§37. New Functionality of Multi-site Data Handling in *"LABCOM/X"* Data Acquisition and Storage System

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For the recent several years, the amount of LHD acquired data has continued increasing almost in conformity with the famous "Moore's law". The volume of plasma diagnostics raw data has grown 4.6 times bigger than that of three years before (Fig. 1). At the end of 10th campaign, LHD short- pulse experiments acquired about 4.6 GB/shot raw data, with having about 170 shots every day. In 11th campaign, the maximum acquisition amount has also increased up to 6.79 GB/shot, constantly having about 180 shots per day.

The second figure in Fig. 1 shows the time evolution of total data amount in LHD storage volumes. It clearly shows that the amount for the recent three years occupies about 80% of the whole volume. This is because we have to introduce larger storage devices additionally every year. For the long-term storage equipment, the 50 GB Blu-ray Disc libraries whose capacities are 750 and 1450 (ASACA AM-750BD/-1450BD) are used now.

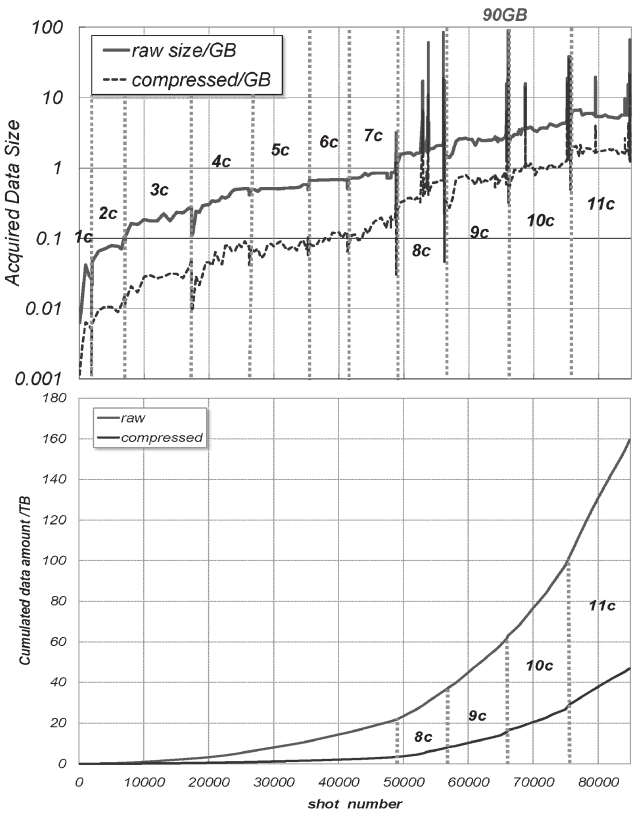

Fig. 1. Acquired data growth per shot (top) and their cumulated total amount (bottom) in LABCOM system

Multi-site Functionality in LABCOM/X Data System

Nowadays there is a general trend in large-scale scientific research fields to have a smaller number of larger experimental or observational devices. Such the site concentration leads to a strong demand to the remote experiment or participation technology. On the other hand, recent "data explosion" induces the demand for high capability of storage distribution and dynamic migration among them. Presently in Japan, SINET3 fast network and the SNET on it, the Layer-3 VPN for fusion research provides a good solution to those problems. One of the most typical examples of such the remote collaboration will be the QUEST experiment which is managed under All Japan ST Research program with the operation by Kyushu Univ. It will adopt the LABCOM/X data acquisition system, and store the whole data in real time to its storage volume in NIFS. (Fig. 2)

In such the distributed collaboration environment, the experimental data acquisition and management system had better provide a seamless data access for every site's users under an appropriate permission control and security. The LABCOM system originally had the massively-sized parallel processing (MPP) architecture in which all the storage, data acquisition servers, and retrieval clients are distributed on network. So, it was almost straightforward to become capable of dealing with multiple sites' data on it.

Different from the original two query keys of "data name" and "shot number", the new data acquisition and retrieval client/server programs have been modified to use three query keys of "site name", "data name", and "shot number" to search and retrieve a designated data. In addition, the indexing database has a restricted access to previously registered servers and clients. We verified this new functionality successfully with two sites "LHD" and "QUEST", and therefore can conclude that it is also applicable to ITER/ITER-BA remote environment.

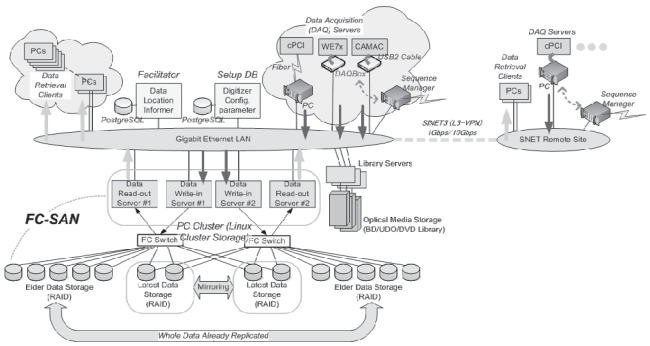

Fig. 2. Schematic view of *"LABCOM/X"* distributed data system with its extension for remote site by SNET

1) Nakanishi, H. *et al.*: Plasma Fusion Res. **2** (2007) S1117.
2) Nakanishi, H. *et al.*: Fusion Eng. Des. **82** (2007) 1203.
3) Nakanishi, H. *et al.*: Fusion Eng. Des. **83** (2008) 397.