

New Supercomputer System SX-ACE at the Cybermedia Center

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New Supercompute

System Overview



The SX-ACE, newly introduced by the Cybermedia Center (CMC) is a "clusterized" vector-typed supercomputer, composed of 3 clusters, each of which is composed of 512 nodes. Each node is equipped with 4-core multi-core CPU and a 64 GB main memory. These 512 nodes are interconnected on a dedicated and specialized network switch, called IXS (Internode Crossbar Switch) and forms a cluster. Note that IXS interconnects 512 nodes with a single lane of 2-layer fat-tree structure and as a result exhibits 4 GB/s for each direction of input and output between nodes. In the CMC, 2 Peta-byte storage is managed on NEC Scalable Technology File System (ScateFS), NECdeveloped fast distributed and parallel file system, so that it can be accessed from the large-scale computing systems including the

SX-ACE at the CMC

Node Performance

As a single SX-ACE node has a multi-core vector-typed processor composed of 4 cores, each of which exhibits 64 GFlops vector performance, and a 64 GB main memory, the vector performance per node becomes 256 GFlops. On the other hand, the maximum transfer between processor and main memory is performed with 256 GB/s. This fact indicates that a single SX-ACE node achieves high memory-bandwidth performance of 1 Byte/Flops, taking higher CPU performance into consideration.

Internode communication enables 4GB/s x 2 (bi-directional) high-bandwidth data communication with a specialized internode communication control unit named RCU connected to IXS. Also, communication between node and disk storage enables 10 Gbps data communication with I/O control unit called IOP.



System Performance

The SX-ACE which the CMC has introduced is composed of 3 clusters (1536 nodes). Theoretical peak performance of the SX-ACE at the CMC is derived as the left table indicates.

	SX-ACE		
	Per-node	1 cluster	3 cluster
# of CPU	1	512	1536
# of core	4	2048	6144
Performance	276 GFLOPS	141 TFLOPS	423 TFLOPS
Vector performance	256 GFLOPS	131 TFLOPS	393 TFLOPS
Main memory	64 GB	32 TB	96 TB
Storage	2 PB		

Importantly, note that performance is the sum of vector-typed processor and scalar processor on SX-ACE. SX-ACE has a 4-core multi-core vector-typed processor and a single scalar processor.

IT Core Annex

IT Core Annex is a new datacenter that aims to aggregate and accommodate computer systems and supercomputer systems on campus for energy-efficient administration and management. It was designed and built based on the careful consideration on air flow and circulation for efficient cooling. The SX-ACE at the CMC is set up at the IT Core Annex.

A remarkable feature of IT Core Annex has two indirect evaporative air cooling systems to improve PUE for more energy-efficient driving of the newly introduced supercomputer system SX-ACE at the CMC.







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