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## A general-purpose control functionality of DAQ-Middleware

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DAQ-Middleware is a software framework for a network-distributed data acquisition (DAQ) system that is based on the Robot Technology Middleware (RTM). The framework consists of two components, a DAQ-Component and a DAQ-Operator. The DAQ-Component has functionalities to process and transfer data, and is implemented as a module to read, gather, record data. On the other hand, the DAQ-Operator has functionalities to control DAQ-Components, and is implemented as a module to control a whole DAQ system. The basic functionalities of a DAQ system, such as starting and stopping a system, transferring data, etc., are already prepared in the framework.

Although the main role of a DAQ system is to gather and record data, the functionality of changing parameter values on modules is also required. The framework has only a simple control functionality for a specific condition.

We, therefore, developed the new DAQ-Middleware framework that has a general-purpose control functionality. The DAQ-Middleware has basically four states, LOADED, CONFIGURED, RUNNING and PAUSED. A new state, CHANGED, was implemented to change parameter values in the new framework. The state can be changed from CONFIGURED state to enable changing values after stopping a run, or from PAUSED state to enable during a run. In both cases, the DAQ-Operator can change parameter values in DAQ-Components with using the new state.

The performance of the DAQ-Middleware with using new control functionality was measured and compared with the conventional system in which the parameter values were changed by restarting the system. The elapsed times between the time of stopping RUNNING state and that of stating the next RUNNING state were measured. The result is 479 msec for the developed system and 899 msec for the conventional system. The difference time is 420 msec.

The new DAQ-Middleware framework was confirmed to implement easily not only functionality of acquiring data but also that of controlling component modules.

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