Pre-Parallelization Exercises in Budget-Constrained HPC Projects: A Case Study in CFD

Abstract

Projects associated with the Grand Challenge Applications (GCAs) often involve large multi-disciplinary teams, are well funded and have access to good computational resources. The code base used in these projects is mature and well maintained and may have gone through multiple revisions spanning decades. Parallelization of this serial code to enable execution on a distributed multi-computer architecture or a shared memory multi-processor system is the next immediate step. Parallelization of serial code used by young researchers working on GCA-related applications in privately-funded institutions, on the other-hand, is not as straightforward. These researchers work under tight budget and resource constraints and do not have much access to funds or experienced programmers as their other counterparts. Initial findings from a case study are presented that show how such limitations can be alleviated by inter-departmental collaboration involving undergraduate students’ final year projects. Code
developed by a single programmer over a period of about three years for the Conjugate Heat Transfer problem in Computational Fluid Dynamics (CFD) has been used for the study.

Reference


Index Terms

Computer Science Distributed

Computing

Key words

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