XcalableMP
Directive-based language eXtension for Scalable Parallel Programming

Overview

What’s XcalableMP?
XcalableMP(XMP) is a directive-based PGAS language based on C99 and Fortran95.
XMP supports typical parallelization under “global-view model” programming and enables parallelizing the original sequential code.
XMP also includes a CAF-like PGAS feature as “local-view model” programming.
Designed by XMP Specification Working Group
Members from academia, research labs, and industries

Implementation Status
XMP specification ver. 1.2 is available
Define actions of OpenMP pragmas in XMP Programs
Add Intrinsic/Built-in Transformational Procedures
Omni XMP compiler ver. 0.7 is developed by University of Tsukuba and AICS, Japan
XMP/C and XMP/fortran Compilers are included
Interface of Scalasca & tlog profiling tools
Supported platforms are Linux cluster, the K computer, Cray XE, XT, and so on

Programming Model

Language Features
SPMD as a basic execution model
Communication and synchronization occur when directives are encountered
All actions are taken by directives for being “easy-to-understand” in performance tuning

Global-view model
Data mapping
Work mapping

Local-view model
Extends C for an array section

The K computer
CPU : SPARC64 VIIIfx 2.0GHz, 8Cores, 128GFlops
Memory : DDR3 SDRAM 16GB, 64GB/s
Network : Torus fusion six-dimensional mesh/torus network, 5GB/s x 10

Performance

HIMENO Benchmark
299.1 TFlops 14.6 % of peak (131,072 Cores)

HPL
542.9 TFlops 53.0% of peak (65,536 Cores)

STREAM
331.6 TB/s, 64.8% of peak (65,536 Cores)

For more information, please visit Center for Computational Sciences, University of Tsukuba (#2519)