CCJ operations in 2017

S. Yokkaichi,[*1] H. En'yo,[*1] T. Ichihara,[*1] and Y. Watanabe[*1]

1 Overview

The RIKEN Computing Center in Japan (CCJ)[1] commenced operations in June 2000 as the largest off-site computing center for the PHENIX[2] experiment being conducted at RHIC. Since then, 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)[3] to CCJ.

Many analysis and simulation projects are being carried out at CCJ, and these projects are listed on the web page `http://ccjsun.riken.go.jp/ccj/proposals/`. As of December 2017, CCJ has contributed to 43 published papers and 42 doctoral theses.

2 Computing hardware and software

The network configuration and the computing hardware (nodes) and software (OS, batch queuing systems, database engine, etc.) are almost same as described in the previous APR.[1] We had 28 computing nodes, of which 18 nodes were purchased in Mar. 2009 and 10 nodes were purchased in Mar. 2011. In 2017, two old nodes out of these were retired. Thus, in total, 368 (=8×16 nodes + 24×10 nodes) jobs can be processed simultaneously by these computing nodes using a batch queuing system LSF.[4] The version of LSF is 9.1, which was upgraded from 8.0.0 in Mar. 2016.[b]

One database (postgreSQL[5]) server and one AFS[6] server are operated in order to share the PHENIX computing environment. Now, only the SL5[7] environment is shared by the computing nodes, which have approximately 0.9 TB of library files. We have two data-transfer servers, on which the grid environment[8] is installed for the data transfer to/from RCF. Two new data-transfer servers will be delivered in Jan. and Mar. in 2018. After the deployment of the two, the current two servers will be retired. Data transfer of the order of 100 TB from J-PARC and BNL will be performed in the future.

Moreover, two login servers, one main server (users' home directory, NIS, DNS, NTP), and two disk servers are operated. In July 2017, a disk server machine was replaced by HP DL180 Gen9, which has 25.5 TB of SATA RAID6. In August 2017, a login server machine was replaced by HP DL20 server with SL7.4.

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

The current total power of the four UPSs is 40 KVA, in which one 10-KVA UPS will require an exchange of batteries soon. Downsizing of the machine rooms (258/260 in Main Bldg.) was planned in 2017, but it has been postponed.

3 Joint operation with ACCC/HOKUSAI

CCJ and the RIKEN Integrated Cluster of Clusters (RICC) have been jointly operated since July 2009. In April 2015, a new system named "HOKUSAI Greatwave" was launched by RIKEN ACCC[9] and the joint operation with CCJ has been continued, including a new hierarchical archive system in which approximately 900 TB of CCJ data are stored. The dedicated usage of 10 nodes, a legacy of old RICC, was also continued and ended in June 2017, at the time of deployment of the new cluster system "HOKUSAI BigWaterFall" by ACCC.

The usage of BigWaterFall, which has 840 nodes/33600 CPU cores, by CCJ has not been started yet. It is planned to use one of the "container technologies" (such as "Docker"[10]) to share the computing environment of PHENIX, in place of NFS, which was used in the old "dedicated" system. When NFS is not used, the nodes can also be used by other users of Hokusai, which results in more efficient usage of Hokusai's CPUs.

Table 1. Number of malfunctioning HDDs in HP servers (calculation nodes and NFS/AFS servers) in 2011–2017, including nodes retired in 2017.

Type (Size)	total	2017	'16	'15	'14	'13	'12	'11
SATA (1 TB)	192	18	8	14	11	16	20	9
SATA (2 TB)	120	10	2	10	0	2	5	4
SATA (4 TB)	10	-	-	-	-	-	-	-
SAS(146 GB)	38	1	5	3	2	0	1	1
SAS (300 GB)	26	1	0	1	1	0	0	1

References
1) S. Yokkaichi *et al.*, RIKEN Accel. Prog. Rep. **50**, 225 (2017).
2) `http://www.phenix.bnl.gov/`
3) `https://www.racf.bnl.gov/`
4) `http://www-03.ibm.com/systems/technicalcomputing/platformcomputing/products/lsf/index.html`
5) `http://www.postgresql.org/`
6) `http://www.openafs.org/`
7) `http://www.scientificlinux.org/`
8) `http://www.globus.org/toolkit/docs/latest-stable/gridftp/`
9) `http://accc.riken.jp/`
10) `https://www.docker.com/`

[*1] RIKEN Nishina Center
[a] term for a type of summary data files in PHENIX
[b] It was performed in 2016 and should be written in the previous APR.[1]