

CSE 597 Project Report

Wenliang Sun

The Pennsylvania State University

Introduction

In this project, we describe the basic idea of the 2D convection-diffusion equation, and then solve the equation by direct solver and iterative solver. We use Jacobi method as the iterative solver and LU decomposition as the direct solver. After that, we discuss the serial method and parallel method. Firstly, we profile the serial method and then profile the parallel method. After that, we find some potential steps to improve our parallel code and compare their profiling results. In the end, we discuss the strong scaling results. Because of the convenience, we select OpenMP. There are many built-in functions in OpenMP library, so it is very friendly for the beginner. According to the experimental results, we know that the parallelization could accelerate the code several times. The more cores we use, the faster the speed. We also discuss the efficiency between cores and speed-up.

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References

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- [2] Gupta, Murli M., Ram P. Manohar, and John W. Stephenson. "A single cell high order scheme for the convection-diffusion equation with variable coefficients." International Journal for Numerical Methods in Fluids 4.7 (1984): 641-651.
- [3] Codina, Ramon. "A discontinuity-capturing crosswind-dissipation for the finite element solution of the convection-diffusion equation." Computer Methods in Applied Mechanics and Engineering 110.3-4 (1993): 325-342.

Github Address

- <https://github.com/William0617/CSE597HW1>
- <https://github.com/William0617/CSE597HW2>