

## §23. Data Analysis on CHS Experiments

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The number of access to the CHS database (CHS/DBS) has increased significantly this year in comparison with the last year. This is because the CHS discharge data for the experiments with small amount of deuterium were referred with the deuterium experiments in LHD expected near future. Along with this increasing access to CHS/DBS, various problems have been exposed. They are in data storage system of raw and analyzed data, fast response to the reference access, keeping the analysis time, ensuring network security, difficulty in up-dating the old model machine parts, and so on. In consideration of these situations, we planed to prepare basic infrastructures of both hard- and soft-ware systems to improve convenience in using the database.

The CHS/DBS is managed by the use of the two branch servers, one is for raw data and the other is for analyzed data, as shown in Fig. 1. The former server is operated by the operational system (OS) of VMS and the latter is operated by the OS of UNIX. Many raw data have been analyzed and interpreted as physical quantity, and they are stored as a data set. There remains significant amount of raw data as well. Naturally, the access to the data set of raw and analyzed data is much more than the raw data only. For such dataset with frequent access, it is preferable to reduce number of disk access, by which processing overhead could be reduced. We are planning to improve portability of the database by saving the data with OS-independent format. Then we can transfer the database to the other computers. In order to promote this improvement, we have started investigation of the structure of the current data format.

Quick search and reference to the database is an important factor when we construct the database system. In the case of CHS/DBS, the bottleneck is networking time. The electric specification of the CHS/DBS LAN speed is 100 Mbps, which is much slower than the back born speed of CHS LAN of the order of G-bit. It can be improved if we change the frequency band. However, the issue discussed in the previous subsection will have more essential effect, because the reference or analysis time will be longer by one order of magnitude if data saving with OS-independent format is carried out. We continued discussion how to keep the

processing speed by improving both hard- and soft-ware systems.

Two modifications in network utilities (hard-ware and soft-ware) have been carried out in order to improve convenience of database users. In accordance with the review and revise of the network security all around the institute, the accessible server of CHS/DBS from outside became only one, the SSH server. The user authentication at login is performed only by the use of a public key, where the secure shell under the CHS/DBS is used. Along with the version change of the RIP (Routing Information Protocol), the second network switch (RIP2) was added in addition to the conventional switch (RIP1). This modification is expected to resolve conventional troubles.

The interior of the CHS/DBS is composed of the DMG(ORNL) and MDS-Plus(MIT), which are used many domestic and international fusion researchers and are updated frequently. In order to enhance user-friendliness, it is important to improve function of the CHS/DBS in cooperation with many other researchers.



Fig. 1. CHS data analysis server