Shiraz University

Parallel Algorithms - Spring 2024
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Teacher Assistant:
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Homework 5
Deadline: 31/03/1403

In this homework, you will explore a parallel implementation of the Conjugate Gradient (CG) algorithm using MPI and OpenMP.
The Conjugate Gradient Algorithm (CG) is an iterative technique to solve linear systems that are symmetric and positive definite. You can use Chapter 12.6 of this reference for further details about the CG algorithm.

Step1 Start by implementing a serial version of the CG method.

Step2 Use MPI for message passing between processes. Distribute the matrix A, vector b, and solution vector x across processes.

Step3 Within each MPI process, Use OpenMP for parallelizing computations.

Step4 Compare the performance of the serial implementation (Step 1), the parallel implementation with MPI (Step 2), and the hybrid implementation with MPI and OpenMP (Step 3) by analyzing their execution time obtained from Gprof.

Report Format:
An explanation of how to run your code (Linux commands to run your code)
A complete analysis of your profiling
A comparison between the execution time of your code with different parameters.

Reminders:
Each homework has to be done individually.
Send the report and the source code as a ZIP file to saraabbasi847@gmail.com. File's name and email subject should be like this:
PA-S24-YOUR NAME-YOUR STUDENT NUMBER-HW5

Best of Luck!