Week-08

Polymorphism, Abstract Classes, final Keyword

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Program 1:

```
final class FinalExample {

      final int MAX_SPEED = 120; // Constant value

     public final void display() {
       System.out.println("The maximum speed is: " + MAX_SPEED + " km/h");
   }
}

public class Test {
   public static void main(String[] args) {
          FinalExample example = new FinalExample();
       example.display();


       System.out.println("This is a subclass of FinalExample.");
   }
}
```

Program 2:

```
import java.util.Scanner;
```

```
public class VowelStringExtractor {

    // Method to extract strings with vowels as first and last characters
    public static String extractVowelStrings(String[] stringArray) {
        StringBuilder result = new StringBuilder();
        String vowels = "aeiouAEIOU"; // String containing all vowels

        // Iterate through the array of strings
        for (String s : stringArray) {
            // Check if the string is not empty and if both the first and last characters
are vowels
            if (s.length() > 0 && vowels.indexOf(s.charAt(0)) != -1 &&
vowels.indexOf(s.charAt(s.length() - 1)) != -1) {
                result.append(s); // Append matching string to the result
            }
        }

        // Return the concatenated string in lowercase or "no matches found"
        return result.length() > 0 ? result.toString().toLowerCase() : "no matches
found";
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        // Input for the number of strings

        int n = scanner.nextInt();
        scanner.nextLine(); // Consume the newline character

        // Input for the strings in one line

        String input = scanner.nextLine();
        String[] strings = input.split(" "); // Split input into an array

        // Process and output the result
        String result = extractVowelStrings(strings);
```

```
        System.out.println(result);

        scanner.close(); // Close the scanner
    }
}
```

Program 3:

```
import java.util.Scanner;



// Abstract class Shape
abstract class Shape {
    public abstract double calculateArea();
}

// Circle class
class Circle extends Shape {
    private double radius;

    public Circle(double radius) {
        this.radius = radius;
    }

    @Override
    public double calculateArea() {
        return Math.PI * radius * radius; // Area of circle: πr²
    }
}

// Rectangle class
class Rectangle extends Shape {
    private double length;
    private double breadth;
```

```
    public Rectangle(double length, double breadth) {
        this.length = length;
        this.breadth = breadth;
    }

    @Override
    public double calculateArea() {
        return length * breadth; // Area of rectangle: length * breadth
    }
}

// Triangle class
class Triangle extends Shape {
    private double base;
    private double height;

    public Triangle(double base, double height) {
        this.base = base;
        this.height = height;
    }

    @Override
    public double calculateArea() {
        return 0.5 * base * height; // Area of triangle: 0.5 * base * height
    }
}

// Main class to test the shapes
public class ShapeTest {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        // Input for Circle

        double radius = scanner.nextDouble();
        Circle circle = new Circle(radius);
        System.out.printf("Area of a circle: %.2f%n", circle.calculateArea());

        // Input for Rectangle

        double length = scanner.nextDouble();

        double breadth = scanner.nextDouble();
```

```
        Rectangle rectangle = new Rectangle(length, breadth);
        System.out.printf("Area of a Rectangle: %.2f%n", rectangle.calculateArea());

        // Input for Triangle

        double base = scanner.nextDouble();

        double height = scanner.nextDouble();
        Triangle triangle = new Triangle(base, height);
        System.out.printf("Area of a Triangle: %.2f%n", triangle.calculateArea());

        scanner.close();
    }
}
```