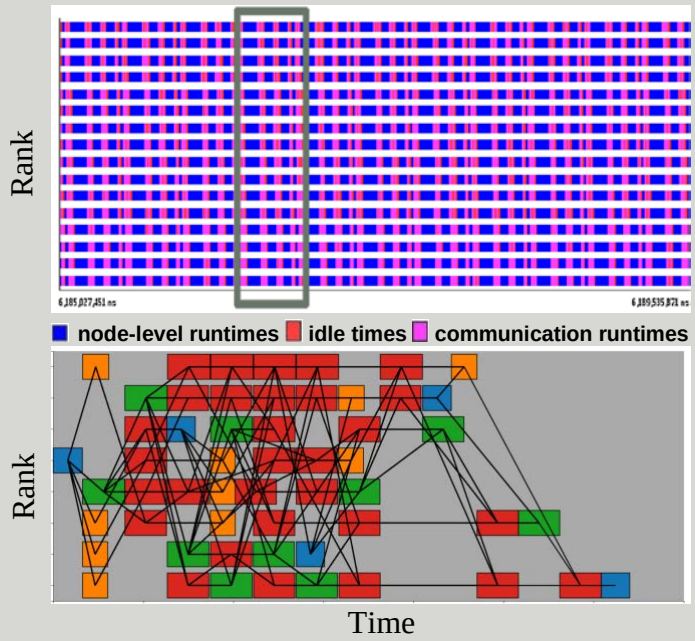
The **High Performance Computing Group at Erlangen Regional Computing Center** (HPC@RRZE) is looking for a

Bachelor/Master thesis student for
Implementation of Node-level Functionality using the DisCosTiC Toolkit for Distributed Applications

The thesis will be supervised by the HPC group at Erlangen Regional Computing Center, which is led by Prof. Dr. Gerhard Wellein (Department of Computer Science, FAU).

Tasks

DisCosTiC (Distributed **CosT i**n **C**luster**):** This library aims to predict the runtime for large-scale parallel applications in an efficient manner. The simulation framework is based on analytical first-principle models. For the execution part, it currently utilizes a fundamental analytic Roofline model. The framework simulates a task-DAG (directed acyclic graph) style model for the workflow and the MPI message matching semantics. The focus lies on compute-bound and memory-bound benchmarks (e.g., stencil codes), running in a strong-scaling scenario on highly parallel systems.



Within the bachelor/master thesis, the focus will be in the following areas:

- Getting familiar with the DisCosTiC framework and reproduction of the simpler test cases
- Extension of DisCosTiC by integrating an improved node-level performance model
- Setting up micro-benchmark tests and proxy applications
- Software verification: analysis of the accuracy of the simulation

(For master thesis) Software performance evaluation and detailed comparison with large-scale algorithms running on the clusters

Required skills

- Student of (computational) engineering or computer science
- Profound knowledge of C/C++ and the Linux OS
- Basic knowledge of code parallelization with MPI and OpenMP
- Knowledge of node-level performance engineering is strongly recommended (as taught, e.g., in the lecture “Programming Techniques for Supercomputers”)
- Nature of work: Theory (20%), Conception (20%), Implementation (60%)

Please direct any inquiries or applications to

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