Issues with cluster computing at DESY Hamburg

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Status and plans

- Growing needs in the areas of
    - beam physics simulations (XFEL, wakefield acceleration)
    - Beamline R&D (simulation of photon fields)
    - Synchrotron user data analysis (crystallography)
- Existing Grid resources partially exploited
- Large scale HPC done elsewhere; need to support low-end HPC locally (~100-1000 core jobs)
- Will probably need to provide an analysis facility for synchrotron users
- Potentially many users from diverse fields

Resources

- Bird cluster (~500-core)
- Ferrari cluster for the Machine group
- SGI Altix UV 100 (72-core, belongs to the CFEL group)
- Dell PowerEdge R815 48-core
- Supporting GPU computing
- Building a small infiniband-based HPC cluster
- All resources are being benchmarked wrt. crystallographic applications and EM simulations to choose appropriate platforms for future needs (when XFEL up and running)

GPU computing

- 1xM1050, 2xM2050, 2xATI HD6870 – for initial tests
- Learning curve for cuda/opencl programming
- Good experience, will probably expand with some off-the-shelf solutions
- Application areas – crystallography, electrodynamic simulations
- Some MATLAB applications have been ported
- 2x-80x speedup achieved

Infiniband Cluster

- 48 ProLiant BL460c G1 blades (x8 cores), Infiniband
- Taken out from the NAF after upgrade
- Hardware in place and connected
- Now being set up and tuned
- Phase I: tuning on linear algebra
- Phase II: tuning on beam physics applications
- Phase III: (probably) crystallographic applications – (probably) will require a reasonable parallel file system

Issues/plans

- Need to improve load balancing/utilization efficieny (e.g. integrate into an SGE infrastructure)
- Several projects to develop/collaborate on high-performance software for on-line data processing and physics simulations (e.g. HDRI-PNI) ongoing
- Ideally providing a common infrastructure for low-end HPC based on the current experience with hardware platforms