



Java Software Development

Homework 6

Deadline: 2016/04/28 23:00

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

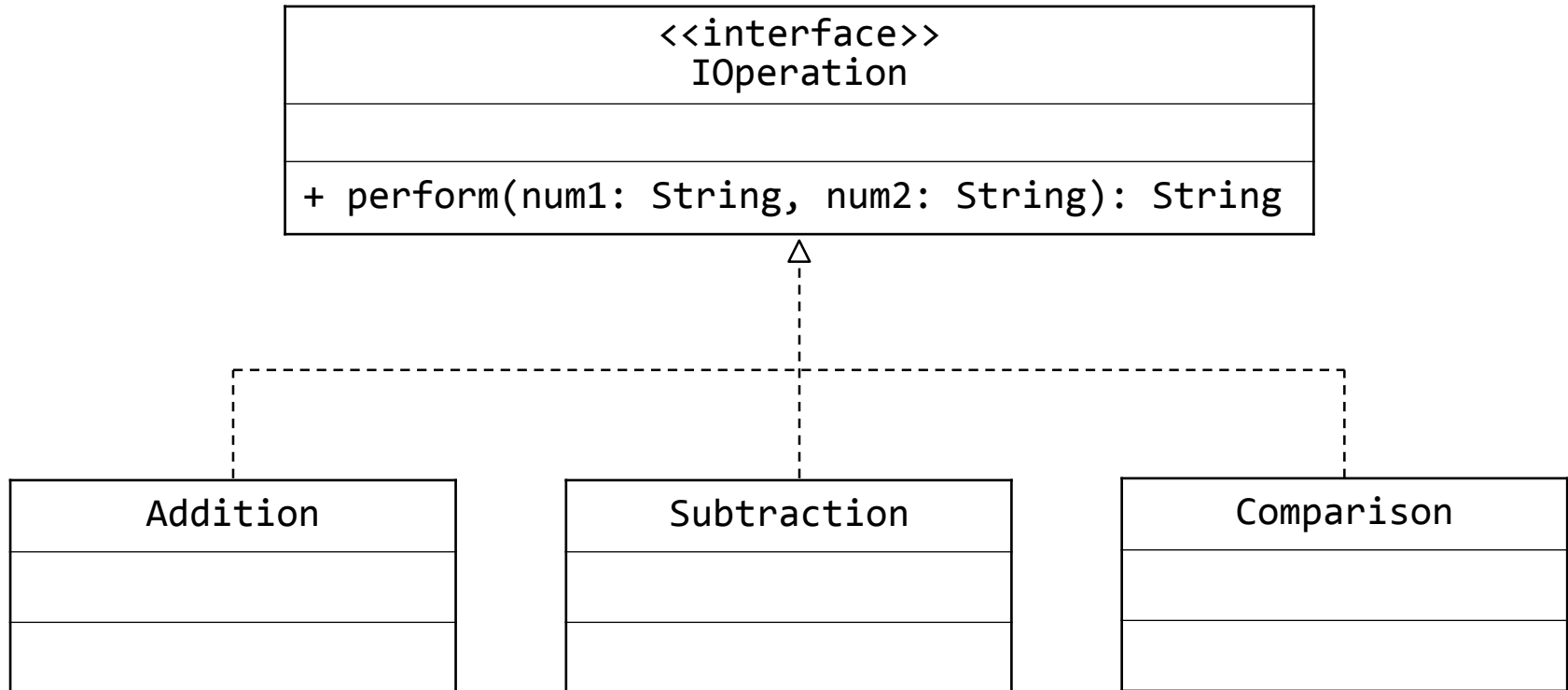
// Determine whether 123 > 456

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

- The input is an expression to be evaluated, which is given from the program argument `args[0]`.
- 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

- Correctness: 80%
 - Note that TA will test your program with more than one test case.
 - Coding standards: 20%
 - Plagiarism is strictly forbidden
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- 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`

Submission

- Please archive your source code to `STUDENT_ID.zip` and upload to Moodle before deadline
- Your zip file should follow the format depicted in the document "Java Online Judge System Manual.pdf"
- Remember to test your code on *Java Online Judge System* before uploading to Moodle
- No late submission is accepted

If you have any problem about this homework,
please contact TA: 黃琪恩 (tony4794@gmail.com)