Programming in Java – Introduction - Solution of assignments

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Assignment

Implement a Calculator class to perform arithmetic operations.

```
$ java Calculator 6 + 4.1
10.1
$ java Calculator 3.6 / -2
-1.8
$ java Calculator 8.5 * 9
76.5
$ java Calculator -3.14
-3.14
```

I let you discover how to convert strings to numbers

Enhance the calculator so that it can handle concatenated operations

```
$ java Calculator 6 + 4.1 * 3
10.1
30.3
$ java Calculator 3.6 / 2 + -0.3 / .5
1.8
1.5
3
```

“Problem decomposition”

What am I asked to do?

1. run a program using the java command
2. take input from the command line
3. interpret the arguments on the command line and execute the indicated operation

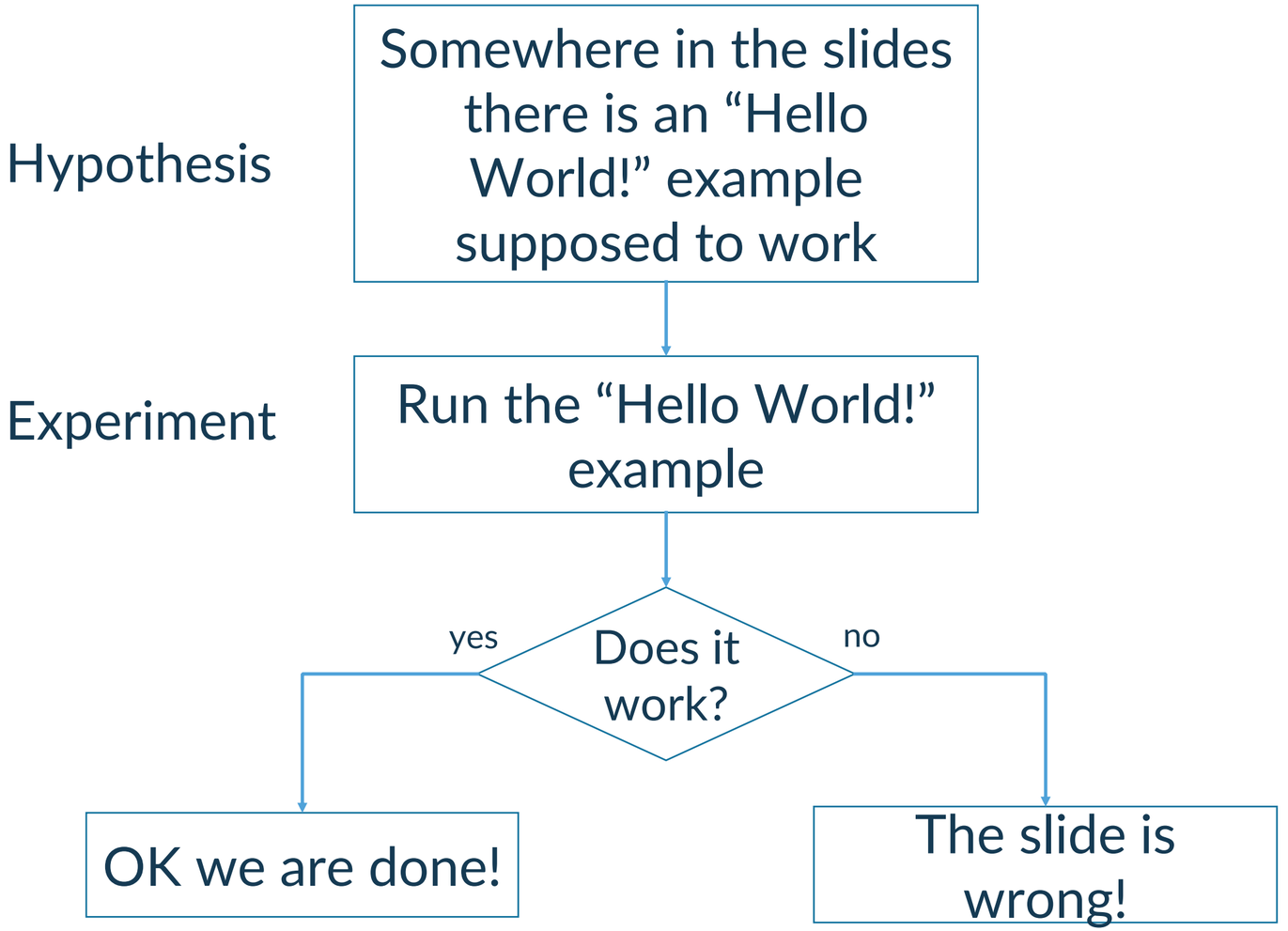
Do I know how to do the actions in the points 1, 2, and 3?

Are there unknowns?

Resolving unknowns with the “scientific method”

- Analyze your problem and identify the unknowns
- Formulate a hypothesis about one unknown
- Test the hypothesis with an experiment
- Observe the results and draw your conclusion

1. Run a program using the java command



2. Take input from the command line

Hypothesis

we can use the command line argument contained in `String[] args`

Experiment

PrintCommandLineArgs.java

```
public class PrintCommandLineArgs {

    public static void main(String[] args) {
        for (String arg : args) {
            System.out.println(arg);
        }
    }
}
```

Results

```
$ java Calculator 3.14 + 15
3.14
+
15
```

3. Interpret the command line 1/2

Hypothesis

```
Double.parseDouble(args[0])
    if ("+" == args[1])
```

Experiment

Calculator.java

```
public class Calculator {

    public static void main(String[] args) {
        double op1 = Double.parseDouble(args[0]);
        double op2 = Double.parseDouble(args[2]);
        if ("+" == args[1]) {
            System.out.println(op1 + op2);
        }
    }
}
```

No results

```
$ java Calculator 3.14 + 15
```

3. Interpret the command line 2/2

Hypothesis

To compare objects we must use the equals() method

Experiment

Calculator.java

```
public class Calculator {

    public static void main(String[] args) {
        System.out.println(args[1]);
        System.out.println("+" == args[1]);
        System.out.println("+".equals(args[1]));
    }
}
```

Hypothesis confirmed

```
$ java Calculator 3.14 + 15
+
false
true
```

Calculator

Calculator.java

```
public class Calculator {

    public static void main(String[] args) {
        double op1 = Double.parseDouble(args[0]);
        double op2 = Double.parseDouble(args[2]);
        if ("+".equals(args[1])) {
            System.out.println(op1 + op2);
        } else if ("*".equals(args[1])) {
            System.out.println(op1 * op2);
        } else if ("/".equals(args[1])) {
            System.out.println(op1 / op2);
        } else if ("-".equals(args[1])) {
            System.out.println(op1 - op2);
        }
    }
}
```

Calculator using `switch`

Calculator.java

```
public class Calculator {
    public static void main(String[] args) {
        double op1 = Double.parseDouble(args[0]);
        double op2 = Double.parseDouble(args[2]);
        switch (args[1]) {
            case "+":
                System.out.println(op1 + op2);
                break;
            case "*":
                System.out.println(op1 * op2);
                break;
            case "/":
                System.out.println(op1 / op2);
                break;
            case "-":
                System.out.println(op1 - op2);
                break;
        }
    }
}
```

Extended Calculator

Calculator.java

```java
public class Calculator {
    public static void main(String[] args) {
        var value = Double.parseDouble(args[0]);
        String operator = null;
        for (int i = 1; i < args.length; i++) {
            if (i % 2 == 1) {
                operator = args[i];
            } else {
                var operand = Double.parseDouble(args[i]);
                switch (operator) {
                    case "+":
                        value = value + operand;
                        break;
                    case "*":
                        value = value * operand;
                        break;
                    case "/":
                        value = value / operand;
                        break;
                    case "-":
                        value = value - operand;
                        break;
                }
                System.out.println(value);
            }
        }
    }
}
```

```
$ java Calculator.java 3.14 + 3.15 - 2 + 0.11
6.29
4.29
4.4
```

Thank you!

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