



Java Software Development

Homework 6

Deadline: 2017/04/27 23:55

Problem Description

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- Write a program that can do some operations on big integers including addition, subtraction and comparison.
 - Big integer: an integer that is greater than $2^{31}-1$ or less than -2^{31}
- Declare an interface `IOperation` with only one operation:
 - `perform(num1: String, num2: String): String`
- Create three classes that implement `IOperation`
 - Addition
 - The `perform` method takes two arguments and returns the sum of them.
 - Subtraction
 - The `perform` method takes two arguments and returns the difference of them.
 - Comparison
 - The `perform` method takes two arguments and returns -1, 0, or 1 if the first argument is less than, equal to, or greater than the second argument, respectively.

- For example, if you want to calculate $123 + 456$:

// Calculate 123 + 456

```
IOperation operation = new Addition();  
String result = operation.perform("123", "456");
```

- If you want to calculate $123 - 456$:

// Calculate 123 - 456

```
IOperation operation = new Subtraction();  
String result = operation.perform("123", "456");
```

- If you want to determine whether 123 is larger than 456

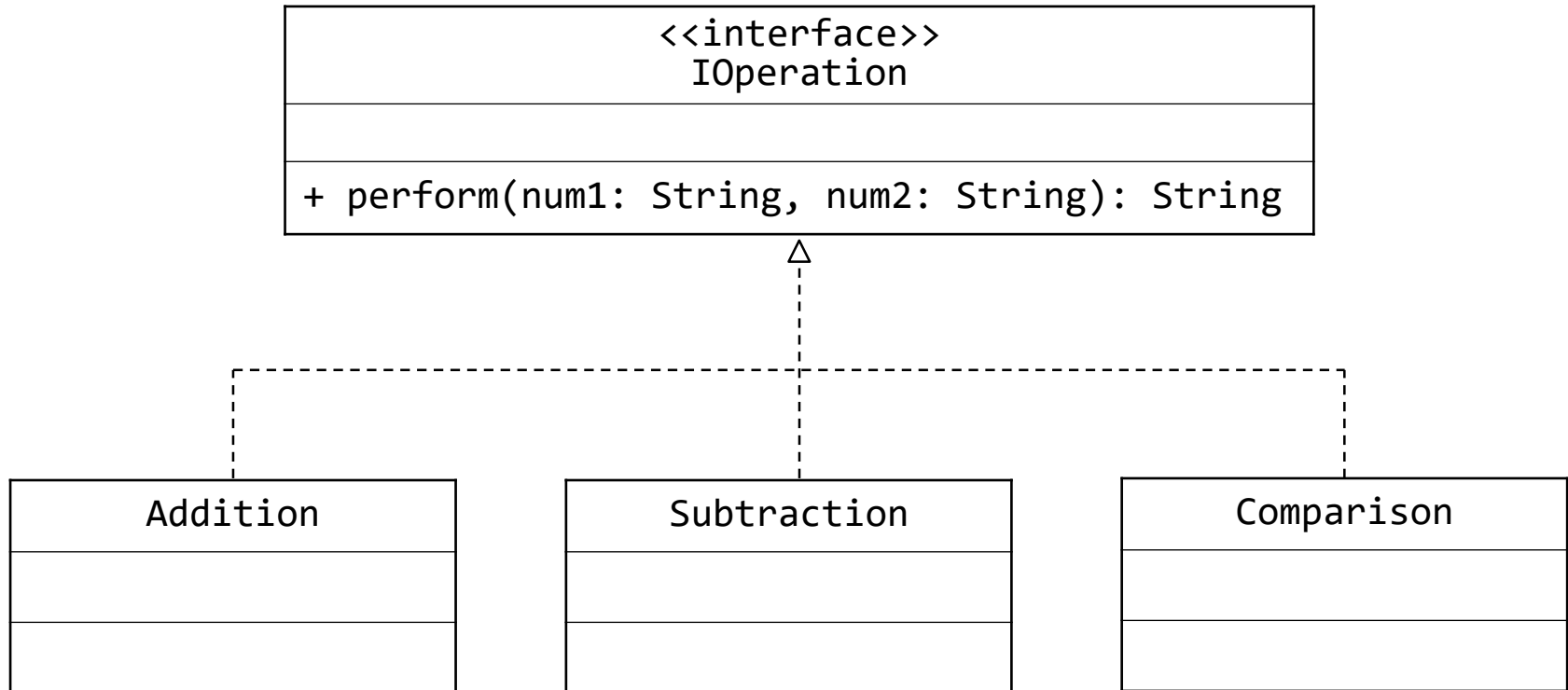
// Determine whether 123 > 456

```
IOperation operation = new Comparison();  
String result = operation.perform("123", "456");
```

- The input is an expression to be evaluated, which is given from keyboard.
- An expression is composed of the following elements:
 - Integers (May be greater than $2^{31}-1$ or less than -2^{31})
 - Arithmetic operators: $+$, $-$
 - Logical operators: $>$, $<$, $=$
 - Whitespaces
- Each element in an expression is separate by whitespaces.
- Arithmetic and logical operators will not appear simultaneously.
- Note that the following expressions may be possible:
 - $123 + -456$ (You should evaluate it to -333)
 - $-123 - -456$ (You should evaluate it to 333)

Class Design

4



Sample Input and Output

1

Input	<code>123 + 456</code>
Output	<code>579</code>

Input	<code>123 - 456</code>
Output	<code>-333</code>

Input	<code>123 > 456</code>
Output	<code>false</code>

Input	<code>123 < 456</code>
Output	<code>true</code>

Input	<code>123 = 456</code>
Output	<code>false</code>

Sample Input and Output

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Input	99999 + 99999
Output	199998

Input	0 - 0 + 0 - 0 + 0 - 0
Output	0

Input	-123456789 + 987654321 - -123456789
Output	987654321

Input	9876543210123456789876543210123456789 + 123
Output	9876543210123456789876543210123456912

Input	-135792468123456789876543210123456789 < -1357924680123456789876543210123456789
Output	false

Scoring Criteria

- Plagiarism is strictly forbidden.
- You **MUST** follow the class design illustrated in page 4.
- The following APIs are **NOT ALLOWED** in your program:
 - `java.math.BigInteger`
 - `java.math.BigDecimal`
- You will not get any points if you don't follow the requirements.

Submission

- Please archive your source code to `STUDENT_ID.zip` (download the example zip file from Moodle) and upload to Moodle before deadline.
- Your zip file should follow the following format.
 - `STUDENT_ID.zip`
 - | - `src`
 - | - `META-INF`
 - | | - `MANIFEST.MF`
 - All the source files (*.java) are put in the `src` directory.
 - The entry point (i.e. main class) of the program is specified in the `MANIFEST.MF` file.
- No late submission is accepted.

If you have any problem about this homework,
please contact TA: 游傑麟 (ygl0118@gmail.com)