XcalableMP

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 coarray features for “local-view model” programming.  

Implementation Status  
- XMP specification ver. 1.2.1 (http://xcalablemp.org)  
- Defined actions of OpenMP directives in XMP programs  
- Start designing XMP/C++ language  
- Omni compiler ver. 0.9 by RIKEN AICS and University of Tsukuba, Japan (http://omni-compiler.org)  
- Open source XMP compiler  
- Interface of Scalasca & tlog profiling tools  
- Supported platforms: Linux clusters, the K computer, Fujitsu FX10, Cray XE, IBM Blue Gene/Q, HITACHI SR16000, and so on.

Programming Model

Global-view Model  
- int a[12];  
  #pragma xmp nodes p(4)  
  #pragma xmp template t(0:11)  
  #pragma xmp distribute t(block) onto p  
  #pragma xmp align a[i] with t(i)

Local-view Model  
- double a[5]:[*], b[5]:[*]; // Declare  
  if(me==2) b[0:2]:[1] = a[3:2]; // Put

The K computer

- SPARC64 VIII/2x 2.0GHz, 8Cores, 128GFlops  
- DDR3 SDRAM 16GB, 64GB/s  
- Torus fusion six-dimensional mesh/torus network, 5GB/s x10

HPL  
- 938.8 TFlops, 47.3% of peak (16,384 Nodes)

HIMENO Benchmark  
- 1346.3 GFlops (82,944 Nodes)

RandomAccess  
- 254.2 GUP/s (16,384 Nodes)

FFT  
- 186.7 TFlops, 1.8% of peak (82,944 Nodes)

STREAM  
- 1415.3 TB/s, 67.5% of peak (32,768 Nodes)