Feasibility of Data Acquisition Middleware based on Robot Technology

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ABSTRACT
In the situation that many programming languages and communication protocols are flooded, it is necessary to design DAQ system independent of programming languages, operating systems and communication protocols, because the rapidly growing Information Technology (IT) and the usage of many PIs in DAQ system lead us to increase necessary DAQ experts and the workload to make the software. In robot technology field, they also had same situation. It was necessary to make an infrastructure of robot systems. Then, Robot Technology Middleware (RTM) was born, AIST led the project and then developed a software package called OpenRTM-aist. From software point of view, the basic technologies are similar to that of DAQ and the model of software development process is also powerful for DAQ. Thus, we studied the feasibility of Data Acquisition Middleware to make a DAQ software framework.

DISCUSSION
- Model of software development process
  - RTM adopted the MDA model. It is a good way to design a platform independent DAQ system. RTM also adopted component-oriented approach. It is a different from the usability point of view.
  - Mapping DAQ components to RT components – DAQ states could be mapped to the RT states in the demonstrators.
  - Development time – RTM has the system tools and the template program of OpenRTM-aist. The RTM defines resource data model and the interfaces to access and manipulate resource data, described in Unified modeling Language (UML). In the PIM, the interfaces and data structures used in the individual methods are mapped according to a CORBA IDL specification. It is still independent of programming languages and operating systems. In the OpenRTM-aist implementation, C++ and Python were adopted as programming language.

CONCLUSION
The feasibility of Data Acquisition Middleware was studied and discussed. Robot Technology Middleware was introduced. The RTM-based DAQ demonstrator was made and evaluated. In the demonstrators, the DAQ states were successfully mapped to the RT states. The study showed that RTM had good features for DAQ and then Data Acquisition Middleware was feasible. More investigation is expected.