

Java and Scala Laboratory

Experiment 2

D12

60009210105

Amitesh Sawarkar


Q1. Write a Java program to create a user-defined package and function to print a message for the users and import the same package in another program.

```
Q1 > mypackage > J UserDefinedPackage.java > ...
1 // UserDefinedPackage.java
2 package mypackage;
3
4 public class UserDefinedPackage {
5     public static void printMessage() {
6         System.out.println(x:"Hello, user! This message is from the user-defined package.");
7     }
8 }

Q1 > J MainProgram.java > ...
1
2 // MainProgram.java
3 import mypackage.UserDefinedPackage;
4
5 public class MainProgram {
6     Run | Debug
7     public static void main(String[] args) {
8         UserDefinedPackage.printMessage();
9     }
10 }

Hello, user! This message is from the user-defined package.
```

Q2. Write a java program to create a user-defined package letmecalculate having class calculator and functions addition, subtraction, multiplication, division. Import this package in another program to use the class calculator.

Q2 > letmecalculate >  Calculator.java > ...

```
1  package letmecalculate;
2      ....
3  public class Calculator {
4      public static int addition(int a, int b) {
5          return a + b;
6      }
7
8      public static int subtraction(int a, int b) {
9          return a - b;
10     }
11
12     public static int multiplication(int a, int b) {
13         return a * b;
14     }
15
16     public static double division(int a, int b) {
17         if (b == 0) {
18             System.out.println(x:"Division by zero is not allowed.");
19             return Double.NaN; // Not-a-Number to indicate an error
20         }
21         return (double) a / b;
22     }
23 }
```

Q2 > J MainProgram.java > ...

```
1 import java.util.Scanner;
2 
3 import letmecalculator.Calculator;
4 
5 public class MainProgram {
6     Run | Debug
7     public static void main(String[] args) {
8         Scanner scanner = new Scanner(System.in);
9 
10        System.out.print(s:"Enter the first number: ");
11        int num1 = scanner.nextInt();
12 
13        System.out.print(s:"Enter the second number: ");
14        int num2 = scanner.nextInt();
15 
16        System.out.println(x:"Choose an operation:");
17        System.out.println(x:"1. Addition");
18        System.out.println(x:"2. Subtraction");
19        System.out.println(x:"3. Multiplication");
20        System.out.println(x:"4. Division");
21 
22        int choice = scanner.nextInt();
23 
24        int result = 0;
25        String operation = "";
26 
27        switch (choice) {
28            case 1:
29                result = Calculator.addition(num1, num2);
30                operation = "Addition";
31                break;
```

```

31         case 2:
32             result = Calculator.subtraction(num1, num2);
33             operation = "Subtraction";
34             break;
35         case 3:
36             result = Calculator.multiplication(num1, num2);
37             operation = "Multiplication";
38             break;
39         case 4:
40             double quotient = Calculator.division(num1, num2);
41             if (Double.isNaN(quotient)) {
42                 System.out.println(x:"Division by zero is not allowed.");
43                 return;
44             }
45             System.out.println(x:"Division");
46             System.out.println("Quotient: " + quotient);
47             return;
48         default:
49             System.out.println(x:"Invalid choice.");
50             return;
51     }
52
53     System.out.println(operation);
54     System.out.println("Result: " + result);
55 }
56 }

```

```

Enter the first number: 10
Enter the second number: 5
Choose an operation:
1. Addition
2. Subtraction
3. Multiplication
4. Division
2
Subtraction
Result: 5

```

Q3. Write a constructor in the Car class given below that initializes the brand class field with the string "Ford". Call the getBrand () method in the main method of the Sample class and store the value of the brand in a variable, and print the value.

```

Q3 > J Car.java > ...
1  public class Car {
2      private String brand;
3
4      public Car() {
5          this.brand = "Ford";
6      }
7
8      public String getBrand() {
9          return brand;
10     }
11 }

```

```

Q3 > J Sample.java > ...
1  public class Sample {
    Run | Debug
2      public static void main(String[] args) {
3
4          Car myCar = new Car();
5
6          String carBrand = myCar.getBrand();
7
8          System.out.println("Brand of the car: " + carBrand);
9      }
10 }

```

Brand of the car: Ford

Q4. Write a program to print the names of students by creating a Student class. If no name is passed while creating an object of Student class, then the name should be "Unknown", otherwise the name should be equal to the String value passed while creating object of Student class.

Q4 > J Student.java > ...

```
1 public class Student {  
2     private String name;  
3  
4     public Student() {  
5         this.name = "Unknown";  
6     }  
7  
8     public Student(String name) {  
9         this.name = name;  
10    }  
11  
12    public String getName() {  
13        return name;  
14    }  
15 }
```

Q4 > J MainProgram.java > ...

```
1 public class MainProgram {  
    Run | Debug  
2     public static void main(String[] args) {  
3  
4         Student student1 = new Student();  
5         System.out.println("Student 1 name: " + student1.getName());  
6  
7         Student student2 = new Student("Amiteśh");  
8         System.out.println("Student 2 name: " + student2.getName());  
9  
10        Student student3 = new Student();  
11        System.out.println("Student 3 name: " + student3.getName());  
12    }  
13 }
```

```
Student 1 name: Unknown  
Student 2 name: Alice  
Student 3 name: Unknown
```

V. Write a Java class **Complex** for dealing with complex number. Your class must have the following features:

Instance variables:

- **realPart** for the real part of type double
- **imaginaryPart** for imaginary part of type double.

Constructor:

- **public Complex ()**: A default constructor, it should initialize the number to 0, 0)
- **public Complex (double realPart, double imaginaryPart)**: A constructor with parameters, it creates the complex object by setting the two fields to the passed values.

Instance methods:

- **public void setRealPart (double realPart)**: Used to set the real part of this complex number.
- **public void setImaginaryPart (double realPart)**: Used to set the imaginary part of this complex number.
- **public double getRealPart ()**: This method returns the real part of the complex number
- **public double getImaginaryPart ()**: This method returns the imaginary part of the complex number

Write a separate class **ComplexDemo** with a **main ()** method and test the **Complex** class methods.

Q5 > J Complex.java > ...

```
1 public class Complex {
2     private double realPart;
3     private double imaginaryPart;
4
5     public Complex() {
6         this.realPart = 0.0;
7         this.imaginaryPart = 0.0;
8     }
9
10    public Complex(double realPart, double imaginaryPart) {
11        this.realPart = realPart;
12        this.imaginaryPart = imaginaryPart;
13    }
14
15    public void setRealPart(double realPart) {
16        this.realPart = realPart;
17    }
18
19    public void setImaginaryPart(double imaginaryPart) {
20        this.imaginaryPart = imaginaryPart;
21    }
22
23    public double getRealPart() {
24        return realPart;
25    }
26
27    public double getImaginaryPart() {
28        return imaginaryPart;
29    }
30 }
```

Q5 > J ComplexDemo.java > ...

```
1 public class ComplexDemo {
2     Run | Debug
3     public static void main(String[] args) {
4         Complex complex1 = new Complex();
5         Complex complex2 = new Complex(realPart:3.0, imaginaryPart:4.0);
6
7         System.out.println("Complex 1: Real Part = " + complex1.getRealPart() + ", Imaginary Part = "
8             + complex1.getImaginaryPart());
9         System.out.println("Complex 2: Real Part = " + complex2.getRealPart() + ", Imaginary Part = "
10            + complex2.getImaginaryPart());
11
12         complex1.setRealPart(realPart:1.5);
13         complex1.setImaginaryPart(-2.0);
14
15         System.out.println("Complex 1 (Updated): Real Part = " + complex1.getRealPart() + ", Imaginary Part = "
16            + complex1.getImaginaryPart());
17     }
18 }
```

```
Complex 1: Real Part = 0.0, Imaginary Part = 0.0
Complex 2: Real Part = 3.0, Imaginary Part = 4.0
Complex 1 (Updated): Real Part = 1.5, Imaginary Part = -2.0
```


Q6. Create a class named 'Student' with String variable 'name' and integer variable 'roll_no'. Assign the value of roll_no as '2' and that of name as "John" by creating an object of the class Student

```
Q6 > J Student.java > ...
1  public class Student {
2
3      private String name;
4      private int roll_no;
5
6      public Student() {
7          this.name = "John";
8          this.roll_no = 2;
9      }
10
11     public String getName() {
12         return name;
13     }
14
15     public int getRollNo() {
16         return roll_no;
17     }
18
19     Run | Debug
20     public static void main(String[] args) {
21         Student student = new Student();
22
23         System.out.println("Name: " + student.getName());
24         System.out.println("Roll No: " + student.getRollNo());
25     }
26 }
```

```
Name: John
Roll No: 2
```