CCJ operations in 2024

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The RIKEN Computing Center in Japan (CCJ)[1] commenced operations in June 2000 as the largest offsite 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 terabytes of raw data files and nDST [a] files from the USA.

Many analysis and simulation projects are being conducted at CCJ, which are listed on the web page `http://ccjsun.riken.jp/ccj/proposals/`. As of December 2024, CCJ has contributed to 49 published papers and 45 doctoral theses.

The network configuration and computing hardware (nodes) and software (OS, batch queuing systems, database engine, *etc.*) are nearly the same as described in the old APR,[3] and the number of servers are summarized in Table 1. The main server serves the home directory of users and services such as NIS, DNS, and NTP. Interactive servers are used for the compilation and test runs for the jobs before the submission to computing nodes. Two login servers serve ssh-login from the internet. The OS upgrade to Alma Linux 8 was performed in July. A replacement of a login server, from DL20G9 to DL360G10, was performed at the same time. In addition, we operate one dedicated server for the RHICf group[4] and two servers for the J-PARC E16 group[5] in order to maintain their dedicated compilation and library environments along with some data.

We operate 26 computing nodes, and 352 ($= 8 \times 17$ nodes $+ 24 \times 9$ nodes) jobs can be processed simultaneously via these computing nodes using a batch queuing system, LSF 9.1.3.[6] Table 2 lists the number of malfunctioning SATA or SAS disks in the HP servers, namely, computing nodes and NFS/AFS servers.

Three 10-KVA UPSs are operated as power supplies for these nodes. The next replacement is planned in March 2026.

The main network switch is Catalyst 9300-24UX, to support 24-port 10GBASE-T for the servers. It is used to upgrade the network of login servers and work-disk servers to 10G connection. One 10GBASE-LR is used for the uplink to RIKEN-LAN and two 10GBASE-SR are used for the downlink to edge switches for calculation nodes.

CCJ and the RIKEN IT division have been jointly operated since July 2009. In April 2015, "HOKUSAI Greatwave" system was launched and the joint operation with CCJ continued, with the inclusion of a hierarchical archive system wherein approximately 1678 TB of CCJ data were stored as of December 2024. A breakdown of the data is presented in Table 3. Further, we participated the test operation of "Hokusai Gratewave 2 (HGW2)," started in December 2023.[7]

A new tape archive system in the RIKEN IT division, called "Hokusai CalmLake (HCL)," was commenced in 2024 autumn. The current archive system will be shutdown by the end of June 2025, announced in January 2025. The technical meeting with IT division for data coying has also started.

Table 1. Number of servers, disk size, and model number as of December 2024.

	Number	Disk size (TB/node)	Model number
Main server	1	6(built-in) + 15.5(RAID)	DL360G10
Login server	2	-	DL20G10/DL360G10
Interactive server	4	-	-/DL320G6/ DL160G9/DL360G10
Calculation node 1	17	10	DL180G6
Calculation node 2	9	20	DL180G6
Work disk server	2	26 / 39	DL180G9/DL385G10
DB server	1	1	DL145G3
Library(AFS) server	1	9	DL180G6
Transfer server	2	12 / 39	DL180G9/DL380G10
Test server	2		DL20G9/DL160G10

Table 2. Number of malfunctioning HDDs in HP servers during 2011–2024.

Type (TB)	Total held	11	12	13	14	15	16	17	18	19	20	21	22	23	24
SATA(1.0)	192	9	20	16	11	14	8	18	16	8	9	10	5	4	1
SATA(2.0)	120	4	5	2	0	10	2	10	2	10	5	9	7	5	1
SATA(4.0)	26	-	-	-	-	-	-	-	0	0	0	2	0	2	2
SATA(6.0)	20	-	-	-	-	-	-	-	0	0	0	0	0	0	0
SAS(0.15)	38	1	1	0	2	3	5	1	3	6	3	5	2	1	0
SAS(0.3)	26	1	0	0	1	1	0	1	0	2	1	2	1	0	0

Table 3. Tape usage in Hokusai as of December 2024.

User	Total	PHENIX official	KEK/ J-PARC	RHICf	User/system archive
Size (TB)	1678	749	672	8	247

References

1) `http://ccjsun.riken.jp/ccj/`.
2) `http://www.phenix.bnl.gov/`.
3) S. Yokkaichi *et al.*, RIKEN Accel. Prog. Rep. **57**, 131 (2024).
4) Y. Itow *et al.*, arXiv:1409.4860 (Proposal).
5) S. Yokkaichi, in this report.
6) `https://www.ibm.com/docs/en/spectrum-lsf/`.
7) `https://i.riken.jp/supercom/`.

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[a] term for a type of summary data files in PHENIX

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