Workshop #1: Foundations of Java language

Upon successful completion of this workshop, you will have demonstrated the abilities to:

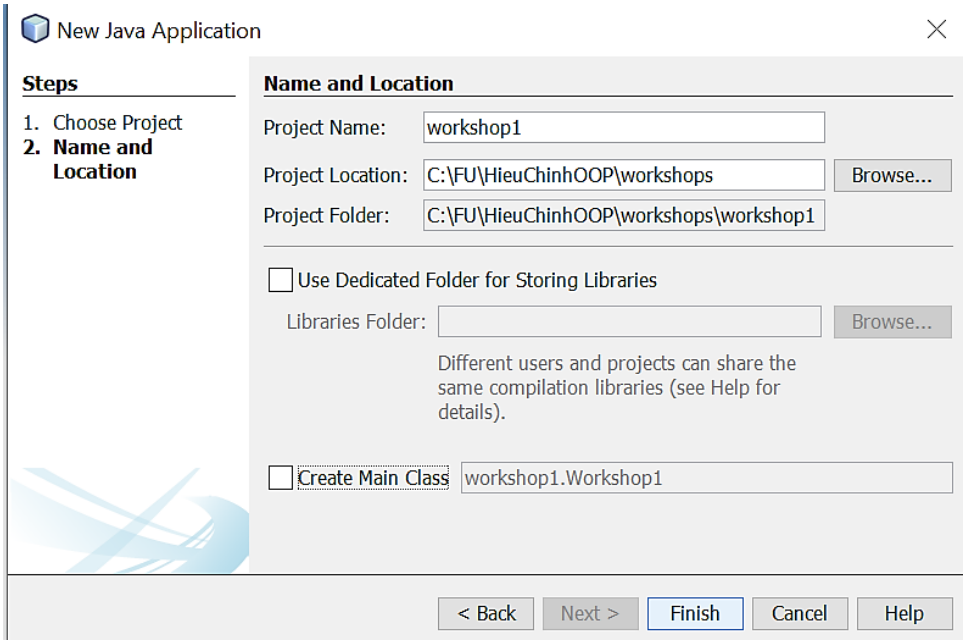
- Practice basic Java language syntax and semantics to write Java programs.
- Use concepts such as variables, conditional and iterative execution methods.
- Compile and run a program.
- Describe to your instructor what you have learned in completing this workshop.

CQ4.1 - Write a Java program that will accept a matrix of integers then this matrix will be printed out and sum of values and average of values are printed also.

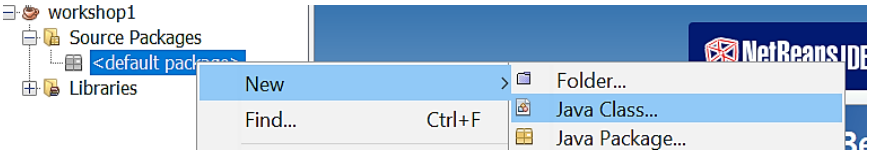
The user interface may be:
Enter number of rows: 2
Enter number of columns: 3
Enter the matrix
m[0][0]=1
m[0][1]=2
m[0][2]=3
m[1][0]=4
m[1][1]=5
m[1][2]=6
Matrix inputted:
1 2 3
4 5 6
Sum: 21
Average: 3.5
Hint: Use System.out.format("%3d", n);

Step by step workshop instructions:

- Initializing NetBeans and create a new project named "**workshop1**"



- Create a class named “**Part1.java**”



- In the class “**Part1.java**”, you type:

Task 1: input the matrix

```
1
2  import java.util.Scanner;
3  public class Part1 {
4      public static void main(String[] args) {
5          int rows;
6          int cols;
7          int matrix[][];
8          Scanner sc=new Scanner(System.in);
9          System.out.println("Enter number of rows: ");
10         rows=sc.nextInt();
11         System.out.println("Enter number of rows: ");
12         cols=sc.nextInt();
13         matrix=new int[rows][cols];
14         System.out.println("Enter the matrix:");
15         for(int i=0;i<rows;i++){
16             for(int j=0;j<cols;j++){
17                 System.out.print("\nm["+i+"]["+j+"]=");
18                 matrix[i][j]=sc.nextInt();
19             }
20         }
21         System.out.println("Matrix inputted:");
22         for(int i=0;i<rows;i++){
23             for(int j=0;j<cols;j++){
24                 System.out.format("%3d",matrix[i][j]);
25             }
26             System.out.println("\n");
27         }
28     }
29 }
```

- To run the code, click the right mouse and choose “**Run File**”

Task 2: get sum of values

- You will add the code to “**Part1.java**”

```
int sum=0;
for(int i=0;i<rows;i++){
    for(int j=0;j<cols;j++){
        sum=sum+matrix[i][j];
    }
}
System.out.println("Sum:"+ sum);
```

Task 3: get average of values

- You will add the code “System.out.println("Average:" +(float)sum/(rows*cols));” to “**Part1.java**”

CQ4.2 - Write a Java program that will accept two float numbers and an operator (+-*/) then the program will print out the result of the specified expression that bases on the inputted operator.

The user interface may be:
Input the number 1: 4
Input the number 2: 5
Input the operator: +
the result of 4+5=9

Step by step workshop instructions:

- In the project above, you create a new class named “**Part2.java**” and add the code:

```
1
2  import java.util.Scanner;
3  public class Part2 {
4      public static void main(String[] args) {
5          float num1,num2;
6          String op;
7          Scanner sc=new Scanner(System.in);
8          System.out.println("Input the number 1:");
9          num1=sc.nextFloat();
10         System.out.println("Input the number 2:");
11         num2=sc.nextFloat();
12         System.out.println("Input the operator(+-*/):");
13         sc=new Scanner(System.in);
14         op=sc.nextLine();
15         if( op.equals("+")){
16             System.out.println("the result of "+num1+ op + num2 + "="+ (num1+num2) );
17         }
18     }
19 }
```

- You must add your code to get the result when user inputs another operator.

CQ 4.3 - Write a Java program that will accept the list of student name, convert all names to uppercase and then the program will print out the list of student name.

Step by step workshop instructions:

- You create a new class named “**Part3.java**” and add the code:

```
public class Part3 {
    public static void main(String[] args) {
        String[] list=new String[10];
        //TODO: input the list of names
        for(int i=0;i<10;i++)
        {
            //Scanner sc=.....
            //list[i]= sc.nextLine();
        }
        //TODO: change the first character of all names to uppercase using toUpperCase();
        //TODO: print out
    }
}
```

CQ 4.4 - Details of a student including name, grade. Write a Java program that allows user to input a student, convert the first letter to uppercase the rest of the letters to lowercase for each word in the name and then the program will print out his/her information.

The user interface may be:
Input Student's information:
- Enter name: vU thANh pHOnG
- Enter grade: 8.5

Output Student's information:
Vu Thanh Phong, 8.50

Step by step workshop instructions:

- You create a new class named "**Part4.java**" and add the code:

```
public class Part4 {
    public static void main(String[] args) {
        Scanner sc1 = new Scanner(System.in);
        String name = ""; float grade;
        System.out.println("Input Student's information: ");
        //TODO: input name and grade



        Scanner sc2 = new Scanner(name);
        System.out.println("Output Student's information: ");
        while(sc2.hasNext()) {
            //TODO: convert the first letter for each word in the name
            //to uppercase the rest of the letters to lowercase
            //String s1 = sc2.next();
            //String s2 = ...
            //TODO: print out name
        }
        System.out.print(",");
        //TODO: print out grade
        System.out.println("");
    }
}
```

CQ4.5 - Construct the class Fraction containing methods for operations on fractions:

(1) Fraction **addFraction**(Fraction f)
3/5 + 1/3 = 14/15
(2) Fraction **subFraction**(Fraction f)
3/5 - 1/3 = 4/15
(3) Fraction **mulFraction**(Fraction f)
3/5 * 1/3 = 3/15
(4) Fraction **divFraction**(Fraction f)
3/5 / 1/3 = 9/5
(5) void **simplifyFraction**()
3/15 -> 1/5
(6) int **findGCD**(int a, int b)
findGCD (24, 12) --> 12 // greatest common divisor
findGCD (-24, 9) --> 3

Develop the class FractionDemo in which a main method is implemented.

The user interface may be:
Enter numerator of the first fraction: 5
Enter denominator of the first fraction: 15
Enter numerator of the second fraction: 4
Enter denominator of the second fraction: 3
Sum of them: 5/3
Substract of them: -1/1
Mul. of them: 4/9
Div. of them: 1/4

Step by step workshop instructions:

- You create a new class named "**Fraction.java**" and add the code:

```
public class Fraction {
    private int numerator;
    private int denominator;

    public Fraction() {...2 lines }
    public Fraction(int numerator, int denominator) {...4 lines }
    public int getNumerator() {...3 lines }
    public void setNumerator(int numerator) {...3 lines }
    public int getDenominator() {...3 lines }
    public void setDenominator(int denominator) {...3 lines }

    public int findGCD(int a, int b) {
        a= Math.abs(a); b= Math.abs(b);
        while (a != b) {
            if (a > b) {
                a -= b;
            } else {
                b -= a;
            }
        }
        return a;
    }
    public void simplifyFraction() {
        int i = findGCD(this.getNumerator(), this.getDenominator());
        this.setNumerator(this.getNumerator() / i);
        this.setDenominator(this.getDenominator() / i);
    }
    public Fraction addFraction(Fraction ps) {...8 lines }
    public Fraction subFraction(Fraction ps) {...8 lines }
    public Fraction mulFraction(Fraction ps) {...8 lines }
    public Fraction divFraction(Fraction ps) {...8 lines }

    public void output(){
        System.out.println(+ numerator + "/" + denominator);
    }
}
```

- You create a new class named "**FractionDemo.java**" and add the code:

```java
public class FractionDemo {
    public static void main(String[] args) {
        int a,b,c,d;
        Scanner sc = new Scanner(System.in);
        //TODO: input numerator and denominator of fractions




        //TODO: initialize the first fraction fr1
        //TODO: initialize the second fraction fr2


        //TODO: print out results
        //System.out.print("Sum of them: "); fr1.addFraction(fr2).output();
        //System.out.print("Substract of them: "); fr1.subFraction(fr2).output();
        //System.out.print("Mul. of them: "); fr1.mulFraction(fr2).output();
        //System.out.print("Div. of them: "); fr1.divFraction(fr2).output();
    }
}
```