```
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//CSE 'A' 2nd year
//Exercise 4b : Polymorphism

/* 1 - Write a TestDriver function to get input for Faculty and
TeachingAssistant and
display their details*/

import java.util.*;
class Person
{
    private String name;
    private String address;
    public Person(String name,String address)
    {
        this.name=name;
        this.address=address;
    }
    public String getName()
    {
        return name;
    }
    public void setAddress(String address)
    {
        this.address=address;
    }
    public String getAddress()
    {
        return address;
    }
}
class Employee extends Person
{
    private String empid;
    private String dept;
    private int basic;
    public Employee(String name,String address,String empid,String dept,int
basic)
    {
        super(name,address);
        this.empid=empid;
        this.dept=dept;
        this.basic=basic;
    }
    public void setDept(String dept)
    {
        this.dept=dept;
    }
    public void setBasic(int basic)
    {
        this.basic=basic;
    }
    public String getEmpid()
    {
        return empid;
    }
    public String getDept()
    {
        return dept;
    }
    public int getBasic()
    {
        return basic;
```

```
    }
    public float calSalary()
    {
        return (basic);
    }
}
class Faculty extends Employee
{
    private String desig;
    private String course;
    public Faculty(String name,String address,String empid,String dept,int
basic,String desig,String course)
    {
        super(name,address,empid,dept,basic);
        this.desig=desig;
        this.course=course;
    }
    public void setDesig(String desig)
    {
        this.desig=desig;
    }
    public void setCourse(String course)
    {
        this.course=course;
    }
    public String getCourse()
    {
        return course;
    }
    public String getDesig()
    {
        return desig;
    }
    @Override public float calSalary()
    {
        return (10*super.getBasic());
    }
}
interface Student
{
    public float[] getMarks();
    public float calcGPA();
}
class TeachingAssistant extends Employee implements Student
{
    private String project;
    private String course;
    private float []marks= new float[3];
    public TeachingAssistant(String name,String address,String empid,String
dept,int basic,String project,String course,float []marks)
    {
        super(name,address,empid,dept,basic);
        this.course=course;
        this.project=project;
        for(int i=0;i<3;i++)
        {
            this.marks[i]=marks[i];
        }
    }
    public void setCourse(String course)
    {
        this.course=course;
    }
    public String getCourse()
```

```
    {
        return course;
    }
    public String getProject()
    {
        return project;
    }
    @Override public float[] getMarks()
    {
        return marks;
    }
    @Override public float calcGPA()
    {
        int total=0;
        float avg;
        for(int i=0;i<3;i++)
        {
            total+=marks[i];
        }
        avg=total/3;
        if(avg<=100 && avg>90)
        {
            return 10;
        }
        else if(avg<=90 && avg>80)
        {
            return 9;
        }
        else if(avg<=80 && avg>70)
        {
            return 8;
        }
        else if(avg<=70 && avg>60)
        {
            return 7;
        }
        else if(avg<=60 && avg>50)
        {
            return 6;
        }
        else
        {
            return 0;
        }

    }
    @Override public float calSalary()
    {
        return (5*super.getBasic());
    }
}
class FacultyTAProgram
{
    public static void main(String []args)
    {
        Scanner in=new Scanner(System.in);
        String name,address,dept,empid;
        int basic;
        String desig,course;
        String project;
        float []marks=new float[3];
        int i;
        System.out.println("\nEnter \n1-Faculty \n2-TeachingAssistant \n");
        int choice=in.nextInt();
```

```
        in.nextLine();
        switch(choice)
        {
            case 1:
            {
                System.out.print("Enter the name of Faculty: ");
                name=in.nextLine();
                System.out.print("Enter the address: ");
                address=in.nextLine();
                System.out.print("Enter the dept: ");
                dept=in.nextLine();
                System.out.print("Enter the empid: ");
                empid=in.nextLine();
                System.out.print("Enter the basic salary: ");
                basic=in.nextInt();
                in.nextLine();
                System.out.print("Enter the designation: ");
                desig=in.nextLine();
                System.out.print("Enter the course: ");
                course=in.nextLine();
                Faculty f=new
Faculty(name,address,empid,dept,basic,desig,course);
                System.out.println("\n\nDetails of FACULTY\nName : "+f.getName()
+"\nAddress : "+f.getAddress()+"\nDept : "+f.getDept()+"\nEmployeeID :
"+f.getEmpid()+"\nDesigantion : "+f.getDesig()+"\nCourse : "+f.getCourse()+"\
nSalary : Rs."+f.calSalary());
                break;
            }
            case 2:
            {
                System.out.print("Enter the name of TeachingAssistant: ");
                name=in.nextLine();
                System.out.print("Enter the address: ");
                address=in.nextLine();
                System.out.print("Enter the dept: ");
                dept=in.nextLine();
                System.out.print("Enter the empid: ");
                empid=in.nextLine();
                System.out.print("Enter the basic salary: ");
                basic=in.nextInt();
                in.nextLine();
                System.out.print("Enter the course: ");
                course=in.nextLine();
                System.out.print("Enter the project approval (yes/no): ");
                project=in.nextLine();
                System.out.print("Enter the marks in three subjects: ");
                for(i=0;i<3;i++)
                {
                    marks[i]=in.nextFloat();
                }
                TeachingAssistant f=new
TeachingAssistant(name,address,empid,dept,basic,project,course,marks);
                System.out.println("\n\nDetails of TEACHING ASSISTANT\nName :
"+f.getName()+"\nAddress : "+f.getAddress()+"\nDept : "+f.getDept()+"\
nEmployeeID : "+f.getEmpid()+"\nProjectInProgress : "+f.getProject()+"\nCourse :
"+f.getCourse()+"\nGPA : "+f.calcGPA()+"\nSalary : Rs."+f.calSalary());
                break;
            }
            default:
            {
                System.out.println("Wrong choice. Sorry ! Enter 1/2 alone.");
                break;
            }
        }
```

```
    }
}

/*
C:\Java Programs\Ex4b>java FacultyTAProgram

Enter
1-Faculty
2-TeachingAssistant

1
Enter the name of Faculty: Eugene Roberts
Enter the address: 15 Happy Campus Chennai
Enter the dept: CSE
Enter the empid: P65854722
Enter the basic salary: 10000
Enter the designation: Associate Professor
Enter the course: OOPs using Java


Details of FACULTY
Name : Eugene Roberts
Address : 15 Happy Campus Chennai
Dept : CSE
EmployeeID : P65854722
Desigantion : Associate Professor
Course : OOPs using Java
Salary : Rs.100000.0

C:\Java Programs\Ex4b>java FacultyTAProgram

Enter
1-Faculty
2-TeachingAssistant

2
Enter the name of TeachingAssistant: Avit
Enter the address: 15 Happy Colony Chennai
Enter the dept: CSE
Enter the empid: T635458
Enter the basic salary: 5000
Enter the course: OOPs using Java
Enter the project approval (yes/no): YES
Enter the marks in three subjects: 95 95 95


Details of TEACHING ASSISTANT
Name : Avit
Address : 15 Happy Colony Chennai
Dept : CSE
EmployeeID : T635458
ProjectInProgress : YES
Course : OOPs using Java
GPA : 10.0
Salary : Rs.25000.0
*/




/* 2 - Write a test driver called TestInterface | TestAbstract . Use an array of
objects of type Shape to display the area, perimeter of all the shapes (Circle,
Rectangle, Square)*/
```

```
import java.util.*;
interface Shows
{
    void display();
}
abstract class Shape
{
    protected String color="Red";
    public Shape()
    {
        //System.out.println("RECTANGLE");
    }
    public Shape(String color)
    {
        this.color=color;
    }
    public void setColor(String color)
    {
        this.color=color;
    }
    public String getColor()
    {
        return color;
    }
    public void display()
    {
        System.out.println("\n\nThis is SHAPE");
    }
    abstract float getArea();
    abstract float getPerimeter();
}
class Circle extends Shape implements Shows
{
    protected float radius=1.0f;
    public Circle()
    {
        super();
    }
    public Circle(float radius)
    {
        super();
        this.radius=radius;
    }
    public Circle(float radius,String color)
    {
        super(color);
        this.radius=radius;
    }
    public void setRadius(float radius)
    {
        this.radius=radius;
    }
    public float getRadius()
    {
        return radius;
    }
    @Override public float getArea()
    {
        return (3.14f*radius*radius);
    }
    @Override public float getPerimeter()
    {
        return (2*3.14f*radius);
```

```
    }
    @Override public void display()
    {
        System.out.println("\n\nThis is CIRCLE");
    }
}
class Rectangle extends Shape implements Shows
{
    protected float width=1.0f;
    protected float length=1.0f;
    public Rectangle()
    {
        super();
    }
    public Rectangle(float width,float length)
    {
        super();
        this.width=width;
        this.length=length;
    }
    public Rectangle(float width,float length,String color)
    {
        super(color);
        this.width=width;
        this.length=length;
    }
    public void setWidth(float width)
    {
        this.width=width;
    }
    public void setLength(float length)
    {
        this.length=length;
    }
    public float getLength()
    {
        return
 length;
    }
    public float getWidth()
    {
        return width;
    }
    @Override public float getArea()
    {
        return (width*length);
    }
    @Override public float getPerimeter()
    {
        return (2*(length+width));
    }
    @Override public void display()
    {
        System.out.println("\n\nThis is RECTANGLE");
    }
}
class Square extends Rectangle
{
    public Square()
    {
        super();
        System.out.println("");
    }
    public Square(float side)
```

```
    {
        super(side,side);
    }
    public Square(float side,String color)
    {
        super(side,side,color);
    }
    public void setSide(float side)
    {
        super.length=side;
        super.width=side;
    }
    public float getSide()
    {
        return super.getLength();
    }
    @Override public float getArea()
    {
        return (super.length*super.width);
    }
    @Override public float getPerimeter()
    {
        return (4*super.length);
    }
    @Override public void display()
    {
        System.out.println("\n\nThis is SQUARE");
    }
}
class ShapeProgram
{
    public static void main(String []args)
    {
        Scanner in=new Scanner(System.in);
        int i;
        float radius,side,width,length;
        String str,color;
        System.out.print("Enter the total number of objects(Different Shapes) to
be formed: ");
        int total=in.nextInt();
        Shape []s=new Shape[total];
        in.nextLine();
        for(i=0;i<total;i++)
        {
            System.out.println("\n\nEnter \n1 -  Circle \n2 - Rectangle \n3 -
Square \n");
            int choice=in.nextInt();
            switch(choice)
            {
                case 1:
                {
                    System.out.print("Enter the radius of Circle: ");
                    radius=in.nextFloat();
                    System.out.print("Do you want to enter color (yes/no): ");
                    str=in.next();
                    if(str.equalsIgnoreCase("yes"))
                    {
                        System.out.print("Enter the color of Circle: ");
                        color=in.next();
                        s[i]=new Circle(radius,color);
                    }
                    else
                    {
                        s[i]=new Circle(radius);
```

```
                    }
                    break;
                }
                case 2:
                {
                    System.out.print("Enter the width of Rectangle: ");
                    width=in.nextFloat();
                    System.out.print("Enter the length of Rectangle: ");
                    length=in.nextFloat();
                    System.out.print("Do you want to enter color (yes/no): ");
                    str=in.next();
                    if(str.equalsIgnoreCase("yes"))
                    {
                        System.out.print("Enter the color of Rectangle: ");
                        color=in.next();
                        s[i]=new Rectangle(width,length,color);
                    }
                    else
                    {
                        s[i]=new Rectangle(width,length);
                    }
                    break;
                }
                case 3:
                {
                    System.out.print("Enter the side of Square: ");
                    side=in.nextFloat();
                    System.out.print("Do you want to enter color (yes/no): ");
                    str=in.next();
                    if(str.equalsIgnoreCase("yes"))
                    {
                        System.out.print("Enter the color of Sqaure: ");
                        color=in.next();
                        s[i]=new Square(side,color);
                    }
                    else
                    {
                        s[i]=new Square(side);
                    }
                    break;
                }
                default:
                {
                    System.out.println("Enter 1/2/3 alone! Enter again: ");
                    choice=in.nextInt();
                    break;
                }
            }
        }
        for(i=0;i<total;i++)
        {
            s[i].display();
            System.out.println("Color is "+s[i].color);
            System.out.println("Area is "+s[i].getArea()+" sq.units");
            System.out.println("Perimeter is "+s[i].getPerimeter()+" units");
        }
    }
}

/*
C:\Java Programs\Ex4b>java ShapeProgram
Enter the total number of objects(Different Shapes) to be formed: 5
```

```
Enter
1 -  Circle
2 - Rectangle
3 - Square

1
Enter the radius of Circle: 10
Do you want to enter color (yes/no): yes
Enter the color of Circle: Blue


Enter
1 -  Circle
2 - Rectangle
3 - Square

2
Enter the width of Rectangle: 5
Enter the length of Rectangle: 2
Do you want to enter color (yes/no): no


Enter
1 -  Circle
2 - Rectangle
3 - Square

2
Enter the width of Rectangle: 6
Enter the length of Rectangle: 4
Do you want to enter color (yes/no): yes
Enter the color of Rectangle: Purple


Enter
1 -  Circle
2 - Rectangle
3 - Square

3
Enter the side of Square: 8
Do you want to enter color (yes/no): yes
Enter the color of Sqaure: Black


Enter
1 -  Circle
2 - Rectangle
3 - Square

3
Enter the side of Square: 6
Do you want to enter color (yes/no): yes
Enter the color of Sqaure: White


This is CIRCLE
Color is Blue
Area is 314.0 sq.units
Perimeter is 62.800003 units


This is RECTANGLE
Color is Red
```

```
Area is 10.0 sq.units
Perimeter is 14.0 units


This is RECTANGLE
Color is Purple
Area is 24.0 sq.units
Perimeter is 20.0 units


This is SQUARE
Color is Black
Area is 64.0 sq.units
Perimeter is 32.0 units


This is SQUARE
Color is White
Area is 36.0 sq.units
Perimeter is 24.0 units
*/
```