

This section is a short user-guide for researchers who are not familiar with the LHD experimental data system. Also several useful resources, which can help the researchers to analyze experimental data, are introduced. Detailed documents are prepared mainly on the web pages. Please refer to the original documents if detailed information is needed [1-3].

Figure shows the flow of the experimental data in LHD. In most of the diagnostics, measured data are analog-to-digital converted by distributed ADC's (CAMAC, Yokogawa WE7000 series, and CompactPCI digitizers are used). Acquired data (raw-data) are then transferred to the data servers. Since all the data files are indexed in order by the data-name and the shot-number, users do not need to specify the location of them explicitly. Therefore, raw-data can be retrieved only by specifying the shot-number and the data-name. After each discharge, physical quantities are calculated automatically. They are called "kaiseki-data" (physical data [4]) and stored in another server. These kaiseki-data are also easily accessed with the shot number and their data name. Data acquired independently are also stored as the kaiseki-data or through the dbStore system [5] into the same LHD data repository. Experimental conditions, e.g. the magnetic field and the vacuum magnetic axis position, and the typical plasma parameters, e.g. the stored energy and the central electron temperature, are stored in the relational database system [6]. Similar information via a web service is also available [7]. Since shape of the LHD plasma is three dimensional, it is required to map the measured data on the flux coordinates in analysis. From the electron temperature profile, the appropriate equilibrium is selected / interpolated using the pre-calculated equilibriums [8]. Physical parameters are thereby mapped to the flux surfaces of that equilibrium. The results can be referred by one of the kaiseki-data, namely 'tmap' [9].

Windows and Linux-based PCs are used for analysis of the data. A commercially developed program, PV-WAVE [10], which is an array-based interactive data analysis language, is mainly used in the NIFS. Within this PV-WAVE environment, raw-data and kaiseki-data can be handled easily with supplied libraries [11]. Executable and the dynamically linked libraries for Windows and Linux are also provided. Those who like to analyze the data with their favorite programming language can develop their applications easily. Libraries developed by Python are available for example [12].

Summary images of the time evolution of the typical plasma parameter [13], the movies of visible image of the plasmas [14], and the experimental logs [15] are also accessible on their own servers. For steady-state / long pulse experiments, an application called realtime graph [16] is used for the data acquisition and for visualization of them.

The LHD experimental local-area network (LHDnet) is separated from the NIFS campus LAN. Web-based SSL-VPN enables the registered users to pass through the gateway to access LHDnet

[17]. VPN for the remote access from outside of NIFS is also prepared. Please inquire the responsible person [18] to obtain the token for the VPN service.

[1] LABCOM online services (<http://w3.lhd.nifs.ac.jp/>)

[2] ANALYSIS Information Group (<http://kaiseki-proxy.lhd.nifs.ac.jp/>)

[3] Y. Nagayama, et. al., Fusion Engineering and Design, 83 (2008) 170.

[4] M. Emoto, et.al., Fusion Engineering and Design, 81 (2006) 2019.

List of kaiseki-data:(http://kaiseki-proxy.lhd.nifs.ac.jp/service/kaiseki_data/main_new.htm)

[5] dbStore service (<http://w3.lhd.nifs.ac.jp/Service/dbStoreManual.htm>)

[6] LHD jikken data kennsaku (<http://egdb.lhd.nifs.ac.jp/shotinfo/>)

[7] logindex (<http://logindex.lhd.nifs.ac.jp/>)

[8] C. Suzuki, et. al., ‘Development and Application of Real-Time Magnetic Coordinate Mapping System in LHD’, submitted to Plasma Physics and Controlled Fusion.

[9] http://kaiseki-proxy.lhd.nifs.ac.jp/service/kaiseki_dataEng/suzuki/tsmap_new.htm

[10] PV-WAVE infomation

(<http://www.roguewave.com/products/pv-wave-family.aspx>)

[11] http://w3.lhd.nifs.ac.jp/LABCOM_Download.htm

[12] <http://kaiseki-proxy.lhd.nifs.ac.jp/documents/Python/tutorial.htm>

[13] PDF files
(<ftp://egftp1.lhd.nifs.ac.jp/pdf/>),
postscript files
(<ftp://egftp1.lhd.nifs.ac.jp/ps/>)

[14] <http://cdpvods2.lhd.nifs.ac.jp/>

[15] <http://comets.lhd.nifs.ac.jp/>

[16] <http://egdb.lhd.nifs.ac.jp/RealtimeGraph/index.html>

[17] http://www.lhd.nifs.ac.jp/org/notice/_lhdvpn.html

[18] http://kaiseki-proxy.lhd.nifs.ac.jp/service/remote/remote_new.htm

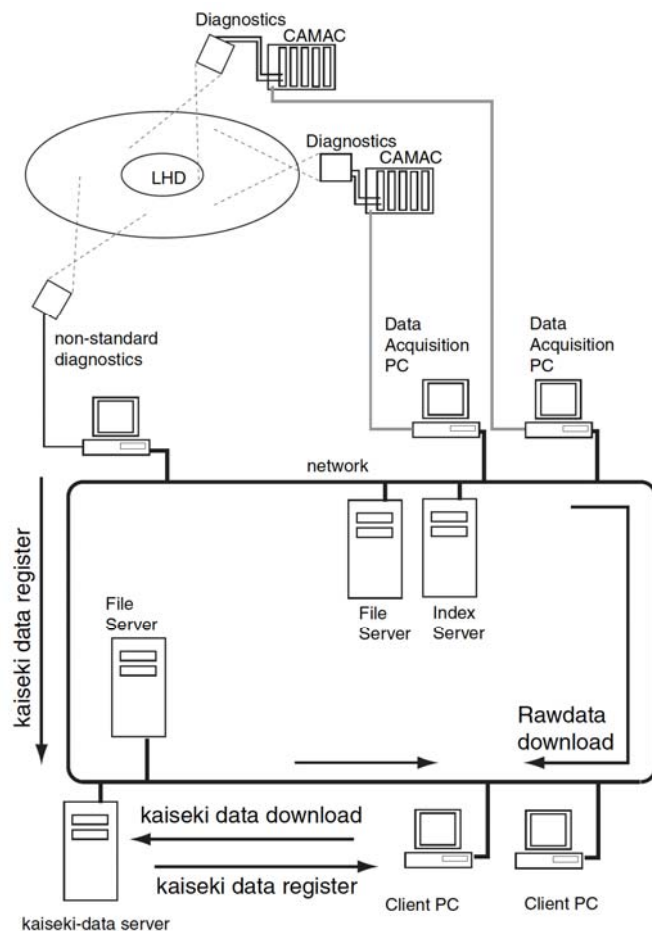


Figure Data flow of the LHD experiments