

CSC 410/510 Programming Assignment #2 – Due 12 November

1. A matrix-vector multiplication takes an input Matrix **A**, and a vector **B** and produces an output vector **C**. Each element of the output vector **C** is the dot product of one row of the input Matrix **A** and vector **B**, that is, $C[i] = \sum_j A[i][j] \cdot B[j]$. To make life easier, we will only handle square matrices (BTW, if your matrix was not square you can always pad with zeros to make it square, common solution in parallel.) of single-precision floating-point numbers. Write the CUDA kernel and the host program to solve this task. Do performance analysis by using the NVIDIA profiling tools, give numbers for the scaled speed-up the Karp-Flatt Metric.

Hint: To make sure that your algorithm calculates the correct values, create a matrix and vector that you know the closed form for (like sum of squares or something like that).

Extra Assignment for graduate students:

A matrix addition takes two input matrices **A** and **B** and produces one output matrix **C**. Each element of the output matrix **C** is the sum of the corresponding elements of the input matrices **A** and **B**, that is, $C[i][j] = A[i][j] + B[i][j]$. For simplicity, we will only handle square matrices of which the elements are single-precision floating-point numbers. Write the device kernel and host program to solve this task. Do performance analysis by using the NVIDIA profiling tools, give numbers for the scaled speed-up the Karp-Flatt Metric.

Assignment Submission:

Your homework is due at the beginning of class. Tar or zip all documentation and source files together. The header of each source file should contain all the normal information (name, class assignment etc.)

- Documentation - all of the following should be in: `prog2.pdf`
 - Description of the program.
 - Description of the algorithms and libraries used.
 - Description of functions and program structure.
 - How to compile and use the program.
 - Description of the testing and verification process.
 - Description of what you have submitted: `Makefile`, external functions, main, etc.
 - Format: PDF (write in any word processor and export as PDF if the option is available, or convert to PDF)
 - Main programs
 - Any required external functions *.c.
 - Any include files you use (other than the standard ones).
 - The `Makefile` to build the programs
 - Tar the directory and then gzip using the correct filename.
- [And I do know that there are better compression routines than gzip.]