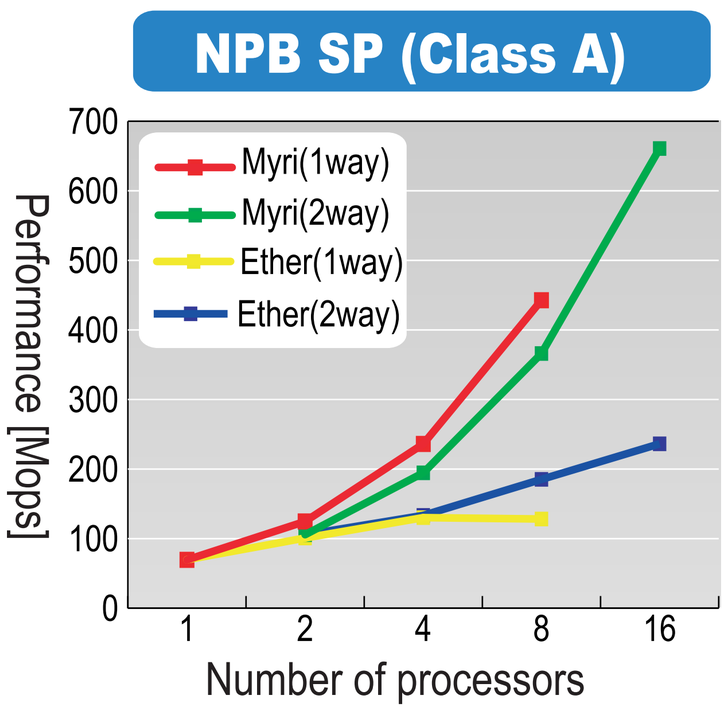
Center for Computational Physics University of Tsukuba

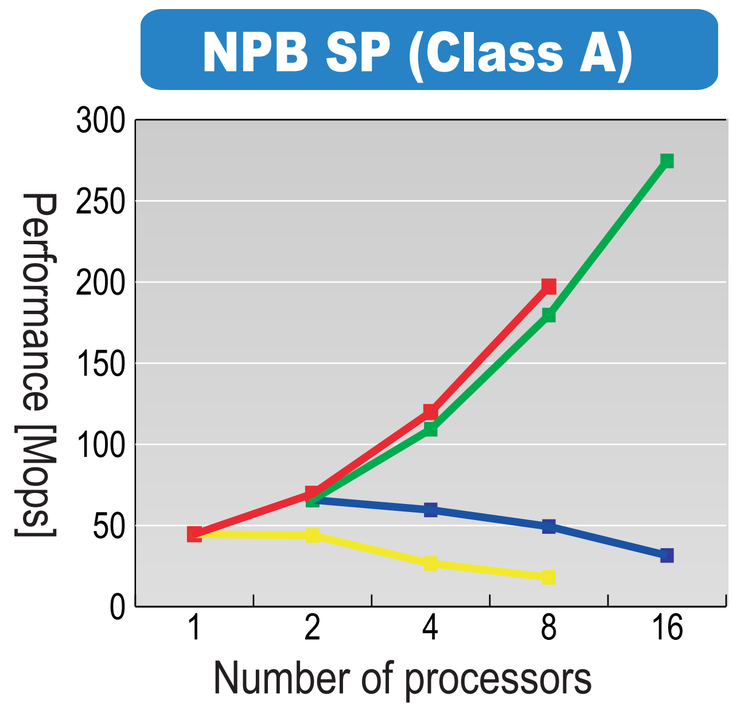
Omni OpenMP Compiler
cluster-enabled OpenMP

Features

- A free open-source OpenMP compiler project supported by PC cluster consortium, Japan.
- Portable and multi-target
- Cluster-enabled OpenMP, Omni/SCASH : OpenMP implementation for SCASH Software distributed shared memory system of SCore cluster software.
  - OpenMP compiler for "shmem" memory model
  - OpenMP extensions for page home node allocation
    - Array data mapping directives and affinity loop scheduling
    - First-touch allocation facility
- SCASH : a page-based software distributed shared memory system on SCore cluster software
  - Use kernel memory protection mechanism to detect R/W
  - SCore PM communication layer for Myrinet
  - Release Consistency memory model with multiple writer protocol
- Web : http://www.hpcc.jp/Omni/

Performance of Omni/SCASH on PC-cluster





Platform

Pentium II Xeon 450MHz (4-way SMP)
1MB L2 cache
2GB main memory
8nodes
800Mbps Myrinet 100base-TX Ethernet
Linux kernel 2.4.18
SCore 5.0.1
egcs 2.91.66

Omni 2.0 Plan

- Fortran 90 front-end
  - For SPEC OMP benchmarks
- OpenMP 2.0 support
  - C & Fortran 90
- Omni/SCASH
  - Target : 64-bit platform (Intel IA64, AMD x86-64)
    - Large-scale applications require large shared memory space
  - Re-design Omni/SCASH for Gigabit Ethernet
    - Use other communication layers (MPI)
    - Run on other platforms than on SCore
  - To improve locality, we are currently designing "first touch page allocation facility" and compiler-prefetch
  - Performance profiler for Omni/SCASH
  - POMP performance monitoring interface support

Omni/SCASH profile by tlogview tool