JAVA ASSIGNMENT ASSIGNMENT-5 DATE:25-03-23

PROBLEM STATEMENT :

Write Menu Driven program to calculate the Area and Volume of the selected Shape
a) Create classes as Circle, Rectangle, Square, Sphere, Cylinder, and Pyramid.
b) Create Shape as abstract class with showShape(String shape) as non-abstract method,

while calculateShape() and calculatePerimeter() as abstract method.
c) Create Volume as an interface with calculateVolume() as an abstract method.
d) Get input from users for measurements of shapes.

-The program should contain different java files.
-Each operation should be a separate function.
- Program should contain at top of the Main file in comments: Name, PRN, Batch
- The program should follow all the coding guidelines.
- The program should contain comments for a particular block of logic.
- It is recommended to upload the Program to your GitHub account.
- Your Shape repository on GitHub should contain a README file describing all functions or methods or definitions.

.

CODE:

Shape

```
/*
Problem Statement : Write Menu Driven program to calculate the Area and Volume of the selected Shape
                a) Create classes as Circle, Rectangle, Square, Sphere, Cylinder, and Pyramid.
                b) Create Shape as abstract class with showShape(String shape) as non-abstract method,
                   while calculateShape() and calculatePerimeter() as abstract method.
                c) Create Volume as an interface with calculateVolume() as an abstract method.
                d) Get input from users for measurements of shapes.

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Batch - AIML A3

LAB ASSIGNMENT - 4
*/

```
package Assignment_5;

import java.util.Scanner;

abstract public class Shape {

    // Here Shape is an abstract class with one implemented method
    // and one abstract method

    public  static void showShape(String shape){
        System.out.println("Shape is "+ shape);
    }
    // This abstract method would be overridden in the other classes
    // for calculating the area of given shape
    abstract public void calculateArea();

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.println("------Menu------");
        System.out.println("Calculate Area and Volume");
        System.out.println("1. Calculate Area");
        System.out.println("2. Calculate Volume");
        System.out.println("3. Exit from the program");
        System.out.println("Enter your choice");
        int choice = scanner.nextInt();
        while (true) {
            switch (choice) {
                case 1:
```

```
System.out.println("Calculating the Area of \n" +
        "1. Rectangle\n" +
        "2. Circle\n" +
        "3. Cylinder\n" +
        "4. Pyramid\n" +
        "5. Sphere\n" +
        "6. exit");
System.out.println("Choosing the shape");
int chooseShape = scanner.nextInt();
switch (chooseShape){
    case 1:
        Shape.showShape("Rectangle");
        Rectangle rectangle = new Rectangle();
        rectangle.calculateArea();
        break;

    case 2:
        Shape.showShape("Circle");
        Circle circle = new Circle();
        circle.calculateArea();
        break;

    case 3:
        Shape.showShape("Cylinder");
        Cylinder cylinder = new Cylinder();
        cylinder.calculateArea();
        break;

    case 4:
        Shape.showShape("Pyramid");
        Pyramid pyramid = new Pyramid();
        pyramid.calculateArea();
        break;

    case 5:
        Shape.showShape("Sphere");
        Sphere sphere = new Sphere();
        sphere.calculateArea();
        break;

    case 6:
        System.exit(0);

    default:
```

```
                System.out.println("Enter a valid choice");
            }
            break;

        case 2:
            System.out.println("Calculate Volume of \n" +
                "1. Sphere\n" +
                "2. Cylinder\n" +
                "3. Pyramid\n" +
                "4. Exit");

            chooseShape = scanner.nextInt();
            switch (chooseShape){
                case 1:
                    Sphere sphere = new Sphere();
                    sphere.calculateVolume();
                    break;

                case 2:
                    Cylinder cylinder = new Cylinder();
                    cylinder.calculateVolume();
                    break;

                case 3:
                    Pyramid pyramid = new Pyramid();
                    pyramid.calculateVolume();
                    break;

                case 4:
                    System.exit(0);

                default:
                    System.out.println("Enter a valid choice");
            }

        case 3:
            System.exit(0);
        }

    }
  }
}
```

Circle

```
package Assignment_5;

import Assignment_5.Shape;

import java.util.Scanner;

public class Circle extends Shape {

    @Override
    public void calculateArea() {
        Scanner scanner = new Scanner(System.in);
        double r = 13;
        double area = Math.PI * Math.pow(r,2);
        System.out.println("Area of Circle = " + area);
    }
}
```

Cylinder

```
package Assignment_5;

import java.util.Scanner;

public class Cylinder extends Shape implements Volume{
    Scanner scanner = new Scanner(System.in);
    @Override
    public void calculateArea() {
        System.out.println("Enter the value of radius");
        float radius = scanner.nextFloat();
        System.out.println("Enter the value of height of the cylinder");
        float height = scanner.nextFloat();
        double area = (2*Math.PI*radius*height) + 2*Math.PI*Math.pow(radius,2);
        System.out.println("The surface area of the Cylinder is " + area);
    }

    @Override
    public void calculateVolume() {
        System.out.println("Enter the value of radius");
        float radius = scanner.nextFloat();
        System.out.println("Enter the value of height of the cylinder");
        float height = scanner.nextFloat();
        double volume = (Math.PI)*Math.pow(radius,2)*height;
```

```
        System.out.println("The surface area of the Cylinder is " + volume);
    }
}
```

Pyramid

```
package Assignment_5;

import java.util.Scanner;

public class Pyramid extends Shape implements Volume{
    Scanner scanner = new Scanner(System.in);
    @Override
    public void calculateArea() {

            // Calculate the area of the base
            System.out.println("Enter the baseLength");
            double baseLength = scanner.nextDouble();
            System.out.println("Enter the baseWidth");
            double baseWidth = scanner.nextDouble();
            System.out.println("Enter the slantHeight");
            double slantHeight = scanner.nextDouble();


            double baseArea = baseLength * baseWidth;

            // Calculate the triangular faces' areas
            double triangularArea = (baseLength * slantHeight) / 2;

            // Calculate the total surface area
            double surfaceArea = baseArea + (triangularArea * 4);

            System.out.println("The surface area of the pyramid is "  + surfaceArea);


    }


    public static double pyramidVolume(double baseLength, double baseWidth, double height) {
        // Calculate the area of the base
        double baseArea = baseLength * baseWidth;

        // Calculate the volume
        double volume = (baseArea * height) / 3;
```

```
        return volume;
    }



    @Override
    public void calculateVolume() {
        System.out.println("Enter the baseLength");
        double baseLength = scanner.nextDouble();
        System.out.println("Enter the baseWidth");
        double baseWidth = scanner.nextDouble();
        System.out.println("Enter the height of the pyramid");
        double height = scanner.nextDouble();
        // Calculate the area of the base
        double baseArea = baseLength * baseWidth;

        // Calculate the volume
        double volume = (baseArea * height) / 3;

        System.out.println("The volume of the pyramid is " + volume);


    }
}
```

Rectangle

```
package Assignment_5;

import Assignment_5.Shape;

import java.util.Scanner;

public class Rectangle extends Shape {

    @Override
    public void calculateArea() {
        // This function calculates the area of the rectangle taking the length and
        // breadth as an input from the user
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter the length of the rectangle");
        float length = scanner.nextFloat();
        System.out.println("Enter the breadth of the rectangle");
```

```
        float breadth = scanner.nextFloat();
        System.out.println("The area of rectangle is " + length*breadth);
    }


}
```

Sphere

```
package Assignment_5;

import java.util.Scanner;

public class Sphere extends Shape implements Volume {

Scanner scanner = new Scanner(System.in);

    @Override
    public void calculateArea() { // Function for calculating the surface area of the sphere
        System.out.println("Enter the radius of the sphere");
        float radius = scanner.nextFloat();
        System.out.println("The surface area of the shape is " + 4*Math.PI*Math.pow(radius,2));
    }

    @Override
    public void calculateVolume() { // Function for calculating the volume of the sphere
        System.out.println("Enter the radius of the sphere");
        float radius = scanner.nextFloat();
        System.out.println("The Volume of the sphere is " + 4.0/3.0 * Math.PI* Math.pow(radius,3));
    }
}
```

Volume

```
package Assignment_5;

public interface Volume {
    abstract public void calculateVolume();
}
```

OUTPUT :

File - Shape

```
"C:\Program Files\Java\jdk-19\bin\java.exe" "-javaagent:C:\
Program Files\JetBrains\IntelliJ IDEA Community Edition 2022
.3.1\lib\idea_rt.jar=50281:C:\Program Files\JetBrains\
IntelliJ IDEA Community Edition 2022.3.1\bin" -Dfile.
encoding=UTF-8 -Dsun.stdout.encoding=UTF-8 -Dsun.stderr.
encoding=UTF-8 -classpath E:\Assignemnt_Java\out\production\
Assignemnt_Java Assignment_5.Shape
------Menu------
Calculate Area and Volume
1. Calculate Area
2. Calculate Volume
3. Exit from the program
Enter your choice
1
Calculating the Area of
1. Rectangle
2. Circle
3. Cylinder
4. Pyramid
5. Sphere
6. exit
Choosing the shape
1
Shape is Rectangle
Enter the length of the rectangle
10
Enter the breadth of the rectangle
13
The area of rectangle is 130.0
Calculating the Area of
1. Rectangle
2. Circle
3. Cylinder
4. Pyramid
5. Sphere
6. exit
Choosing the shape
2
Shape is Circle
Area of Circle = 530.929158456675
Calculating the Area of
1. Rectangle
2. Circle
3. Cylinder
```

```
4. Pyramid
5. Sphere
6. exit
Choosing the shape
3
Shape is Cylinder
Enter the value of radius
10
Enter the value of height of the cylinder
13
The surface area of the Cylinder is 1445.132620651305
Calculating the Area of
1. Rectangle
2. Circle
3. Cylinder
4. Pyramid
5. Sphere
6. exit
Choosing the shape
4
Shape is Pyramid
Enter the baseLength
10
Enter the baseWidth
13
Enter the slantHeight
8
The surface area of the pyramid is 290.0
Calculating the Area of
1. Rectangle
2. Circle
3. Cylinder
4. Pyramid
5. Sphere
6. exit
Choosing the shape
5
Shape is Sphere
Enter the radius of the sphere
13
The surface area of the shape is 2123.7166338267
Calculating the Area of
1. Rectangle
2. Circle
```

```
3. Cylinder
4. Pyramid
5. Sphere
6. exit
Choosing the shape
6

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk-19\bin\java.exe" "-javaagent:C:\
Program Files\JetBrains\IntelliJ IDEA Community Edition 2022
.3.1\lib\idea_rt.jar=50286:C:\Program Files\JetBrains\
IntelliJ IDEA Community Edition 2022.3.1\bin" -Dfile.
encoding=UTF-8 -Dsun.stdout.encoding=UTF-8 -Dsun.stderr.
encoding=UTF-8 -classpath E:\Assignemnt_Java\out\production\
Assignemnt_Java Assignment_5.Shape
------Menu------
Calculate Area and Volume
1. Calculate Area
2. Calculate Volume
3. Exit from the program
Enter your choice
2
Calculate Volume of
1. Sphere
2. Cylinder
3. Pyramid
4. Exit
1
Enter the radius of the sphere
13
The Volume of the sphere is 9202.7720799157

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk-19\bin\java.exe" "-javaagent:C:\
Program Files\JetBrains\IntelliJ IDEA Community Edition 2022
.3.1\lib\idea_rt.jar=50290:C:\Program Files\JetBrains\
IntelliJ IDEA Community Edition 2022.3.1\bin" -Dfile.
encoding=UTF-8 -Dsun.stdout.encoding=UTF-8 -Dsun.stderr.
encoding=UTF-8 -classpath E:\Assignemnt_Java\out\production\
Assignemnt_Java Assignment_5.Shape
------Menu------
Calculate Area and Volume
1. Calculate Area
2. Calculate Volume
3. Exit from the program
Enter your choice
2
Calculate Volume of
1. Sphere
2. Cylinder
3. Pyramid
4. Exit
2
Enter the value of radius
13
Enter the value of height of the cylinder
10
The surface area of the Cylinder is 5309.29158456675

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk-19\bin\java.exe" "-javaagent:C:\
Program Files\JetBrains\IntelliJ IDEA Community Edition 2022
.3.1\lib\idea_rt.jar=50296:C:\Program Files\JetBrains\
IntelliJ IDEA Community Edition 2022.3.1\bin" -Dfile.
encoding=UTF-8 -Dsun.stdout.encoding=UTF-8 -Dsun.stderr.
encoding=UTF-8 -classpath E:\Assignemnt_Java\out\production\
Assignemnt_Java Assignment_5.Shape
------Menu------
Calculate Area and Volume
1. Calculate Area
2. Calculate Volume
3. Exit from the program
Enter your choice
2
Calculate Volume of
1. Sphere
2. Cylinder
3. Pyramid
4. Exit
3
Enter the baseLength
10
Enter the baseWidth
13
Enter the height of the pyramid
8
The volume of the pyramid is 346.6666666666667

Process finished with exit code 0
```

GitHub Repository: https://github.com/SnakeEyes1308/Java-Assignment-