CSOC 2430: HW3

Your Task:

Write a **Java** program to conduct experimental analysis for project P-4.60 and P-4.61 from the book. (Page 187)

- **P-4.60**: Perform an experimental analysis of the two algorithms *prefixAverage1 (p1)* and *prefixAverage2(p2)*, from *Section 4.3.3*. Visualize their running times as a function of the input size with a log-log chart.

- **P-4.61**: Perform an experimental analysis that compares the relative running times of the methods(example1 (e1) through example5(e5)) shown in Code Fragment 4.12. Visualize their running times as a function of the input size with a log-log chart.

Implementation Detail:

Inputs and outputs

Your program will take 3 arguments.

- The first argument will specify the algorithm (function) to be tested. Possible values include *p1, p2, e1, e2, e3, e4, e5*. Each corresponding to an algorithm to be tested. For example, *p1* means function *prefixAverage1*, *e1* means function *example1*
- The second argument will specify the name of output file.
- The third argument is an integer, which specifies the upper limit of input array size (when there are more than one input arguments e.g., example5 (e5), this applies to the first argument only) for each algorihtm.

For example, if input arguments are:

```
$ java HW3 p1 p1.txt 6
```

It means we want to test the run time of *prefixAverage1* with input size 10^1 (10 to the power of 1), 10^2, all the way up to 10^6. Your program should keep track of the amount of time needed to complete the algorithm, in milliseconds. Log10 it. Then write the numbers into the file name specified, one number per line. (Means there will be 6 lines, each line a number)

plots

In addition to the textual output as per usual, you will also need to plot some plots. The plot should look similar to the one below for these code fragments:
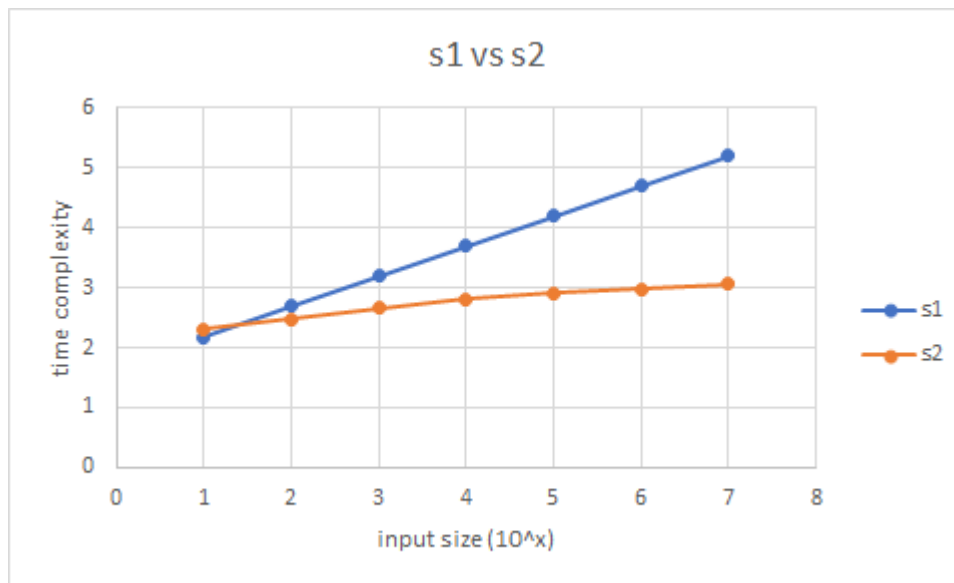
Notice the plot is in log-log scale, with x-axis as the input sizes and y-axis the time taken to complete. The input size parameter of your plot should be kept similar to the one above, ranging from 10^1 up to 10^6. (contact us if you are having difficulty running 10^6)

A total of 4 plots should be generated. Each plot also should be named as following:

1. **plot_1.png** should contain the comparative results of p1 and p2 in one plot
2. **plot_2.png** should contain the comparative results of e1 and e2 in one plot
3. **plot_3.png** should contain the comparative results of e3 and e4 in one plot
4. **plot_4.png** should contain the individual results of e5 as a single plot

You are free to generate the plots using tools of your choice: R, Matlab, Excel, etc... However, we expect the plots to be submitted in png format.

Here is some example output files.

Hint

If you don't know how to time the run, just try:

```
System.currentTimeMillis();
```

Submit your assignment:

Because everyone's run time will be different, we won't provide a testing script this time. But please name your directory and source file name correctly. Also please write outputs to a file with provided name.

If not yet, learn some basic linux operation and bash technique during this assignment. They are VERY useful.

Create a directory on the Linux server, **its name must be hw3**

```
$ mkdir hw3
```

Change your current directory to the hw2

```
$ cd hw3
```

Compile the program

```
$ javac *.java
```