

CCJ operations in 2014

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1 Overview

The RIKEN Computing Center in Japan (CCJ)¹⁾ commenced operations in June 2000 as the largest off-site computing center for the PHENIX²⁾ experiment being conducted at the RHIC³⁾. Since then, the CCJ has been providing numerous services as a regional computing center in Asia. We have transferred several hundred TBs of raw data files and nDST^{a)} files from the RHIC Computing Facility (RCF)⁴⁾ to the CCJ. The transferred data files are stored in a High Performance Storage System (HPSS)⁵⁾. A joint operation of the CCJ with the RIKEN Integrated Cluster of Clusters (RICC)⁶⁾ is continued since July 2009. HPSS and dedicated 20 PC nodes are maintained by them.

Many analysis and simulation projects are being carried out at the CCJ, and these projects are listed on the web page <http://ccjsun.riken.go.jp/ccj/proposals/>. As of December 2014, CCJ has contributed 31 published papers and 40 doctoral theses.

2 Computing hardware and software

In 2014, computing hardware (nodes and RAIDs) and software (OS, batch queuing systems, database engine, and so on) were changed slightly from those described in the previous APR¹⁾. In summary, we have 28 computing nodes, two login servers, one main server (users home directory, NIS, DNS, NTP), two disk servers and HPSS machines in our machine room, and 20 computing nodes in the RICC room. In total, 524 jobs can be processed simultaneously by these computing nodes.

One database (postgresql⁷⁾) server and one AFS⁸⁾ server are operated in order to share the PHENIX computing environment (the other database server retired in 2014). Sharing of the Scientific Linux⁹⁾ 4 (SL4) environment was stopped in April 2014, and now only the SL5 environment is shared by the computing nodes, which have approximately 0.9 TB of library files. We have four data-transfer servers on which the grid environment¹⁰⁾ is installed for the data transfer to/from RCF. Two servers out of the four retired in Jan. 2015.

Disk failure occurred in March 2014, during a re-boot after a planned power outage. File system of an users work disk became corrupt and about 1.5 TB of data were lost in spite of adopting VxFS, a journaling file system. Another trouble, namely, power outage at the RAID due to the power failure on Wako Campus in February, is thought to be an underlying cause of

the corruption of the file system. This has been the most serious accident at the CCJ so far, although it is declared that there are no backup of the disk.

Table 1 lists the numbers of malfunctioning SATA or SAS disks in the HP servers, namely, computing nodes and NFS/AFS servers.

Table 1. Number of malfunctioning HDDs in 2011-2014

Type	Size	Total	2014	2013	2012	2011
SATA	1 TB	192	11	16	20	9
	2 TB	120	0	2	5	4
SAS	146 GB	38	2	0	1	1
	300 GB	24	1	0	0	1

2.1 HPSS

The amount of data archived in the HPSS were approximately 1.73 PB (1.53 PiB) in 2.15 million files, as of December 2014, not so changed in 2014. No new data file has been transferred in 2014, and therefore, the data list in the previous APR¹⁾ is still effective.

RICC will be upgraded to the "HOKUSAI" system, a new RIKEN computing cluster launched in April 2015, and HPSS will retire around August 2015. Data migration to the new archiving system was performed in Jan. 19 - Mar. 16 2015. The 863 TB (785 TiB) of data in 1.66 million files out of 1.73 PB were migrated to the new archiving system, because the raw data of PHENIX, which were transferred for DST production and already served out, were not migrated.

3 Prospect

The replacement of the main RAID and server is on-going, and should be completed in May 2015. The batteries of the four UPSs have expired and should be replaced in 2015. Regarding to the upgrade from RICC to HOKUSAI, configuration changes in the network and job submitting environment are planned in the first half of 2015.

References

- 1) Y. Ikeda et al.: RIKEN Accel. Prog. Rep. **47**, 237 (2014).
- 2) <http://www.phenix.bnl.gov/>
- 3) <http://www.bnl.gov/rhic/>
- 4) <https://www.racf.bnl.gov/>
- 5) <http://www.hpss-collaboration.org/>
- 6) <http://acc.riken.jp/ricc/>
- 7) <http://www.postgresql.org/>
- 8) <http://www.openafs.org/>
- 9) <http://www.scientificlinux.org/>
- 10) <http://www.globus.org/toolkit/docs/latest-stable/gridftp/>

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^{a)} term for a type of summary data files in PHENIX