

DV2575 Project-2: Gaussian Elimination

In this project, you will employ the CUDA based parallel computing to implement the gaussian elimination.

In linear algebra, gaussian elimination is an algorithm to solve the system of linear equations. It usually referred to as a sequence of operations, which are performed on the matrix with the corresponding coefficients.

The traditional solution approach for gaussian elimination consists of three important steps:

- The first step is to transform a particular system of linear equations into an upper-triangular matrix.
- The second step is known as forward substitution, in which a pivot column is used to reduce the rows of matrix, and thus modifying the matrix until the lower left-hand corner is filled with zeros as much as possible.
- The third step is called back-substitution, in which the value of each variable is calculated.
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The project is divided into four iterations, where each has to be finished and approved before you are allowed to go ahead with the upcoming iteration.

Iteration

- Implement the single thread based gaussian elimination
- Implement the multiple-thread based gaussian elimination
- Compare the time used in the two methods
- Performance analysis showing how the following factors affect the performance:
 - Effect of number of variables on solving linear equations.
 - Effect of number of threads on solving linear equations.

Final report

The project solution shall finally be documented in an academic written report. You have to cover and explain each implementation step and the performance analysis in a well structured and understandable way.

Questions?

Feel free to ask Yong Yao (in person, will not answer by e-mail!). Lars Lundberg will answer questions regarding the course in general.

Good Luck!