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SSN College of Engineering

Department of Computer Science and Engineering

UCS2313 – Object Oriented Programming Lab

II Year CSE - B Section (III Semester)

Academic Year 2022-23

Batch: 2021- 2025

Faculty Incharge :S.Rajalakshmi

Exercise - 6 – Packages

Objective:

1. To test the creation and usage of packages in Java

Sample Learning Outcome:

1. Need of packages and steps to create it in Java
2. Create a user defined package and access it outside the package
3. Create subpackages and their usage

Best Practices:

1. Class Diagram usage
2. Naming convention – for file names, variables
3. Comment usage at proper places
4. Prompt messages during reading input and displaying output
5. Incremental program development
6. Modularity
7. All possible test cases in output

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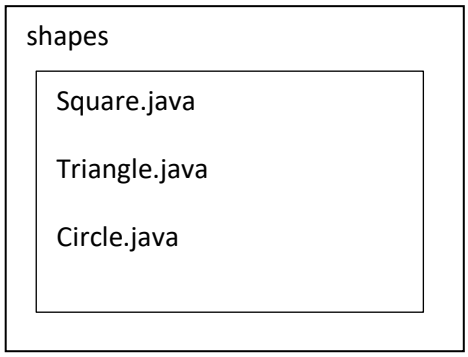
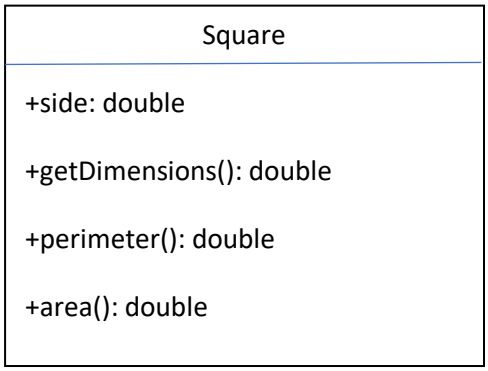
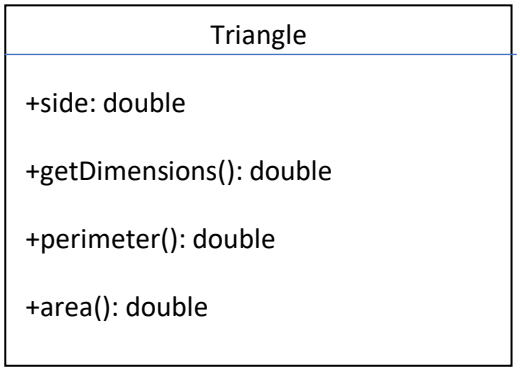
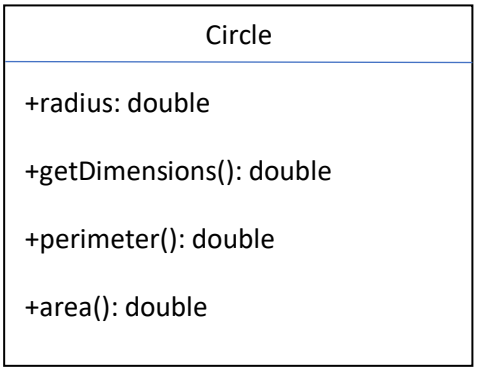
1. **Create a package named 'shapes' with the following three java classes. Create class for geometric shapes like Square, Triangle and Circle. The classes should contain the methods to calculate area and perimeter. Use this package to find area and perimeter of different shapes as chosen by the user.**

Class diagram:









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Program code:

Circle.java

```
package Shapes;

public class Circle         //public class
{
    public double radius;           //class member

    public void getDimensions(double radius)        //getter
    {
        this.radius=radius;
    }

    public double perimeter()       //method to calculate perimeter
    {
        return 2*Math.PI*radius;
    }

    public double area()        //method to calculate area
    {
        return Math.PI*radius*radius;
    }
}
```

Sqaure.java

```
package Shapes;

public class Square         //public class
{
    public double side;             //public class member

    public void getDimensions(double side)          //getter
    {
        this.side=side;
    }

    public double perimeter()          //method to calculate perimeter
    {
        return 4*side;
    }

    public double area()            //method to calculate area
    {
        return side*side;
    }
```

```
}
```

Triangle.java

```
package Shapes;

public class Triangle           //public class
{
    public double side;         //public class member
    public void getDimensions(double side)          //getter
    {
        this.side=side;
    }

    public double perimeter()       //method to calculate perimeter
    {
        return 3*side;
    }

    public double area()            //method to calculate area
    {
        return (Math.sqrt(3)/4)*side*side;
    }
}
```

Main.java

```
import Shapes.*;
import java.util.Scanner;

class Main
{
    public static void main(String[] args)
    {
        int choice=0;
        Scanner scanner=new Scanner(System.in);
        do
        {
            System.out.println("PROGRAM TO CALCULATE THE AREA AND PERIMETER OF
GIVEN SHAPE\n");
            System.out.println("Choices: ");
            System.out.println("1.Triangle\n2.Square\n3.Circle\n4.Exit\n");
            System.out.println("Enter the choice: ");
            choice=scanner.nextInt();
            System.out.println();
            switch(choice)
            {
```

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```
                case 1:
                    Triangle t=new Triangle();
                    System.out.println("Enter the side of the equilateral
triangle: ");
                    double side1=scanner.nextDouble();
                    t.getDimensions(side1);
                    System.out.println("The perimeter of equilateral triangle
is: "+t.perimeter());
                    System.out.println("The area of equilateral triangle is:
"+t.area()+"\n");
                    break;
                case 2:
                    Square s=new Square();
                    System.out.println("Enter the side of the Square: ");
                    double side2=scanner.nextDouble();
                    s.getDimensions(side2);
                    System.out.println("The perimeter of Square is:
"+s.perimeter());
                    System.out.println("The area of Square is:
"+s.area()+"\n");
                    break;
                case 3:
                    Circle c=new Circle();
                    System.out.println("Enter the radius of the circle: ");
                    double radius=scanner.nextDouble();
                    c.getDimensions(radius);
                    System.out.println("The circumference of Circle is:
"+c.perimeter());
                    System.out.println("The area of Circle is:
"+c.area()+"\n");
                    break;
                case 4:
                    System.exit(0);
                default:
                    System.out.println("Invalid choice!\n");
            }
        }while(choice!=4);
    }
}
```

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Output:

```
PS C:\Rohith\Backup\Desktop\SEM 3\OOP-Java\Java programs\Lab programs\Exercise-6> javac Main.java
PS C:\Rohith\Backup\Desktop\SEM 3\OOP-Java\Java programs\Lab programs\Exercise-6> java Main
PROGRAM TO CALCULATE THE AREA AND PERIMETER OF GIVEN SHAPE

Choices:
1.Triangle
2.Square
3.Circle
4.Exit

Enter the choice:
1

Enter the side of the equilateral triangle:
10
The perimeter of equilateral triangle is: 30.0
The area of equilateral triangle is: 43.301270189221924

PROGRAM TO CALCULATE THE AREA AND PERIMETER OF GIVEN SHAPE

Choices:
1.Triangle
2.Square
3.Circle
4.Exit

Enter the choice:
2

Enter the side of the Square:
10
The perimeter of Square is: 40.0
The area of Square is: 100.0
```

```
PROGRAM TO CALCULATE THE AREA AND PERIMETER OF GIVEN SHAPE

Choices:
1.Triangle
2.Square
3.Circle
4.Exit

Enter the choice:
3

Enter the radius of the circle:
10
The circumference of Circle is: 62.83185307179586
The area of Circle is: 314.1592653589793

PROGRAM TO CALCULATE THE AREA AND PERIMETER OF GIVEN SHAPE

Choices:
1.Triangle
2.Square
3.Circle
4.Exit

Enter the choice:
4

PS C:\Rohith\Backup\Desktop\SEM 3\OOP-Java\Java programs\Lab programs\Exercise-6>
```

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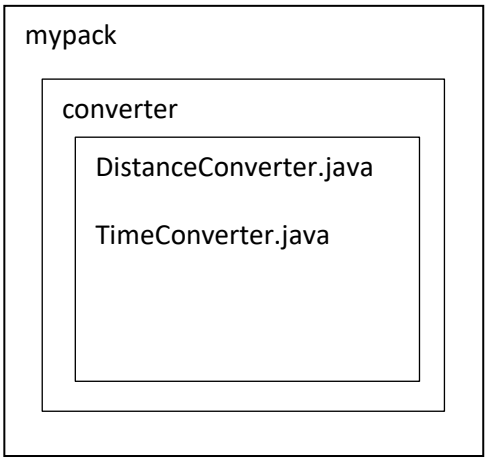
2. **Create a package named 'mypack.converter' with the following java classes. Implement distance converter (meter to KM, miles to KM and vice versa) in DistanceConverter class, time converter (hours to minutes, minute to seconds and vice versa) in TimeConverter class. Write the main program to access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

Class diagram:



DistanceConverter
+km: double
+meter: double
+miles: double
+meter2KM(meter): double
+miles2KM(miles): double
+KM2meter(km): double
+KM2miles(km): double

TimeConverter
+hr: double
+min: double
+sec: double
+hr2min(hr): double
+min2sec(min): double
+min2hr(min): double
+sec2min(sec): double

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Program code:

DistanceConverter.java

```
package mypack.converter;

public class DistanceConverter
{
    public double km,meter,miles;

    public double meter2KM(double meter)
    {
        this.meter=meter;
        return meter/1000;
    }

    public double miles2KM(double miles)
    {
        this.miles=miles;
        return miles*1.60934;
    }

    public double KM2meter(double km)
    {
        this.km=km;
        return km*1000;
    }

    public double KM2miles(double km)
    {
        this.km=km;
        return km*0.621371;
    }
}
```

TimeConverter.java

```
package mypack.converter;

public class TimeConverter
{
    public double hr,min,sec;

    public double hr2min(double hr)
    {
        this.hr=hr;
        return hr*60;
    }
```

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```
    public double min2sec(double min)
    {
        this.min=min;
        return min*60;
    }

    public double min2hr(double min)
    {
        this.min=min;
        return min/60;
    }

    public double sec2min(double sec)
    {
        this.sec=sec;
        return sec/60;
    }
}
```

Main2.java

```
import mypack.converter.DistanceConverter;
import mypack.converter.TimeConverter;
import java.util.Scanner;

class Main2
{
    public static void main(String[] args)
    {
        int choice1=0,choice2=0;
        Scanner scanner=new Scanner(System.in);
        DistanceConverter d=new DistanceConverter();
        TimeConverter t=new TimeConverter();
        double km=0,meter=0,miles=0,min=0,hr=0,sec=0;
        do
        {
            System.out.println("CONVERTER PROGRAM\n");
            System.out.println("Choice:\n1.Distance Converter\n2.Time
Converter\n3.Exit\n");
            System.out.println("Enter the choice: ");
            choice1=scanner.nextInt();
            System.out.println();
            switch(choice1)
            {
                case 1:
                    System.out.println("DISTANCE CONVERTER\n");
```

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```
                    System.out.println("Choices:\n1.meter to KM\n2.miles to
KM\n3.KM to meter\n4.KM to miles\n");
                    System.out.println("Enter the choice: ");
                    choice2=scanner.nextInt();
                    System.out.println();
                    switch(choice2)
                    {
                        case 1:
                            System.out.println("METER TO KM\n");
                            System.out.println("Enter the meter value: ");
                            meter=scanner.nextDouble();
                            System.out.println(meter+" meters to KM =
"+d.meter2KM(meter)+" km\n");
                            break;
                        case 2:
                            System.out.println("MILES TO KM\n");
                            System.out.println("Enter the miles value: ");
                            miles=scanner.nextDouble();
                            System.out.println(miles+" miles to KM =
"+d.miles2KM(miles)+" km\n");
                            break;
                        case 3:
                            System.out.println("KM TO METER\n");
                            System.out.println("Enter the km value: ");
                            km=scanner.nextDouble();
                            System.out.println(km+" km to METER =
"+d.KM2meter(km)+" meter\n");
                            break;
                        case 4:
                            System.out.println("KM TO miles\n");
                            System.out.println("Enter the miles value: ");
                            km=scanner.nextDouble();
                            System.out.println(km+" km to miles =
"+d.KM2miles(km)+" miles\n");
                            break;
                        default:
                            System.out.println("Invalid choice\n");
                    }
                    break;
                case 2:
                    System.out.println("TIME CONVERTER\n");
                    System.out.println("Choices:\n1.Hours to
minutes\n2.Minutes to seconds\n3.Minutes to hours\n4.Seconds to minutes\n");
                    System.out.println("Enter the choice: ");
                    choice2=scanner.nextInt();
                    System.out.println();
                    switch(choice2)
                    {
```

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```
                        case 1:
                            System.out.println("Hours to minutes\n");
                            System.out.println("Enter the hour value: ");
                            hr=scanner.nextDouble();
                            System.out.println(hr+" hrs to minutes =
"+t.hr2min(hr)+" min \n");
                            break;
                        case 2:
                            System.out.println("Minutes to seconds\n");
                            System.out.println("Enter the min value: ");
                            min=scanner.nextDouble();
                            System.out.println(min+" min to seconds =
"+t.min2sec(min)+" sec \n");
                            break;
                        case 3:
                            System.out.println("Minutes to hours\n");
                            System.out.println("Enter the min value: ");
                            min=scanner.nextDouble();
                            System.out.println(min+" min to hours =
"+t.min2hr(min)+" hrs \n");
                            break;
                        case 4:
                            System.out.println("Seconds to minutes\n");
                            System.out.println("Enter the seconds value: ");
                            sec=scanner.nextDouble();
                            System.out.println(sec+" sec to minutes =
"+t.sec2min(sec)+" min \n");
                            break;
                        default:
                            System.out.println("Invalid choice\n");
                    }
                    break;
                case 3:
                    System.exit(0);
                default:
                    System.out.println("\nInvalid choice!\n");
            }
        }while(choice1!=3);
    }
}
```

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Output:

```
PS C:\Rohith\Backup\Desktop\SEM 3\OOP-Java\Java programs\Lab programs\Exercise-6> javac Main2.java
PS C:\Rohith\Backup\Desktop\SEM 3\OOP-Java\Java programs\Lab programs\Exercise-6> java Main2
CONVERTER PROGRAM

Choice:
1.Distance Converter
2.Time Converter
3.Exit

Enter the choice:
1

DISTANCE CONVERTER

Choices:
1.meter to KM
2.miles to KM
3.KM to meter
4.KM to miles

Enter the choice:
1

METER TO KM

Enter the meter value:
1000
1000.0 meters to KM = 1.0 km
```

```
CONVERTER PROGRAM

Choice:
1.Distance Converter
2.Time Converter
3.Exit

Enter the choice:
1

DISTANCE CONVERTER

Choices:
1.meter to KM
2.miles to KM
3.KM to meter
4.KM to miles

Enter the choice:
2

MILES TO KM

Enter the miles value:
100
100.0 miles to KM = 160.934 km
```

```
CONVERTER PROGRAM

Choice:
1.Distance Converter
2.Time Converter
3.Exit

Enter the choice:
1

DISTANCE CONVERTER

Choices:
1.meter to KM
2.miles to KM
3.KM to meter
4.KM to miles

Enter the choice:
3

KM TO METER

Enter the km value:
1
1.0 km to METER = 1000.0 meter
```

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```
CONVERTER PROGRAM

Choice:
1.Distance Converter
2.Time Converter
3.Exit

Enter the choice:
1

DISTANCE CONVERTER

Choices:
1.meter to KM
2.miles to KM
3.KM to meter
4.KM to miles

Enter the choice:
4

KM TO miles

Enter the miles value:
1000
1000.0 km to miles = 621.371 miles
```

```
CONVERTER PROGRAM

Choice:
1.Distance Converter
2.Time Converter
3.Exit

Enter the choice:
2

TIME CONVERTER

Choices:
1.Hours to minutes
2.Minutes to seconds
3.Minutes to hours
4.Seconds to minutes

Enter the choice:
1

Hours to minutes

Enter the hour value:
2
2.0 hrs to minutes = 120.0 min
```

```
CONVERTER PROGRAM

Choice:
1.Distance Converter
2.Time Converter
3.Exit

Enter the choice:
2

TIME CONVERTER

Choices:
1.Hours to minutes
2.Minutes to seconds
3.Minutes to hours
4.Seconds to minutes

Enter the choice:
2

Minutes to seconds

Enter the min value:
10
10.0 min to seconds = 600.0 sec
```

```
CONVERTER PROGRAM

Choice:
1.Distance Converter
2.Time Converter
3.Exit

Enter the choice:
2

TIME CONVERTER

Choices:
1.Hours to minutes
2.Minutes to seconds
3.Minutes to hours
4.Seconds to minutes

Enter the choice:
3

Minutes to hours

Enter the min value:
80
80.0 min to hours = 1.3333333333333333 hrs
```

```
CONVERTER PROGRAM

Choice:
1.Distance Converter
2.Time Converter
3.Exit

Enter the choice:
2

TIME CONVERTER

Choices:
1.Hours to minutes
2.Minutes to seconds
3.Minutes to hours
4.Seconds to minutes

Enter the choice:
4

Seconds to minutes

Enter the seconds value:
120
120.0 sec to minutes = 2.0 min
```

```
CONVERTER PROGRAM

Choice:
1.Distance Converter
2.Time Converter
3.Exit

Enter the choice:
3

PS C:\Rohith\Backup\Desktop\SEM 3\OOP-Java\Java programs\Lab programs\Exercise-6>
```

Learning Outcomes:

Thus the working of packages in Java has been implemented and executed successfully in various programs.