Lab 9

In this lab, you’ll work with the streams examples from the book to understand their performance on our systems and then to improve them.

Streams

Begin by copying the contents of /home/courses/cs180j/lab9. This is the code for the stream examples from the book, modified only to make them standalone programs. Begin by compiling and running them on both huygens and descartes. Each reports the time for its main operations (not including memory allocation and setting up the random data). For reference, the book reported the times as 62ms for the single stream version, 61ms for the first double stream version, and 48ms for the corrected double stream version.

You’ll find two phenomena that require explanation:

1. Although the book found a significant improvement with the corrected double stream version, that certainly isn’t apparent here. (I got as much as a 10% improvement, but the single stream data are quite noisy and the improvement is almost always less than that...)

2. The times running on huygens and descartes are quite different even though the GPU cards are the same on the two systems. (Both are significantly more capable than the one used by the authors in the experiments reported above.)

See if you can explain these phenomena. It may be helpful to run one of the programs without invoking the kernel (just comment out lines that invoke it). What other experiments can you perform to develop or verify hypotheses about these phenomena? Talk to me either when you have explanations or if you need additional guidance.

Once you’re confident that you understand what’s happening, see if you can devise a variation of this task so that using two streams achieves the hypothetical speedup of two. (Don’t worry about making the task meaningful (though kudos to you if you can); remember that their program is a toy example.)