§5. LHD Numerical Analysis System

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LHD numerical analysis system serves mainly for the LHD Experiment Project and its related simulation projects, and the research collaboration with worldwide universities and institutes.

The CPU server consisting of 5 nodes are working cooperatively as the main part of the system. Each node has eight vector processing elements, and the amount of the memory and processing speed are 512GB and 512GFLOPS respectively. Distributed parallelized computations using multiple nodes are possible as well as auto-parallelized computations in one node at this system. This architecture can provide a variety of que classes: 14 kinds of ques exist, in which users can use from 4GB and 1 CPU up to 512 GB and 32 CPUs using 4 nodes. Table 1 presents performances of the previous and present systems

Purpose	Previous System	Present System
Calculation Server	SX-5/6B(48GB) 6CPU Mem:64GB	SX-8/32M4(512GF)32CPU Mem:512GB (4 nodes) SX-8/8M1 (128GF) 8CPU Mem:128GB Node: IX connectionS (16GB/s one direction)
High Speed Disk Device	1.2TB (SX-5 direct connected)	10TB iStorage S2400 (SAN-GFS)
Large Volume Disk Device	NONE	10TB iStorage S2400 (SAN-GFS)
Backup Device	STK L700 10TB	20TB iStorage S2400 (SAN-GFS) 19.2TB(Uncompressed) iStorage T40A(2 systems)
Application Server 1 Application Server 2	TX-7/L1000 PA8500(440MHz) 2CPU Mem:4GB	TX7/i6010 Itanium2(1.6GHz) 2CPU MEM:16GB NX7000/rp3410-2 PA8800(800MHz) 2CPU MEM:2GB
Gateway Server	TX7/L1000 PA-8500(440MHz) Mem:1GB 3 systems	TX7/i6010 Itanium2(1.6GHz) 2CPU MEM:4GB 2 systems

Table 1: Properties of the Previous and the Present LHD Numerical Analysis System

The CPU server connected by Fiber Channel to the high-speed magnetic disk system (RAID) with 40TB storage. Two gateways as the front end servers are provided that the users can submit their batch jobs using NQSII through the NIFS-LAN from all over the world. Two application servers and the LHD Experiment data file server are also provided for the analyses of the simulation results and for the data processing of LHD experiment, respectively. The local manual for the present computer system, FAQ (Frequently Asked Questions), and other any information associated with the system are presented on Web (http://www.dss.nifs.ac.jp/nifscc/lhd.html).

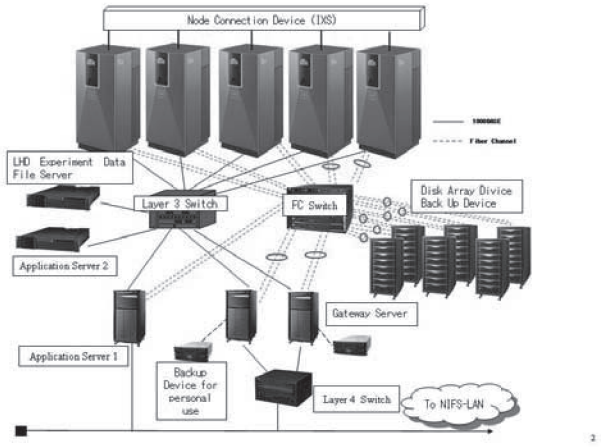

Fig. 1: Schematic View of LHD Numerical Analysis System

The monthly used CPU time of the previous computer system from April 2007 to March 2008 are shown in Figure 2. The total operation time, the total used CPU time, the ratio of CPU time to the operation time, and the numbers of executed jobs for the same period with Figure 2 are summarized in Table 2. The averaged ratio of CPU time to the operation time is 70.4% in 2007 FY, which is larger than the one of the previous year.

A: operation	B: cpu time	Ratio: B/6A	Number of jobs
308, 149:20	216, 811:52	70. 4%	78, 870

Table 2 : Summary of SX-8 Operation in FY 2007

The numbers of the collaboration projects and registered users in the 2007 FY are 67 and 179, respectively.

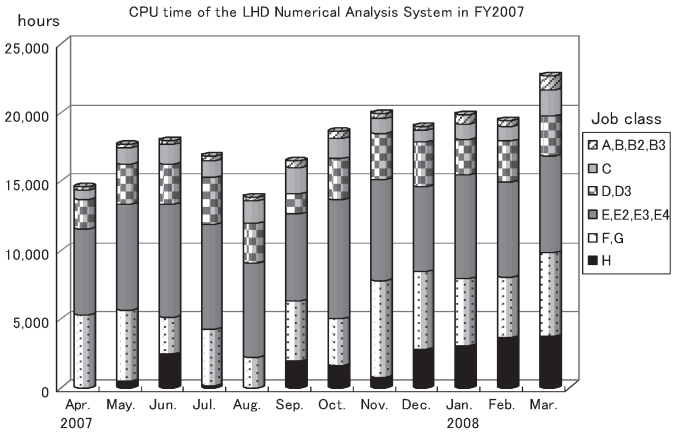

Fig.2 : Operation Overview of SX-8 in FY 2007