Ex4b - Interface and Abstract class

Aviansh Gupta

CSE-A

185001028

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;

Person(String name,String address){

this.name = name;

this.address = address;

}

String getname(){return name;}

String getAddress(){return address;}

void setAddress(String address){this.address = address;}

}

class Employee extends Person{

private String empid;

private String dept;

private int basic;

Employee(String name,String address,String empid,String dept,int basic){

super(name,address);

this.empid = empid;

this.dept = dept;

this.basic = basic;

}

String getEmpid(){return empid;}

String getDept(){return dept;}

void setDept(String dept){this.dept = dept;}

void setBasic(int basic){this.basic = basic;}

int getBasic(){return basic;}

float calSalary(){return basic;}

}

class Faculty extends Employee{

private String desig;

private String course;

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;

}

String getDesig(){return desig;}

void setDesig(String desig){this.desig = desig;}

String getCourse(){return course;}

void setCourse(String course){this.course = course;}

float calSalary(){return getBasic();}

}

interface Student{

float getMarks();

float clacGPA();

}

class TeachingAssistant extends Employee implements Student{

private String project;

private String course;

private float marks;

TeachingAssistant(String name, String address, String empid, String dept, int basic, String project, String course, float marks){

super(name,address,empid,dept, basic);

this.project = project;

this.marks = marks;

}

String getProject(){return project;}

String getCourse(){return course;}

void setCourse(String course){this.course = course;}

public float getMarks(){return marks;}

public float clacGPA(){return marks;}

float calSalary(){return getBasic();}

}

class details{

public static void main(String argv[]){

String name, address,dept, project, course, empid, desig;

int basic, marks,choice,choice1,choice2;

Scanner s = new Scanner(System.in);

TeachingAssistant t = null;

Faculty f = null;

System.out.println("enter the details");

System.out.println("Enter your choice\n1.Teaching assisstant\n2.Faculty");

choice = s.nextInt();

System.out.println("Enter :\n1.Name\n2.Address\n3.Employee ID\n4.Department\n5.Basic Pay");

name = s.nextLine();

address = s.nextLine();

empid = s.nextLine();

s.nextLine();

dept = s.nextLine();

basic= s.nextInt();

if(choice == 1){

System.out.println("Enter :\n6.Project\n7.Course\n8.Marks");

s.nextLine();

project = s.nextLine();

course = s.nextLine();

marks = s.nextInt();

t= new TeachingAssistant(name, address, empid, dept, basic, project, course, marks);

}

else if (choice == 2){

System.out.println("Enter :\n6.Designation\n7.Course");

s.nextLine();

desig = s.nextLine();

course = s.nextLine();

f= new Faculty(name,address,empid,dept,basic,desig,course);

}

do{

System.out.println("\nEnter choice:\n1.Edit record\n2.Display record\n3.Exit");

choice1=s.nextInt();

if(choice1==1){

switch(choice){

case 1: System.out.println("1.Address\n2.Department\n3.Basic\n4.Course");

choice2=s.nextInt();

if(choice2==1){

System.out.println("Enter:");

s.nextLine();

t.setAddress(s.nextLine());

}

else if(choice2==2){

System.out.println("Enter:");

s.nextLine();

t.setDept(s.nextLine());

}

else if(choice2==3){

System.out.println("Enter:");

t.setBasic(s.nextInt());

}

else if(choice2==4){

System.out.println("Enter:");

s.nextLine();

t.setCourse(s.nextLine());

}

break;

case 2: System.out.println("1.Address\n2.Department\n3.Basic Pay\n4.COurse");

choice2=s.nextInt();

if(choice2==1){

System.out.println("Enter:");

s.nextLine();

f.setAddress(s.nextLine());

}

else if(choice2==2){

System.out.println("Enter:");

s.nextLine();

f.setDept(s.nextLine());

}

else if(choice2==3){

System.out.println("Enter:");

f.setBasic(s.nextInt());

}

else if(choice2==3){

System.out.println("Enter:");

s.nextLine();

f.setCourse(s.nextLine());

}

break;

default : System.out.println("Choose either 1 or 2");

break;

}

}

if(choice1==2){

System.out.println("\n");

switch(choice){

case 1: System.out.printf("Name:"+t.getname()+"\nAddress:"+t.getAddress()+"\nEmployee ID:"+t.getEmpid()+"\nDepartment:"+t.getDept()+"\nBasic:"+t.getBasic()+"\nProject:"+t.getProject()+"\nCourse:"+t.getCourse()+"\nMarks:"+t.getMarks());

System.out.printf("\nSalary:"+t.calSalary()+"\nGPA"+t.clacGPA());

break;

case 2: System.out.printf("Name:"+f.getname()+"\nAddress:"+f.getAddress()+"\nEmployee ID:"+f.getEmpid()+"\nDepartment:"+f.getDept()+"\nBasic:"+f.getBasic()+"\nDesignation:"+f.getDesig()+"\nCourse:"+f.getCourse());

// System.out.printf("Designation:%s\nDepartment:%s\nBasic Pay:%f\nSalary:%f\n",f.getDesig(),f.getDept(),f.getBasic(),f.calSalary());

break;

default : System.err.println("Choose either 1 or 2");

break;

}

System.out.println("\n");

}

}while(choice1 != 3);

}

}

/\*

OUTPUT

enter the details

Enter your choice

1.Teaching assisstant

2.Faculty

1

Enter :

1.Name

2.Address

3.Employee ID

4.Department

5.Basic Pay

a

b

123

g

80

Enter :

6.Project

7.Course

8.Marks

pro

math

70

Enter choice:

1.Edit record

2.Display record

3.Exit

1

1.Address

2.Department

3.Basic

4.Course

2

Enter:

math

Enter choice:

1.Edit record

2.Display record

3.Exit

2

Name:

Address:a

Employee ID:b

Department:math

Basic:80

Project:pro

Course:null

Marks:70.0

Salary:80.0

GPA70.0

Enter choice:

1.Edit record

2.Display record

3.Exit

3

enter the details

Enter your choice

1.Teaching assisstant

2.Faculty

2

Enter :

1.Name

2.Address

3.Employee ID

4.Department

5.Basic Pay

abrit

chennai

234

math

80

Enter :

6.Designation

7.Course

prof

ml

Enter choice:

1.Edit record

2.Display record

3.Exit

1

1.Address

2.Department

3.Basic Pay

4.COurse

2

Enter:

cse

Enter choice:

1.Edit record

2.Display record

3.Exit

2

Name:

Address:abrit

Employee ID:chennai

Department:cse

Basic:80

Designation:prof

Course:ml

Enter choice:

1.Edit record

2.Display record

3.Exit

3

\*/

1. Draw the class diagram of the above class hierarchy.

2. Implement the above class hierarchy by using Interface and Abstract class.

3. 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).

4. Note down the differences while implementing the Inheritance through Interface

and Abstract class.

5. Note the run-time polymorphism in resolving the method call exhibited by Java

through method overriding.

import java.util.\*;

abstract class Shape{

protected String color = "red";

Shape(){}

Shape(String color){this.color = color;}

String getColor(){return color;}

void setColor(String color){}

abstract float getArea();

abstract float getPerimeter();

int shape() {

return -1;

}

}

class Circle extends Shape{

protected float radius = 1.0f;

Circle(){}

Circle(float radius){

this.radius = radius;}

Circle(float radius,String color){

this.radius = radius;

this.color = color;

}

float getRadius(){return radius;}

void setRadius(float radius){this.radius = radius;}

float getPerimeter(){return (2\*3.14f\*radius);}

float getArea(){return (3.14f\*radius\*radius);}

int shape() {

return 0;

}

}

class Rectangle extends Shape{

protected float width = 1.0f;

protected float length = 1.0f;

Rectangle(){}

Rectangle(float width,float length){

this.width = width;

this.length = length;

}

Rectangle(float width,float length,String color){

this.width = width;

this.length = length;

this.color = color;

}

float getWidth(){return width;}

void setWidth(float width){this.width = width;}

float getLength(){return length;}

void setLength(float length){}

float getArea(){return (width\*length);}

float getPerimeter(){return (2\*(width+length));}

int shape() {

return 1;

}

}

class Square extends Rectangle{

protected float side = length=width;

Square(){}

Square(float side){this.side = side;}

Square(float side,String color){

this.side = side;

this.color = color;

}

float getSide(){return side;}

void setSide(float side){this.side = side;}

float getArea(){return side\*side;}

float getPerimeter(){return 4\*side;}

int shape() {

return 2;

}

}

class testimplementation{

public static void main(String[] ar) {

Scanner sc = new Scanner(System.in);

System.out.println("Enter the no' of shapes:");

int n = sc.nextInt();

Shape[] s = new Shape[3 \* n];

int choice;

String clr;

float len, wid;

for (int i = 0; i < 3 \* n; i++) {

System.out.println("Enter choice:\n1.Circle\t2.Rectangle\t3.Square");

choice = sc.nextInt();

if (choice == 1) {

System.out.println(

"Three circles created:\n1.Circle with default colour and rad\n2.Circle with default colour and rad 5\nCircle with blue colour and rad 5");

s[i] = new Circle();

s[++i] = new Circle(10);

s[++i] = new Circle(10, "GREEN");

} else if (choice == 2) {

System.out.println(

"Three rectangles created:\n1.Rectangle with default colour length and width\n2.Rectangle with default colour and length 3 and width 5\nRectangle with blue colour and len 5 and wid 8");

s[i] = new Rectangle();

s[++i] = new Rectangle(5, 8);

s[++i] = new Rectangle(5, 10, "YELLOW");

} else if (choice == 3) {

System.out.println(

"Three squares created:\n1.Square with default colour and side length\n2.Square with default colour and side lenght 5\nSquare with blue colour and side length 5");

s[i] = new Square();

s[++i] = new Square(7);

s[++i] = new Square(13, "Blue");

}

}

int choice2 = 1, choice3;

float r, p, a, w;

do {

if (choice2 == 1) {

System.out.println("S.No.\tShape:\t\tlen\t\tbreadth\t\trad\t\tPerimeter\tArea");

for (int i = 0; i < 3 \* n; i++) {

switch (s[i].shape()) {

case 0:

r = ((Circle) s[i]).getRadius();

p = ((Circle) s[i]).getPerimeter();

a = ((Circle) s[i]).getArea();

System.out.printf("%d\tCircle\t\t-\t\t-\t\t%f\t%f\t%f\n", (i + 1), r, p, a);

break;

case 1:

r = ((Rectangle) s[i]).getLength();

w = ((Rectangle) s[i]).getWidth();

p = ((Rectangle) s[i]).getPerimeter();

a = ((Rectangle) s[i]).getArea();

System.out.printf("%d\tRectangle\t%f\t%f\t-\t\t%f\t%f\n", (i + 1), r, w, p, a);

break;

case 2:

r = ((Square) s[i]).getSide();

p = ((Square) s[i]).getPerimeter();

a = ((Square) s[i]).getArea();

System.out.printf("%d\tSquare\t\t%f\t-\t\t-\t\t%f\t%f\n", (i + 1), r, p, a);

break;

}

}

} else if (choice2 == 2) {

System.out.println("Enter the serial number of the shape you want to alter:");

choice3 = sc.nextInt();

switch (s[choice3 - 1].shape()) {

case 0:

System.out.println("Enter rad");

((Circle) s[choice3 - 1]).setRadius(sc.nextFloat());

break;

case 1:

System.out.println("Enter len and wid");

((Rectangle) s[choice3 - 1]).setLength(sc.nextFloat());

((Rectangle) s[choice3 - 1]).setWidth(sc.nextFloat());

break;

case 2:

System.out.println("Enter side");

((Square) s[choice3 - 1]).setSide(sc.nextFloat());

break;

}

}

System.out.println("Enter choice\n1.Display\t2.Edit \t3.Exit");

choice2 = sc.nextInt();

} while (choice2 != 3);

}

}

/\*

OUTPUT

Enter the no' of shapes:

3

Enter choice:

1.Circle 2.Rectangle 3.Square

1

Three circles created:

1.Circle with default colour and rad

2.Circle with default colour and rad 5

Circle with blue colour and rad 5

Enter choice:

1.Circle 2.Rectangle 3.Square

2

Three rectangles created:

1.Rectangle with default colour length and width

2.Rectangle with default colour and length 3 and width 5

Rectangle with blue colour and len 5 and wid 8

Enter choice:

1.Circle 2.Rectangle 3.Square

3

Three squares created:

1.Square with default colour and side length

2.Square with default colour and side lenght 5

Square with blue colour and side length 5

S.No. Shape: len breadth rad Perimeter Area

1 Circle - - 1.000000 6.280000 3.140000

2 Circle - - 10.000000 62.800003 314.000000

3 Circle - - 10.000000 62.800003 314.000000

4 Rectangle 1.000000 1.000000 - 4.000000 1.000000

5 Rectangle 8.000000 5.000000 - 26.000000 40.000000

6 Rectangle 10.000000 5.000000 - 30.000000 50.000000

7 Square 1.000000 - - 4.000000 1.000000

8 Square 7.000000 - - 28.000000 49.000000

9 Square 13.000000 - - 52.000000 169.000000

Enter choice

1.Display 2.Edit 3.Exit

2

Enter the serial number of the shape you want to alter:

9

Enter side

14

Enter choice

1.Display 2.Edit 3.Exit

1

S.No. Shape: len breadth rad Perimeter Area

1 Circle - - 1.000000 6.280000 3.140000

2 Circle - - 10.000000 62.800003 314.000000

3 Circle - - 10.000000 62.800003 314.000000

4 Rectangle 1.000000 1.000000 - 4.000000 1.000000

5 Rectangle 8.000000 5.000000 - 26.000000 40.000000

6 Rectangle 10.000000 5.000000 - 30.000000 50.000000

7 Square 1.000000 - - 4.000000 1.000000

8 Square 7.000000 - - 28.000000 49.000000

9 Square 14.000000 - - 56.000000 196.000000

Enter choice

1.Display 2.Edit 3.Exit

3

\*/