OOP Lab

Week 4 Assignment Submission

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Batch B1

10

Q1) Create a **Person** class with private instance variables for the person's name and birth date. Add appropriate accessor methods for these variables. Then create a subclass **College Graduate** with private instance variables for the student's GPA and year of graduation and appropriate accessors for these variables. Include appropriate constructors for your classes. Then create a separate class with **main()** method that demonstrates your classes. Use keyword super appropriately.

CODE:

// Lab4Q1.java

```
import java.util.*;


class Person
{
  private String name;
  private String dob;
    Person ()
  {
  }
  void setName (String n)
  {
    name = n;
  }
```

```
  String getName ()
  {
    return name;
  }
  void setDob (String d)
  {
    dob = d;
  }
  String getDob ()
  {
    return dob;
  }
  void display ()
  {
    System.out.println ("Name: " + getName ());
    System.out.println ("DOB: " + getDob ());
  }
}

class CollegeGraduate extends Person
{
  private float gpa;
  private int gradyear;
    CollegeGraduate ()
  {
    super ();
  }
```

```
  void setGPA (float g)
  {
    gpa = g;
  }
  void setGradYear (int y)
  {
    gradyear = y;
  }
  float getGPA ()
  {
    return gpa;
  }
  int getGradYear ()
  {
    return gradyear;
  }
  void display ()
  {
    super.display ();
    System.out.println ("GPA: " + getGPA ());
    System.out.println ("Graduation Year: " + getGradYear ());
  }
}
```

class **Lab4Q1**

```
{
```

```
  public static void main (String[]args)
  {
    Scanner sc = new Scanner (System.in);
    CollegeGraduate clg = new CollegeGraduate ();
      System.out.println ("Enter Name: ");
    String name = sc.nextLine ();
      clg.setName (name);
      System.out.println ("Enter Date of Birth: ");
    String dob = sc.nextLine ();
      clg.setDob (dob);
      System.out.println ("Enter GPA: ");
    float gpa = sc.nextFloat ();
      clg.setGPA (gpa);
      System.out.println ("Enter Graduation Year: ");
    int grad = sc.nextInt ();
      clg.setGradYear (grad);
      clg.display ();
  }
}
```

SAMPLE INPUT/OUTPUT:

Q2) Define a class Maximum with the following overloaded static methods

1. max (which finds maximum among three integers and returns the maximum integer)
2. max (which finds maximum among three floating point numbers and returns the maximum among them)
3. max (which finds the maximum in an array and returns it)
4. max (which finds the maximum in a matrix and returns the result)

Place this in a package called p1. Let this package be present in a folder called "myPackages", which is a folder in your present working directory (eg: c\ student\3rdsem \mypackages\p1). Write a main method to use the methods of Max class in a package p1.

CODE:

// Maximum.java

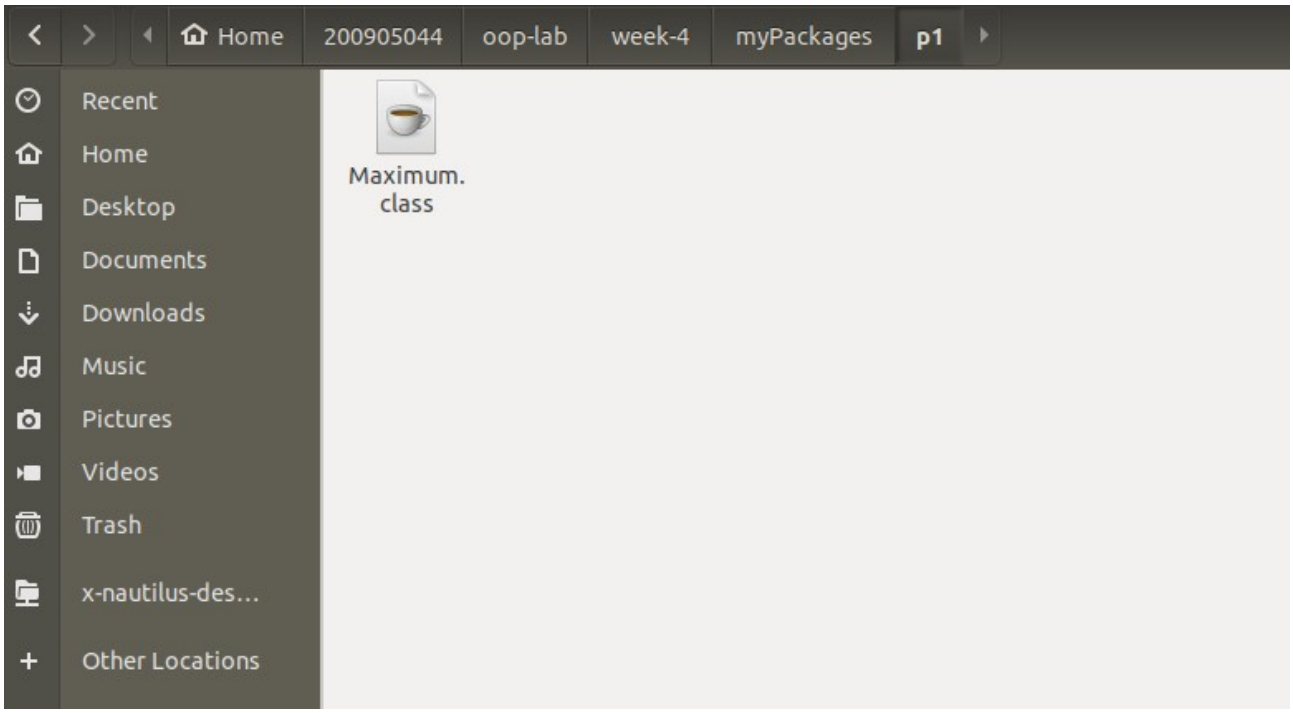
```
package myPackages.p1;

public class Maximum

{

  public static int max (int a, int b, int c)

  {

    int m = (a > b) ? ((a > c) ? a : c) : ((b > c) ? b : c);

      return m;
```

```
  }
  public static float max (float a, float b, float c)
  {
    float m = (a > b) ? ((a > c) ? a : c) : ((b > c) ? b : c);
    return m;
  }
  public static int max (int arr[])
  {
    int m = arr[0];
    for (int i = 0; i < arr.length; i++)
      {
        if (m < arr[i])
          m = arr[i];
      }
    return m;
  }
  public static int max (int arr[][])
  {
    int m = arr[0][0];
    for (int i = 0; i < arr.length; i++)
      {
        for (int j = 0; j < arr[0].length; j++)
          {
            if (m < arr[i][j])
              m = arr[i][j];
          }
      }
    return m;
  }
}
```

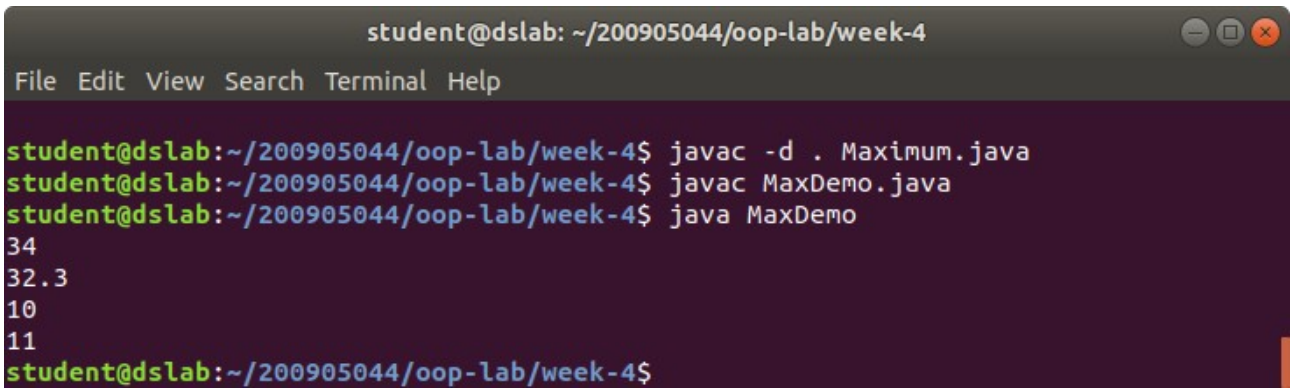
// MaxDemo.java

```
import myPackages.p1.Maximum;
class MaxDemo
{
  public static void main (String[]args)
  {
     System.out.println (Maximum.max (24, 34, 25));
     System.out.println (Maximum.max (23.6f, 32.3f, 22.1f));
    int ar[] = { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 };
    System.out.println (Maximum.max (ar));
    int ar2[][] = { {1, 2, 3, 4, 5}, {7, 8, 9, 10, 11} };
    System.out.println (Maximum.max (ar2));
  }
}
```

FOLDER STRUCTURE:



SAMPLE INPUT/OUTPUT:



Q3) Create an abstract class Figure with abstract method area and two integer dimensions. Create three more classes Rectangle, Triangle and Square which extend Figure and implement the area method. Show how the area can be computed dynamically during run time for Rectangle, Square and Triangle to achieve dynamic polymorphism. (Use the reference of Figure class to call the three different area methods)

CODE:

```
import java.util.*;


abstract class Figure
{
  int dim1, dim2;
    Figure (int dim1, int dim2)
  {
    this.dim1 = dim1;
    this.dim2 = dim2;
  }
  abstract void area ();
}
```

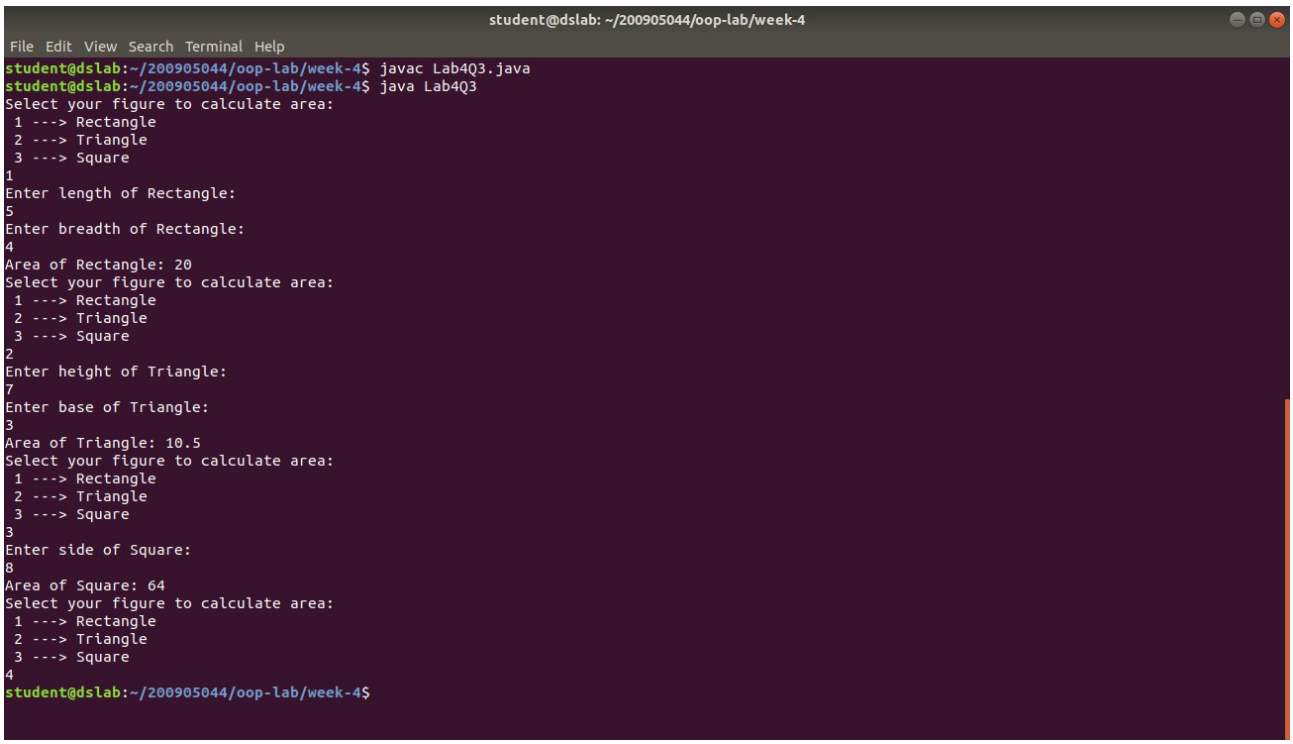
```
class Rectangle extends Figure
{
  Rectangle (int l, int b)
  {
    super (l, b);
  }
  void area ()
  {
    System.out.println ("Area of Rectangle: " + (dim1 * dim2));
  }
}


class Triangle extends Figure
{
  Triangle (int b, int h)
  {
    super (b, h);
  }
  void area ()
  {
    double ar = 0.5 * dim1 * dim2;
    System.out.println ("Area of Triangle: " + ar);
  }
}
```

```
class Square extends Figure
{
  Square (int s)
  {
    super (s, s);
  }
  void area ()
  {
    System.out.println ("Area of Square: " + (dim1 * dim2));
  }
}


class Lab4Q3
{
  public static void main (String[]args)
  {
    Scanner sc = new Scanner (System.in);
    while (true)
      {
        int n;
        int l, b;
        double area;
        Figure s1;
          System.out.println ("Select your figure to calculate area: \n 1 ---> Rectangle \n 2 ---> Triangle \n 3 ---> Square");
```

```
  n = sc.nextInt ();
if (!(n == 1 || n == 2 || n == 3))
  {
    break;
  }

switch (n)
  {

  case 1:
    System.out.println ("Enter length of Rectangle: ");
    l = sc.nextInt ();
    System.out.println ("Enter breadth of Rectangle: ");
    b = sc.nextInt ();
    Rectangle rect = new Rectangle (l, b);
    s1 = rect;
    s1.area ();
    break;
  case 2:
    System.out.println ("Enter height of Triangle: ");
    l = sc.nextInt ();
    System.out.println ("Enter base of Triangle: ");
    b = sc.nextInt ();
    Triangle tria = new Triangle (l, b);
    s1 = tria;
    s1.area ();
```

```
            break;
          case 3:
            System.out.println ("Enter side of Square: ");
            l = sc.nextInt ();
            Square sqr = new Square (l);
            s1= sqr;
            s1.area ();
            break;
          default:
            break;

          }

      }
  }
}
```

SAMPLE INPUT/OUTPUT:


student@dslab: ~/200905044/oop-lab/week-4
File Edit View Search Terminal Help
student@dslab:~/200905044/oop-lab/week-4$ javac Lab4Q3.java
student@dslab:~/200905044/oop-lab/week-4$ java Lab4Q3
Select your figure to calculate area:
1 ---> Rectangle
2 ---> Triangle
3 ---> Square
1
Enter length of Rectangle:
5
Enter breadth of Rectangle:
4
Area of Rectangle: 20
Select your figure to calculate area:
1 ---> Rectangle
2 ---> Triangle
3 ---> Square
2
Enter height of Triangle:
7
Enter base of Triangle:
3
Area of Triangle: 10.5
Select your figure to calculate area:
1 ---> Rectangle
2 ---> Triangle
3 ---> Square
3
Enter side of Square:
8
Area of Square: 64
Select your figure to calculate area:
1 ---> Rectangle
2 ---> Triangle
3 ---> Square
4
student@dslab:~/200905044/oop-lab/week-4$

THANK YOU!