ECE8780: Assignment 1.1
(Hackathon Extension)

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1 Problem Description

You've all (presumably) solved the problem of Image gray scaling. However, the kernel currently reads from the global memory. We've seen that multiple reads and writes on global memory is a waste of bandwidth and also underutilizes the GPU compute capability.

In this small hackathon extension, you will write an optimized version of the simple kernel you wrote in Assignment 1. Specifically, you're going to:

- Implement an image gray scaling kernel using shared memory of a fixed TILE_WIDTH size. In other words, you will grab a chunk of global memory into shared memory, process it and then write it back to global memory.

- Profile the performance of the kernel vis a vis the unoptimized version. Do you notice a significant difference? Why or why not?

2 Deliverables

You shall write *another* kernel to use shared memory. DO NOT modify the existing kernel. You must profile the execution of both kernels like so:

1. Input size varying from 64x64 through 512x512.

2. Vary the number of threads per block from 16 to the limit of your hardware.

3. Vary the hardware from old generation k40s to new generation p100/v100.

Your results must be included in a LaTeX typeset report, with appropriate graphs and visualization tools you deem necessary to support your hypothesis.