

# Implementing ISSM cores using MPI+OpenMP



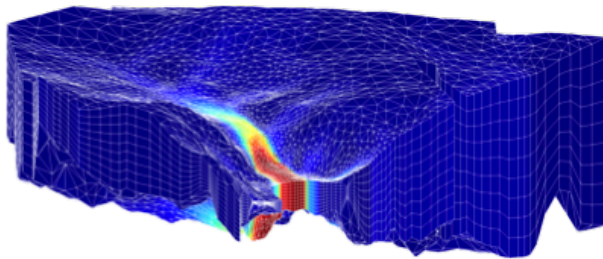
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Applicable for students as HiWi

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.



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## Tasks

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

- design an hybrid approach for the most compute intensive 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

- [1] <https://issm.jpl.nasa.gov/>

