§4. Plasma Simulator

Den, M., Ohtani, H., Usami, S.,
Computer Working Group

Plasma Simulator is a high-performance computational system to support studies in confinement physics of fusion plasma and its theoretical systematization, researches on the science of complexity as basic plasma physics, and other collaborative researches to establish and advance the simulation science.

Specification of SX-7/160M5	
Total Main Memory	1280GB
Total Peak Performance	1412GFLOPS
Number of Nodes	5
Number of CPUs / node	32
Main Memory / node	256GB
Peak Performance / CPU	8.8GFLOPS
Inter-node Data speed	8GB/s

Table1: Properties of SX-7/160M5

The main part of Plasma Simulator, the CPU server consists of NEC SX-7/160M5 with 5 nodes and 160 CPUs. Table 1 presents performances of SX-7/160M5. The amount of the memory and processing speed are 1280GB and 1412GFLOPS, respectively. This architecture can provide variation of job queue classes and their priority order, which were totally modified on September 2007 in order to promote multi-node simulation better. (Then, 14 kinds of queue class before September 2007 and 9 kinds after September 2007.) Users can use from 32GB memory and 4 CPUs up to 1280 GB memory and 160 CPUs using 5 nodes. Figure 1 shows schematic view of the computer system. The CPU server connected by Fiber Channel to the Mass Data Processing System (MDPS) with 100TB storage. Gateway Servers as the front end processor are provided that the users can submit their batch jobs using NQSII through the NIFS-LAN from all over the world. The Data Process Server is also provided for the analyses of the simulation results. The local manual for Plasma Simulator, FAQ, and other any information associated with the system are presented on Web (http://www.dss.nifs.ac.jp/workgr/).

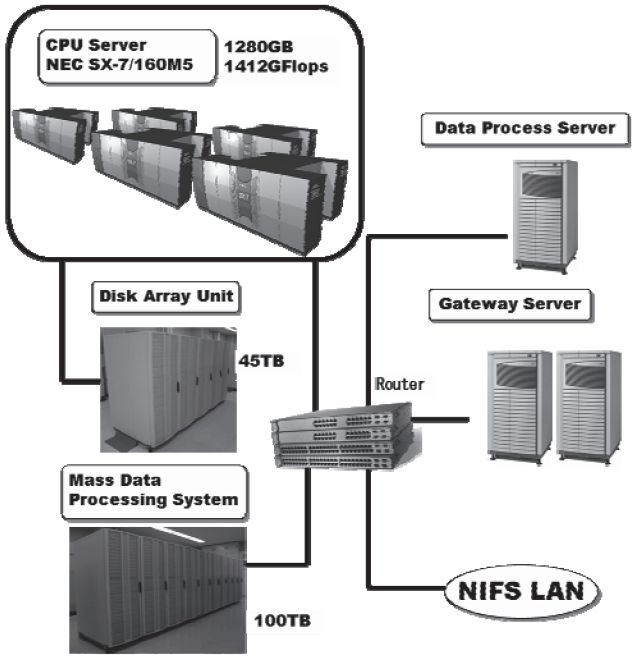

Fig. 1: Schematic View of Plasma Simulator

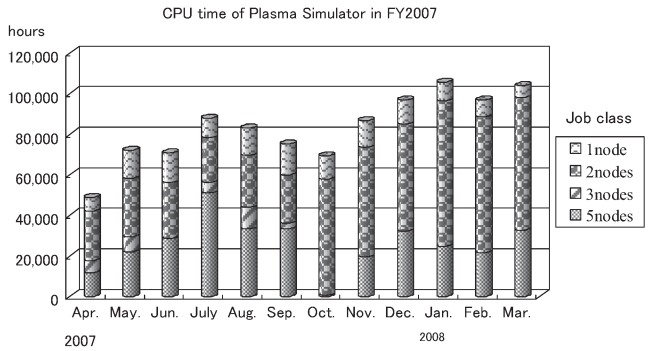

Fig.2 : Operation Overview of SX-7 in FY 2007

A: operation time (hour)	B: cpu time (hour)	Ratio: B/A	Number of jobs
4,958,899,200	3,589,424,745	72.4%	22,799

Table 2 : Summary of SX-7/160M5 Operation in FY 2007

Figure 2 displays the monthly used CPU time from April 2007 to March 2008. After September 2007 (when job queue classes were modified), CPU time of multi-node jobs increases. 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 as Figure 2 are summarized in Table 2. The averaged ratio of CPU time to the operation time is 72.4% in FY 2007. This ratio maintains high value (more than 60%) for several years.

The number of the collaboration projects is 40.