**CENG443 Take-home Exam**

Due: February 1, 2024 at:10:00

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In this assignment, you are going to implement a parallel image processing algorithm by using GPU. You are going to use OpenCL library. Image processing tools provide a large range of different algorithms for all kind of circumstances. A simple and effective algorithm is the **Histogram equalization**. It re-adjusts the contrast of an image using the image's histogram.

I have written its sequential code. You need to implement a parallel version of the same algorithm which should give the same output.

The program that takes two inputs; the first for the input image and the second for the output image. Your program should perform a parallel **Histogram equalization** algorithm on the input image and then store the results into a new image.

You need to measure the time for only Histogram equalization and make tables that compares timings of your algorithms with varying number of cores. You need to make tables for speed-up and efficiency values of your parallel algorithm.

**What is required?**

1. Report
   * A report that includes your names and surnames and appropriate title and small description.
   * Very short pseudocode of your **parallel** algorithm with at most **12 lines**.
   * Brief explanation: Steps of your parallel algorithm in terms of 4 steps of Foster’s methodology.
     + Furthermore, you should discuss which parallelism you adopted, task or data parallelism, with the reasoning behind it.
2. Tables; for elapsed timings, speed-ups and efficiencies of your parallel algorithm.
3. Code

* Source code named main.c written in C/C++ programming language.

1. Draw speedup and efficiency charts.