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Java Assignment 1

Input Methods and Menu Based Calculator

```java
public class MainClass {

    public static void main(String[] args){

        InputClass input = new InputClass();
        Calc calc = new Calc();

        // Assignment Part 1
        boolean exitPart1 = false;
        while (!exitPart1) {
            System.out.println(
                """
                    Calculate Factorial using:-

                    1) Use Command Line Args
                    2) Use Scanner
                    3) Use BufferedReader
                    4) Use DataInputStream
                    5) Use Console
                    6) Go to part 2 of Assignment

                """);

            System.out.println("Your option: ");
            int option = input.intInput();
            switch (option) {
                case 1:
                    // factorial using Command Line Args
                    input.factorialCommandLineArgs(args);
                    break;

                case 2:
                    // factorial using Scanner
                    input.factorialScanner();
                    break;

                case 3:
                    // factorial using Buffered Reader
                    input.factorialBufferedReader();
                    break;

                case 4:
                    // factorial using Data input stream
                    input.factorialDataInputStream();
                    break;

                case 5:
                    // factorial using factorial console
                    input.factorialConsole();
                    break;

                case 6:
                    // exit part 1 and move to part 2
                    exitPart1 = true;
                    break;

                default:
                    System.out.println("Invalid Option");
                    break;
            }

        }

        // Assignment Part 2
        boolean exitPart2 = false;
        while (!exitPart2) {
            System.out.println(
                """
                    1) Add
                    2) Sub
                    3) Multi
                    4) Div
                    5) Sqrt
                    6) Pow
                    7) Mean
                    8) Var
                    9) Exit

                """);

            System.out.println("Your option: ");
            int option = input.intInput();
            switch (option) {
                case 1:
                    // perform Addition
                    System.out.println(String.format("Addition Result: ", calc.addition()));
                    break;

                case 2:
                    // perform Subtraction
                    System.out.println(String.format("Subtraction Result: ", calc.subtraction()));
                    break;

                case 3:
                    // perform Multiplication
                    System.out.println(String.format("Multiplication Result: ", calc.multiplication()));
                    break;

                case 4:
                    // perform Division
                    System.out.println(String.format("Division Result: ", calc.division()));
                    break;

                case 5:
                    // perform SquareRoot
                    System.out.println(String.format("SquareRoot Result: ", calc.squareRoot()));
                    break;

                case 6:
                    // perform Power
                    System.out.println(String.format("Power Result: ", calc.power()));
                    break;

                case 7:
                    // perform Mean
                    System.out.println(String.format("Mean Result: ", calc.mean()));
                    break;

                case 8:
                    // perform Variance
                    System.out.println(String.format("Variance Result: ", calc.variance()));
                    break;

                case 9:
                    // dispose scanner class instance in InputClass object before exitting program
                    input.disposeScanner();
                    exitPart2 = true;
                    break;

                default:
                    System.out.println("Invalid Option");
                    break;
            }

        }
    }
}

```

```java
import java.lang.Math;

public class Calc {
    // input class
    InputClass input = new InputClass();

    // Calculate factorial recursively
    public int factorial(int x){
        if(x <= 1) return x;
        else return x * factorial(x - 1);
    }


    // Perform addition calculation
    public double addition(){
        System.out.println("Performing addition");
        double num1 = input.doubleInput();
        double num2 = input.doubleInput();

        return num1 + num2;
    }

    // Perform subtraction calculation
    public double subtraction(){
        System.out.println("Performing subtraction");
        System.out.println("Enter Number 1: ");
        double num1 = input.doubleInput();
        System.out.println("Enter Number 2: ");
        double num2 = input.doubleInput();

        return num1 - num2;
    }

    // perform multiplication calculation
    public double multiplication(){
        System.out.println("Performing multiplication");
        System.out.println("Enter Number 1: ");
        double num1 = input.doubleInput();
        System.out.println("Enter Number 2: ");
        double num2 = input.doubleInput();

        return num1 * num2;
    }

    // perform division calculation
    public double division(){
        System.out.println("Performing division");
        System.out.println("Enter Number 1: ");
        double num1 = input.doubleInput();
        System.out.println("Enter Number 2: ");
        double num2 = input.doubleInput();

        return num1 / num2;
    }

    // perform squareRoot calculation
    public double squareRoot(){
        System.out.println("Performing root");
        System.out.println("Enter Number 1: ");
        double num1 = input.doubleInput();

        return Math.sqrt(num1);
    }

    // perform power calculation
    public double power(){
        System.out.println("Performing power");
        System.out.println("Enter Number 1: ");
        double num1 = input.doubleInput();
        System.out.println("Enter Number 2: ");
        double num2 = input.doubleInput();

        return Math.pow(num1, num2);
    }

    // perform mean calculation
    public double mean(){
        System.out.println("Performing mean (type end to stop taking inputs)");
        double sum = 0;
        int count = 0;
        while (true) {
            System.out.println(String.format("Enter Number %d: ", count + 1));
            String num = input.strInput();
            // System.out.println(num == "end");
            if(num.equals("end")){
                break;
            }
            else{
                sum += Integer.valueOf(num);
                count += 1;
            }
        }

        return sum/count;
    }

    // perform variance calculation
    public double variance(){
        System.out.println("Performing variance");
        System.out.println("Enter number of inputs");
        int len = Integer.valueOf(input.strInput());

        double[] nums = new double[len];

        // store inputs
        for (int i = 0; i < len; i++) {
            System.out.println(String.format("Enter Number %d: ", i + 1));
            nums[i] = input.doubleInput();
        }

        // compute mean
        double mean = 0;
        for (double d : nums) {
            mean += d;
        }
        mean /= len;

        // calculate variance numerator
        int var_numerator = 0;
        for (double d : nums) {
            var_numerator += Math.pow(d - mean, 2);
        }

        // return variance
        return var_numerator / (len - 1);
    }
}

```

```java
import java.io.BufferedReader;
import java.io.Console;
import java.io.DataInputStream;
import java.io.IOException;
import java.io.InputStreamReader;
import java.util.Scanner;

public class InputClass {

    // static scanner instance for entire program
    private static Scanner sc = new Scanner(System.in);
    private static Calc calc = new Calc();

    // prints address of static Scanner instance
    public void showSC_Hash(){
        System.out.println(sc.hashCode());
    }

    // disposes static scanner instance
    public void disposeScanner(){
        sc.close();
    }

    // integer input using scanner class
    public int intInput(){
        int num = sc.nextInt();
        return num;
    }

    // double input using scanner class
    public double doubleInput(){
        double num = sc.nextDouble();
        return num;
    }

    // string input using scanner class
    public String strInput(){
        String str = sc.next();
        return str;
    }

    // factorial using Command Line Args
    public void factorialCommandLineArgs(String[] args){
        try {
            if(args.length > 0 && Integer.parseInt(args[0]) >= 0){
                int factorial_num = Integer.parseInt(args[0]);
                if(factorial_num == Integer.MIN_VALUE) System.out.println("Invalid Command Line input");
                else System.out.println(String.format("Factorial of %d is: %d", factorial_num, calc.factorial(factorial_num)));
            }
            else{
                System.out.println("Invalid Command Line input");
            }
        } catch (NumberFormatException e) {
            System.out.println("Invalid Command Line input");
        }
    }

    // factorial using Scanner
    public void factorialScanner(){
        System.out.println("Enter Number 1: ");
        int factorial_num = intInput();
        System.out.println(String.format("Factorial of %d is: %d", factorial_num, calc.factorial(factorial_num)));
    }

    // factorial using Buffered Reader
    public void factorialBufferedReader(){
        BufferedReader reader = new BufferedReader(new InputStreamReader(System.in));
        try {
            System.out.println("Enter Number 1: ");
            int factorial_num = Integer.parseInt(reader.readLine());
            System.out.println(String.format("Factorial of %d is: %d", factorial_num, calc.factorial(factorial_num)));
        } catch (IOException | NumberFormatException e) {
            System.out.println("Invalid input");
        }
    }

    // factorial using Data input stream
    public void factorialDataInputStream(){
        DataInputStream dis = new DataInputStream(System.in);
        try {
            System.out.println("Enter Number 1: ");
            int factorial_num = Integer.parseInt(dis.readLine());
            System.out.println(String.format("Factorial of %d is: %d", factorial_num, calc.factorial(factorial_num)));
        } catch (IOException | NumberFormatException e) {
            System.out.println("Invalid input");
        }
    }

    // factorial using factorial console
    public void factorialConsole(){
        Console console = System.console();
        try {
            System.out.println("Enter Number 1: ");
            int factorial_num = Integer.parseInt(console.readLine());
            System.out.println(String.format("Factorial of %d is: %d", factorial_num, calc.factorial(factorial_num)));
        } catch (NumberFormatException e) {
            System.out.println("Invalid input");
        }
    }
}

```

Output

```
PS C:\Users\devbh\OneDrive\Desktop\College\Sem---4\Java\Assignments\Assignment1> javac mainclass.java
PS C:\Users\devbh\OneDrive\Desktop\College\Sem---4\Java\Assignments\Assignment1> java MainClass 3
    Calculate Factorial using:-

    1) Use Command Line Args
    2) Use Scanner
    3) Use BufferedReader
    4) Use DataInputStream
    5) Use Console
    6) Go to part 2 of Assignment


Your option:
1
Factorial of 3 is: 6
    Calculate Factorial using:-

    1) Use Command Line Args
    2) Use Scanner
    3) Use BufferedReader
    4) Use DataInputStream
    5) Use Console
    6) Go to part 2 of Assignment


Your option:
2
Enter Number 1:
3
Factorial of 3 is: 6
    Calculate Factorial using:-

    1) Use Command Line Args
    2) Use Scanner
    3) Use BufferedReader
    4) Use DataInputStream
    5) Use Console
    6) Go to part 2 of Assignment


Your option:
3
Enter Number 1:
3
Factorial of 3 is: 6
    Calculate Factorial using:-

    1) Use Command Line Args
    2) Use Scanner
    3) Use BufferedReader
    4) Use DataInputStream
    5) Use Console
    6) Go to part 2 of Assignment


Your option:
4
Code is in file but method is deprecated which causes compilation errors
    Calculate Factorial using:-

    1) Use Command Line Args
    2) Use Scanner
    3) Use BufferedReader
    4) Use DataInputStream
    5) Use Console
    6) Go to part 2 of Assignment


Your option:
5
Enter Number 1:
3
Factorial of 3 is: 6
    Calculate Factorial using:-

    1) Use Command Line Args
    2) Use Scanner
    3) Use BufferedReader
    4) Use DataInputStream
    5) Use Console
    6) Go to part 2 of Assignment


Your option:
6
    1) Add
    2) Sub
    3) Multi
    4) Div
    5) Sqrt
    6) Pow
    7) Mean
    8) Var
    9) Exit


Your option:
1
Performing addition
1
2
Addition Result: 3.00
    1) Add
    2) Sub
    3) Multi
    4) Div
    5) Sqrt
    6) Pow
    7) Mean
    8) Var
    9) Exit


Your option:
2
Performing subtraction
Enter Number 1:
3
Enter Number 2:
2
Subtraction Result: 1.00
    1) Add
    2) Sub
    3) Multi
    4) Div
    5) Sqrt
    6) Pow
    7) Mean
    8) Var
    9) Exit
```

```
Your option:
3
Performing multiplication
Enter Number 1:
2
Enter Number 2:
3
Multiplication Result: 6.00
    1) Add
    2) Sub
    3) Multi
    4) Div
    5) Sqrt
    6) Pow
    7) Mean
    8) Var
    9) Exit


Your option:
4
Performing division
Enter Number 1:
4
Enter Number 2:
2
Division Result: 2.00
    1) Add
    2) Sub
    3) Multi
    4) Div
    5) Sqrt
    6) Pow
    7) Mean
    8) Var
    9) Exit


Your option:
5
Performing root
Enter Number 1:
5
SquareRoot Result: 2.24
    1) Add
    2) Sub
    3) Multi
    4) Div
    5) Sqrt
    6) Pow
    7) Mean
    8) Var
    9) Exit


Your option:
6
Performing power
Enter Number 1:
2
Enter Number 2:
2
Power Result: 4.00
    1) Add
    2) Sub
    3) Multi
    4) Div
    5) Sqrt
    6) Pow
    7) Mean
    8) Var
    9) Exit


Your option:
7
Performing mean (type end to stop taking inputs)
Enter Number 1:
1
Enter Number 2:
2
Enter Number 3:
-3
Enter Number 4:
4
Enter Number 5:
-2
Enter Number 6:
-2
Enter Number 7:
end
Mean Result: 0.00
    1) Add
    2) Sub
    3) Multi
    4) Div
    5) Sqrt
    6) Pow
    7) Mean
    8) Var
    9) Exit


Your option:
8
Performing variance
Enter number of inputs
5
Enter Number 1:
1
Enter Number 2:
2
Enter Number 3:
3
Enter Number 4:
4
Enter Number 5:
5
Variance Result: 2.00
    1) Add
    2) Sub
    3) Multi
    4) Div
    5) Sqrt
    6) Pow
    7) Mean
    8) Var
    9) Exit


Your option:
9
```