print("Enter kms: ");
				kms = sc.nextDouble();
				System.out.println("\tMeters: " + dc.kmsToMeters(kms) + "  Miles: " +
dc.kmsToMiles(kms));
				System.out.print("Enter miles: ");
				mils = sc.nextDouble();
				System.out.println("\tMeters: " + dc.kmsToMeters(dc.milesToKms(mils)) + "
Kms: " + dc.milesToKms(mils));
				break;
				}
			case 2: {
				double h, m, s;
				System.out.println("__TIME__");
				//call constructor to instantiate class TimeConverter
				TimeConverter tc = new TimeConverter();
				System.out.print("Enter seconds: ");
				s = sc.nextDouble();
				System.out.println("\tMinutes: " + tc.secsToMins(s) + "  Hours: " +
tc.minsToHours(tc.secsToMins(s)));
				System.out.print("Enter minutes: ");
				m = sc.nextDouble();
				System.out.println("\tSeconds: " + tc.minsToSecs(m) + "  Hours: " +
tc.minsToHours(m));
				System.out.print("Enter hours: ");
				h = sc.nextDouble();
```

```
                                System.out.println("\tSeconds: " + tc.minsToSecs(tc.hoursToMins(h)) + "
Minutes: " + tc.hoursToMins(h));
                                break;
                                }
                        default: System.out.println("Invalid option!");
                        }
                }
        }
```

Output:

```
kri@kri-ubuntu:~/workspace$ javac TestConverter.java mypack/converter/*.java
kri@kri-ubuntu:~/workspace$ java TestConverter
Enter choice -- 1:Distance 2:Time -- : 1
__DISTANCE__
Enter meters: 30
        Kms: 0.03  Miles: 0.01864113576
Enter kms: 15
        Meters: 15000.0  Miles: 9.32056788
Enter miles: 2
        Meters: 3218.688  Kms: 3.218688
kri@kri-ubuntu:~/workspace$ java TestConverter
Enter choice -- 1:Distance 2:Time -- : 2
__TIME__
Enter seconds: 1296
        Minutes: 21.6  Hours: 0.36000000000000004
Enter minutes: 180
        Seconds: 10800.0  Hours: 3.0
Enter hours: 1
        Seconds: 3600.0  Minutes: 60.0
```