A07

Modular data acquisition system and its use in gas-filled detector readout at ESRF

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Since 1992, 18 beamlines have been opened to users at ESRF. Although the data acquisition requirements vary a lot from one beamline to another, we are trying to implement a modular data acquisition system architecture to fit with a maximum number of acquisition projects at ESRF.

Common to all of these systems are large acquisition memories, and common requirements are to visualize the data during an acquisition run and to transfer them quickly after the run. Therefore, we wrote a general memory API library dealing with acquisition memory and its organization and a general data transfer API library for transferring the data using TCP/IP sockets. General programs using these libraries are the online display program and the data transfer program. The online display program is X11/Motif client. The data transfer program as well as the acquisition control program, are written in the form of a device server. The device server model was originally designed for the machine control system and then successfully reused in the beamline control system.

In the second half of this paper, we present the acquisition system for a 2D gas-filled detector, which is one of the first concrete examples using the proposed modular data acqui-sition architecture. This acquisition system uses on the hardware side fast TDC, histogramming controller and commercially available memory. For doing time-resolved measurements, a Time Frame Generator and for counting a Multi Channel Scaler can be added to the system. The overall acquisition rate that can be achieved by this system is around 1M events/s.