

# COEN 346

## Programming Assignment #1

### Quick-Sort using multi-threading

The program gets a list of integer values specified in an input file named input.txt. Using the recursive threading and quick sort technique, the program should sort the input list. The input "input.txt" consists of several text based lines. The first line indicates size for the list of numbers to be sorted (n). The next "n" lines contain the input numbers. The output ("output.txt") should be the sorted list, each number in a line.

To follow the recursive threading method in the quick sort your implementation should meet the following requirements:

- The main function should read input file and fill an integer array. Then it runs "QuickSort" function as a new thread and passes the input array to that thread. Main function should wait until QuickSort algorithm is finished and then print out the sorted array in the output.
- The "QuickSort" function is responsible to select a "pivot" and divide its input array (e.g. arr) to two sub-arrays (e.g. leftArr and rightArr) as defined in quicksort algorithm. It then calls the QuickSort recursively in a new thread for leftArr and/or rightArr as needed. The main requirement of this assignment is that the implementation should enable leftArr and rightArr be sorted concurrently in two different threads.

Here is an example of input and output files:

```
Input.txt
8
3304
8221
26849
14038
1509
6367
7856
21362

Output.txt
1509
3304
6367
7856
8221
14038
```

21362  
26849

The assignment should be done in a group of two students. The deliverable consists of a well-commented code and a two pages report specifying the high level description of the code (description of the methods/functions/threads and the flow of the program). The report should also include a brief conclusion, discussing your experience with threading and your suggestion for an example application of threads other than the ones discussed so far.

This assignment will take 20% of your total mark for programming assignments. Also for this assignment 80% of the mark is dedicated to your code and 20% to your report.

The code and the report should be submitted to the EAS website (<https://fis.encs.concordia.ca/eas/>).  
The deliverable should be submitted to EAS before: Monday February 8<sup>th</sup> (11 pm).