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Using an integrated implementation and specification language to design DSLs for HPC applications

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Abstract

Magnolia is an integrated specification and programming language developed at BLDL. It has a library centric design and is geared for extreme generic reuse of modules. As such it is a framework for exploring and designing domain specific languages (DSLs). This gives Magnolia some interesting properties for the high performance computing (HPC) domain:

- It is a test bed for programming models, e.g., for locality control.
- It has features for exploring and validating the correctness of code and code transformations.
- It supports abstraction at all levels, e.g., the layered coordinate-free numerics architecture for solving partial differential equations (PDEs).

We will illustrate some ideas with PDE solvers for Burgers' equation and the elastic wave equation (used in seismic simulations).

Short bio



Magne Haveraaen received his PhD from the University of Bergen where he is professor in computer science and head of Bergen Language Design Laboratory (BLDL).

His research interests include domain engineering, software security and safety and programming models.