

§2. LHD Numerical Analysis Server

Todo, Y., Sato, M., Suzuki, Y., Inoue, N.,
Computer Working Group

LHD Numerical Analysis Server is used primarily for the LHD Experiment Project and its related simulation projects, and the research collaboration with the universities and the institutes. The operation of the LHD Numerical Analysis Server (HITACHI SR16000 model XM1) started on February 1, 2011. At the beginning of the operation, the LHD Numerical Analysis Server consisted of the Computation Server and the Front-end Server. On October 14, 2011, two additional nodes, the Computation Server II and the Data Processing Server were installed. Each server is equipped with 32 cores of POWER7 processor (3.3GHz) and 128GB memory. The peak performance of each server is 844.8Gflops. They are connected by Fibre Channel to the 102.3TB external storage system. The LHD Numerical Analysis Server is connected inside the Plasma Simulator network. The specifications are listed in Table 1. The manual for LHD Numerical Analysis Server is presented on the web (<https://www.ps.nifs.ac.jp/>).

Computer and CPU	SR16000 model XM1, POWER7
Main Memory	128GB/node
Number of nodes	4
Peak Performance	844.8Gflops/node
Number of CPU cores	32/node
Storage	102.3TB

Table 1. Specifications of LHD Numerical Analysis Server.

Seven job classes listed in Table 2 are available. The largest classes that run up to 128 logical CPU are X1 and X5. The X1 and X5 class jobs are run on the Computation Server. All the jobs are run on a single node. In Table 2, one physical CPU core is counted for four logical CPU. Then each server provides 128 logical CPU with an exception for the Front-end Server that provides 96 logical CPU for batch jobs.

Class	Allocated logical CPU	Logical CPU per job	Elastice time limit	Number of jobs per user
FQ	32	≤ 32	15 min	1
P5	32	≤ 8	5 hrs	4
F1	32	≤ 32	1 hr	4
F5	224	≤ 32	5 hrs	7
F24	32	≤ 32	24 hrs	1
X1	128	≥ 32	1 hr	4
X5	128	≥ 32	5 hrs	2

Table 2. Job classes on LHD Numerical Analysis Server.

The CPU time used for each month from April 2013 to March 2014 is shown in Fig. 1. The number of executed jobs and CPU time used for each job class is summarized in Table 3. In Fig. 1 and Table 3, CPU time is the sum of the time each physical CPU core worked. The numbers of the collaboration projects and the registered users of the fiscal year 2013 were 37 and 108, respectively.

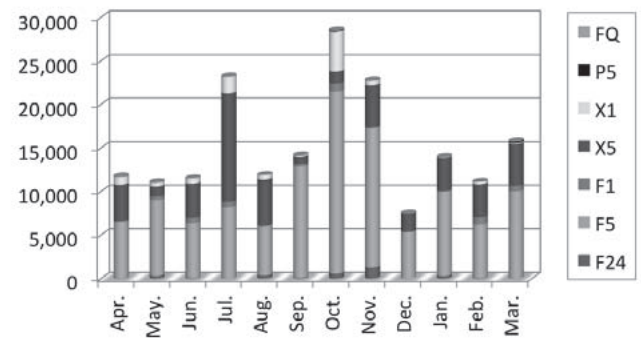


Fig. 1. CPU time (hours) used for each month in FY 2013.

Class	Number of jobs	CPU time (hours)
FQ	2,960	558
P5	1,942	462
F1	2,556	4,678
F5	18,958	116,023
F24	276	3,127
X1	3,895	10,072
X5	1,625	48,728
Total	32,212	183,648

Table 3. Number of jobs and CPU time used for each class in FY 2013.