Community Grids Top Projects

HPJava

http://www.hpjava.org/

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Project Overview

The HPJava project is developing an environment for scientific and parallel programming based around Java. It incorporates a preprocessor for an extended dialect of Java, together with various support libraries for communication and other functionality for parallel programming.

The extended version of Java adds "scientific" multidimensional arrays and distributed arrays (a la Fortran 90 and High Performance Fortran) to the basic Java language. It does this in a way that maintains complete compatibility with all standard Java class libraries and Java Virtual Machines. The parallel features of HPJava support a programming model called the "HPspmd model", integrating high-level, data-parallel features from languages, such as HPF, with established, library-centered approaches to programming distributed memory parallel computers (MPI, etc.) Target architectures include purpose-built supercomputers and networks of workstations.

An initial version of the HPJava translation system will be released as open source software in the near future. It will support the full HPJava parallel programming language and will incorporate syntax proposals for multi-array extensions to the Java language (consistent with those of the Java Grande Numerics Working Group.) Our multidimensional arrays can have any rank, and the elements of multi-arrays can have any standard Java type, including Java class types and standard Java array types. Regular sections of multi-arrays are fully supported.

The release will also incorporate a new Java version of the "Adlib" collective communication library for data parallel computing, as well as our established "mpiJava" library for parallel computing with Java.

Related Publications

- *Parallel Programming in HPJava*
  Bryan Carpenter, Han-Ku Lee, Sang Boem Lim,and Guansong Zhang
  http://www.hpjava.org/

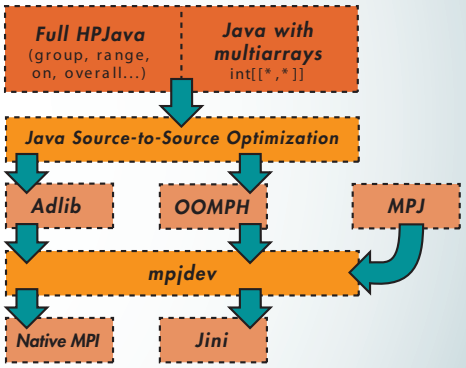
- *Translation Schemes for the HPJava Parallel Programming Language*
  Bryan Carpenter, Geoffrey Fox, Han-Ku Lee, and Sang Boem Lim
  14th Workshop on Languages and Compilers for Parallel Computing
  Cumberland Falls, KY, August 2001

- *Benchmarking HPJava: Prospects for Performance*
  Han-Ku Lee, Bryan Carpenter, Geoffrey Fox, and Sang Boem Lim
  6th Workshop on Languages, Compilers and Run-time Systems for Scalable Computers, Washington, DC, March 2002

- *Collective Communication for the HPJava Programming Language*
  Bryan Carpenter, Geoffrey Fox, Han-Ku Lee, and Sang Boem Lim
  Java Grande/ISCOPE 2002 Special Issue of *Concurrency and Computation: Practice and Experience*

- *Supporting Multidimensional Arrays in Java*
  Manish Gupta, Sam Midkiff, and Jose Moreira
  Java Grande/ISCOPE 2001 Special Issue of *Concurrency and Computation: Practice and Experience*

HPJava Architecture



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