Implementing ISSM cores using MPI+OpenMP

Applicable for students as HiWi
Keywords: ISSM, Performance Engineering, C++, MPI+OpenMP

Introduction
The Ice Sheet System Model (ISSM [1]) is a C++ finite element code to simulate polar ice sheets and glaciers. Therefore exist multiple compute cores, each computing one physics effect. The current implementation is parallelized using PETSc an MPI-based math framework.

Tasks
Since a pure MPI implementation has limits we will implement a hybrid approach using MPI+OpenMP to speed up the most compute intensiv kernels.

- design an hybrid approach for the most compute intensiv kernels
- implementing the hybrid approach
- measure the performance improvement, especially the impact on the load balancing

Qualifications
Skills
- good command of C++
- good command of OpenMP

Interested in
- high performance computing
- numerical physics simulation

References

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