Master's thesis:
MPI-based Cluster Backend for BART

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Overview:

The aim of the master thesis is to design and implement a cluster backend based on the Message Passing Interface (MPI) for the Berkeley Advanced Reconstruction Toolbox (BART), which is developed by the Institute of Biomedical Imaging.

BART is a toolbox for computational MRI imaging written in C which is widely used in the MRI community. In addition to basic operations on multidimensional arrays (such as vector math and Fourier and Wavelet transforms), it implements a number of different reconstruction algorithms. Currently, BART can be used on CPUs with parallelization achieved using threads and on GPUs. The goal of this Master's Thesis is to extend the parallelization capabilities by providing a backend which uses MPI to run operations on multiple nodes of a cluster.

Specific Tasks:

- Become acquainted with MPI
- Understand the existing BART code
- Extend the parallelization backend to allow MPI
- Take into account the tradeoffs when using single-node vs. cluster-wide parallelization
- Document the resulting changes

Recommended Knowledge:

- C programming
- Interest in parallel programming
- Basic git workflow

Contact:

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