Issued Date : Monday May 2, 2022 **Due Date :** Friday May 13, 2022

Special instructions : Must be done in teams of 8 people

Objective

The objective of this assignment is to compare how two different programming languages can solve a given problem.

Problem statement

You have to implement two different sorting algorithms using two different programming languages for each algorithm, for a total of 4 programs. One of the programming languages must be Java, and the second one is left at your discretion. In choosing the second language you must make sure that it includes features such as file processing, dynamic binding, time measurements and concurrency. It is best to choose two languages that are not too similar in terms of paradigm or evaluation.

The programs must read a list of integer numbers from a file and save them in an array to be later sorted. The file rand.txt contains about 1 million values and that sample should provide an adequate measure of performance for the two sorting algorithms. You must record statistics such as the total execution time, the amount of memory consumed, and the number of loop iterations so that you can make an efficient evaluation of each language and also of each algorithm.

Relationship with term paper

Each programming assignment should be done from the perspective of the comparative study to be made in the term paper. In this particular assignment, you should select sorting algorithms (e.g. insertion sort, bubble sort, selection sort, shell sort, quick sort, …) and programming languages that are quite different, in order to enable interesting comparisons to be made between your implementations in different programming languages. In the term paper, you will be asked to provide a comparative description of each of the programming languages you have used in your assignments.

Assignment submission requirements and procedure

You have to submit your assignment before midnight on the due on moodle under the name "*programming assignment 1*". Late assignments are not accepted.
The file submitted must be a **.zip** file containing:

- a simple document describing in English your sorting algorithms and the programming languages used,
- all your code (i.e. 4 different programs) in text format and in executable format,
- one input file containing data to be read and sorted by the programs,
- one output file for each program containing the sorted result, as well as relevant statistics on the execution (minimally: execution time and memory consumption),

- instructions on how to compile and execute all your programs in a README file.

Evaluation Criteria

- Description in English of the algorithms and the programming languages. Also, explain why the selected languages are more suitable to solve the sorting problems. (3 pts)
- Correctness of implementations (8 pts).
- Input and output files (3 pts).
- Output of relevant statistics enabling comparison (4 pts).
- Choice of different languages (2 pts).

Useful links and documents

- Moodle
  - Sorting and searching algorithms by Thomas Niemann
- gcc.gnu.org
  - C, C++, Objective-C, Fortran and Ada
- microsoft.com
  - C#, F#, Visual Basic
- microfocus.com
  - Visual COBOL
  - Turbo Pascal
- java.sun.com
  - Java
- haskell.org
  - Haskell
- www.plt-scheme.org/software/drscheme
  - Scheme
- www.perl.com
  - Perl
- www.python.org
  - Python
- www.ruby-lang.org
  - Ruby