Java Software Development

Homework 6

Problem Description

- 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.

Problem Description

- 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

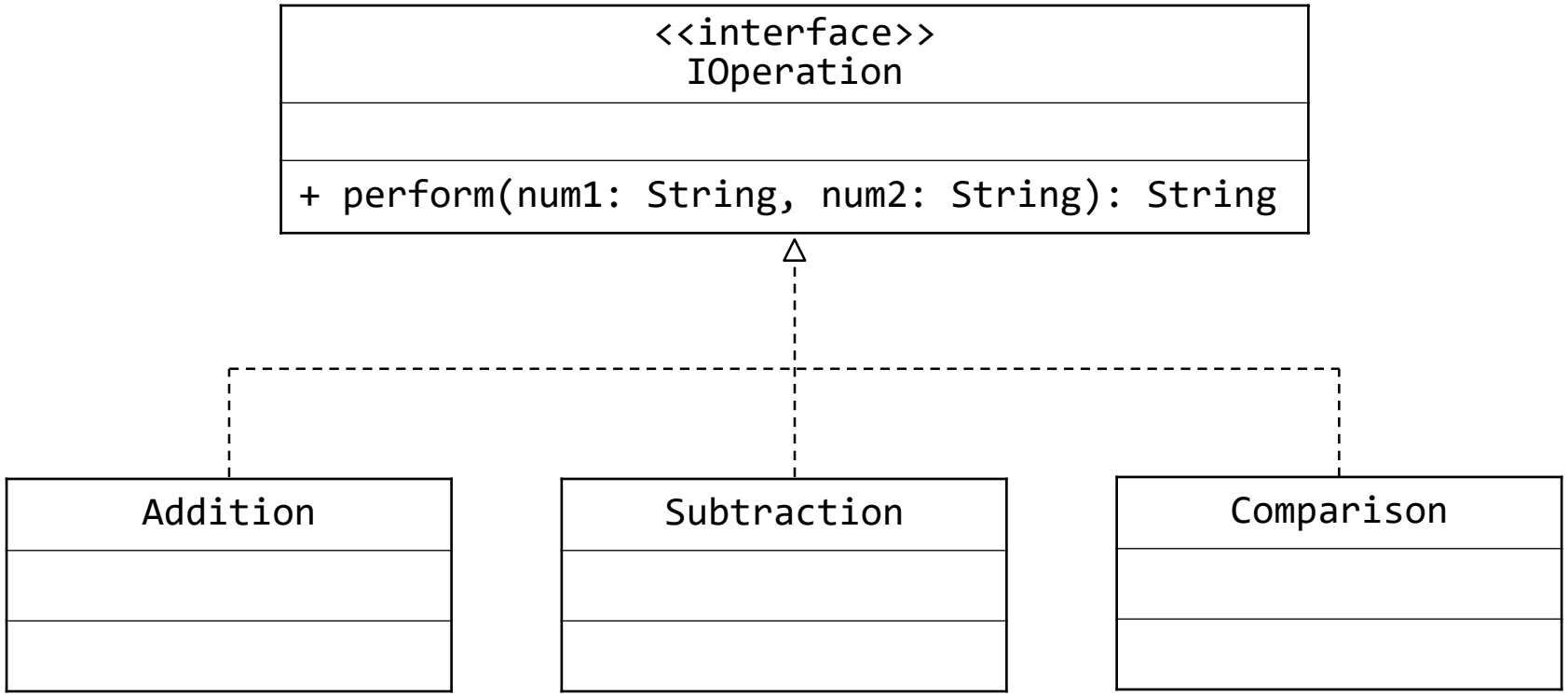
```
// Determine whether 123 > 456
IOperation operation = new Comparison();
String result = operation.perform("123", "456");
```

Problem Description

- 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



Sample Input and Output

Input	123 + 456
Output	579

Input	123 - 456
Output	-333

Input	123 > 456
Output	false

Input	123 < 456
Output	true

Input	123 = 456
Output	false

Sample Input and Output

Input	99999 + 99999
Output	199998

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

Input	-123456789 + 987654321 - -123456789
Output	987654321

Input	98765432101234567898765432101234567 89 + 123
Output	98765432101234567898765432101234567 912

Input	-135792468123456789876543210123456789 < -135792468012345678987654321012345678 9
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: selab@mail.csie.ncku.edu.tw