Programming Assignment 3

CSCD320 Algorithms

Instructor: Dr. Bojian Xu
Eastern Washington University, Spokane, Washington

Please follow these rules strictly:

1. Verbal discussions with classmates are encouraged, but each student must independently write his/her own work, without referring to anybody else's solution.
2. No one should give his/her code to anyone else.
3. The deadline is sharp. Late submissions will **NOT** be accepted (it is set on the Canvas system). Send in whatever you have by the deadline.
4. Every source code file must have the author's name on the top.
5. All source code must be written in Java and commented reasonably well.
6. You are not allowed to use library-provided subroutines if they are what you are asked to implement.
7. Sharing any content of this assignment and its keys in any way with anyone who is not in this class of this quarter is NOT permitted.

Finding the Fastest Calculation of Matrix-chain Multiplication

In this programming assignment, we want to implement the dynamic programming based solution for finding the fastest way for multiplying a chain of matrices. Please refer to the lecture slides and book chapter for the algorithm solving this problem.

Specification

- The Java class that has the `main` function needs to be named as "FastMatrixMulti". That is, the name of the source file that contains the `main` function should be "FastMatrixMulti.java".
- The input of your program is a text file that has multiple lines, where each line is a positive integer number. All these numbers represent the dimension sizes of the matrices, for which you want to figure out the fastest way for doing their multiplication. The file name of the input file should be provided by the grader as one command line parameter. For example,
  - If the grader provides an input file named "`matrices.txt`", the command line to run your program will be: `$java FastMatrixMulti matrices.txt`.
    (Note: `$` is the command line prompt and is not part of the command line.)

– Suppose the input file provided by the grader has the following content:

```
10
100
5
50
```

That means: (1) You are given a chain of three matrices: `A1A2A3`, whose dimension sizes are: 10×100, 100×5, and 5×50. (2) You are asked to find out the best way to do the multiplication of these three matrices.

- Your program's output includes two things: (1) The printing of the best way of doing the multiplication of the given matrix chain. For example, if the grader uses the above input file, you should print on the screen:

```
((A1A2)A3)
```

followed (in a new line) by the printing of the actual minimum time cost of multiplying the given matrix-chain, which for the above example should be:

```
7500
```

Submission

- All your work files must be saved in one folder, named: **firstname_lastname_EWUID_cscd320_prog3**
(1) We use the underline '_' not the dash '-'.
(2) All letters are in the lower case including your name's initial letters.
(3) If you have middle name(s), you don't have to put them into the submission's filename.
(4) If your name contains the dash symbol '-', you can keep them.
(5) You do NOT need enclose the testing data files and the Java .class files.
(6) If you use IDE tool for programming, do not submit all auxiliary files from the IDE (for example: project file, package management file, etc). You only save and submit the `FastMatrixMulti.java` file in the foler, and make sure that single java file works in command line.

- You then compress the above whole folder into a .zip file.

- Submit .zip file onto the Canvas system by the deadline.