

Assignment 2 – What to Do in General

- You will be given a serial program, called Karman

- You need to parallelize the Karman code and write a report

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- 80% of the full mark comes from the parallelization using MPI

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- 20% of the mark comes from the parallelization using both MPI and OpenMP (a hybrid approach), i.e., parallelizing the computations in one machine using OpenMP, while parallelizing the computations across machines using MPI

Assignment 2 – Detailed Requirements for Programming

- Parallelize the Karman code, using a pure MPI approach (80% of marks) and a hybrid MPI-OpenMP approach (20% marks)

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- Profiling which Karman functions are more time consuming

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- Design your decomposition strategy, data exchange strategies between neighboring partitions, the MPI functions (e.g., collective operations)

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- For a hybrid approach, design the parallelization strategy for OpenMP

Assignment 2 – Detailed Requirements for Programming

- Benchmarking the execution time of your parallel program as you increase the number of processes
- If you develop a hybrid MPI-OpenMP implementation,
 - benchmark the runtime of OpenMP code
 - Compare the performance between OpenMP and MPI
- Ensure the simulation results are the same after the parallelization
- Your parallel program should contain the adequate comments as the evidence of good programming practice.

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Assignment 2 – Requirements for Report

- Profiling the functions to determine which functions are more time consuming; discuss the profiling results
- Discuss your MPI implementation, for example,
 - your decomposition strategy and load balancing strategy;
 - your strategy of exchanging the boundary data between neighboring partitions;
 - collective operations you used;
- Benchmark the change in execution times of your parallel program as you increase the number of processes; present the results in graph or table

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Assignment 2 – Requirements for Report

- Analyze and discuss the performance of your parallel program
- If you develop the hybrid MPI-OpenMP implementation,
 - Discuss OpenMP implementation
 - Benchmark the runtime of the OpenMP codes and present the results
 - Discuss the performance comparison between the hybrid approach and the pure MPI approach
- Writing skills: pay attention to spelling, punctuation and grammar

Assignment 2 – Submission

- **Submit a compressed folder (.zip) to Tabula; the folder should contain**
 - your parallel code (the directory structure used in the project should not change)
 - your report (pdf format and place your report in the top level directory in the folder)
- **Deadline: 12pm March 14th, 2018**

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