PACS-CS System Hardware and Software

System Specifications

- Single CPU per node for high memory bandwidth (1.1 Byte/FLOP)
- Using commodity GbEthernet NICs and switches with software trunking for cost-effective wide bandwidth interconnection (0.13 Byte/FLOP)
- 3-dimensional Hyper-Crossbar network for wide aggregated bandwidth per node to support various configuration of nearest neighboring mesh models
- Wide bisection bandwidth on any of three dimensions (640GB/s on each dimension)
- Fault tolerant local hard disk drives in RAID-1 configuration for system and user space
- Separated dual nodes on 1-U chassis in the same density with 2-socket configured dual-Xeon system
- Specially designed high-throughput and low-latency network layer (PM/Ethernet-HXB) operated under SCore cluster middleware

Hardware implementation: Hitachi Co, Ltd,
Software implementation: Fujitsu Co, Ltd, (PM/Ethernet - HXB)

3-D Hyper-Crossbar Network

A computation node is equipped with three (X-, Y- and Z-dimension) of paired on-board GbE NICs (6 ports in total) for data communication. Nodes on a single line of a dimension are connected by an L2 GbE switch. For 3-D nearest neighboring communication, the node can communicate with surrounding nodes simultaneously with aggregated 750MB/s of theoretical peak bandwidth.

A dedicated network layer PM/Ethernet-HXB provides the feature of network trunk with a paired links and high-speed routing on 3-D. This network is suitable for direct physical mapping of problems with spatial domain decomposition.