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GaspiLS AND THE GPI-2 ECOSYSTEM: GPI-2 SCALABILITY AND PERFORMANCE MADE EASY

1 *GaspiLS provides scalability for FEM and CFD simulations*

2 *Performance plots: Scalability advantage of GaspiLS compared to PetSC. Jacobi preconditioned Richardson Method; 3-D Poisson equation (2d order FD discretization), cubic matrix (359³)*

The distributed systems used in high performance computing require highly efficient and scalable applications. Scalability is a measure of the efficiency of a parallel implementation and ultimately indicates whether the available resources – for example, CPUs – are being efficiently used. The Competence Center High Performance Computing develops GPI-2, a parallel programming model that is ideal for implementing such applications.

GaspiLS is a library of scalable, iterative linear solvers developed to easily exploit the benefits generated by GPI-2 and make them available for immediate practical use in a multitude of applications. GaspiLS is ready for direct use with a variety of new or existing simulation programs ultimately solving linear systems.

HySCALA explores new areas of application and new markets for GaspiLS
GaspiLS has already proven itself in several industry projects. Its further distribution is currently being promoted as part of the EU project HySCALA (Hybrid Scalable sparse matrix linear algebra for industrial applications).

The aim is to analyze various, potential new market segments and fields of application for GaspiLS and to identify specific requirements for a competitive linear solver library. We are looking primarily for generic yet efficient preconditioners that allow us to reduce the number of iterations required for convergence of the iterative process and minimize the total run times. Presently, the focus is on the scalable implementation of efficient preconditioners that can be applied to a broad class of problems.

GaspiCxx for increased productivity
Within GaspiLS, we have factorized the implementation for the explicit management of communication resources required by the GPI-2 data transfer and used GaspiCxx to supply it to other applications. GaspiCxx defines an easy to use C++ interface. It delivers the full native GPI-2 performance. At the same time, the management of GPI-2 communication resources is fully transparent to the application.

This eliminates a large part of the implementation work normally required to develop GPI-2 applications. Development of GPI-2 applications and the exploitation of the advantages – like the good scalability – has never been so easy.