COURSE WORKSHOP
"INTRODUCTION TO PARALLEL COMPUTING"

EXERCISE – I 2022-2023 (10%)

You are asked to write and run an MPI program in C according to the following instructions (assuming a parallel environment of 'p' processors in point-to-point communication):

1. Processor '0' to read from the user a sequence of integers 'T' of length N (T0...TN-1) – ['N' should also be provided by the user]
2. To be checked in parallel by the 'p' processors if the sequence 'T' is sorted in ascending order (that is, if it applies to all elements of the sequence: ÿi <= ÿi+1 | i=0...N- 2).
3. Processor '0' to print the result (yes/no – whether the sequence is sorted or not) on the screen. If it is not sorted, it should also be printed at which element the sorting 'breaks' (ie which element ÿi of the sequence is the first one for which ÿi > ÿi+1 applies).

The total required total computing load (comparisons etc.) should be equally distributed across the 'p' processors of your parallel environment. The set of input data should also initially be equally distributed to the 'p' processors, and without redundancy.

Parametrically expand your code to work correctly for any number of 'p' multi-processors. Assume first that 'N' is an integer multiple of 'p'. Then try to extend your implementation to work correctly for any combination of 'N' and 'p' values.

Also try to make your program work (a) with a menu of options (eg 1. Continue – 2. Exit) and (b) iteratively (i.e. repeatedly display the above menu until the user selects the 'exit' option ' from the program).

Method - Delivery Date:

The Exercise must be submitted electronically (through the Eclass platform) until **Sunday 27/11/2022.**

Deliverables: Commented code, documentation and indicative runs