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The Design and Realization of the Distributed Data Sharing System of the Detector Control System of the Daya Bay Neutrino Experiment

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The Daya Bay reactor neutrino experiment is designed to determine precisely the neutrino mixing angle θ_{13} with the sensitivity better than 0.01 in the parameter $\sin^2 2\theta_{13}$ at the 90% confidence level. To achieve this goal, the collaboration has built eight functionally identical antineutrino detectors. The detectors are immersed in water pools that provide active and passive shielding against backgrounds. The experiment has been taking data for almost 1.5 years and making steady progress. Eight antineutrino detectors are taking data now in 3 experimental halls. And the first results have already been released. The detector control and monitoring system (DCS) was developed to support the running experiment. And according to the difference of different hardware systems, such as high voltage crates, front end electronic crates, water system, gas system, low voltage crates, temperature and Humidity of the environment system etc., different data acquisition (DAQ) modules are developed. A global control system is developed to monitor and control the entire running status of the whole experiment. Sharing data from the subsystems are most important for both equipment monitoring and data analysis. This paper will present the design and the realization of a distributed data sharing system used in the Detector Control System of the experiment. The interface of the embedded DAQ of the sensors and the communication logic will be show in details. The integration of the developed remote control framework will be introduced as well.

Key words: Daya Bay, Neutrino, Detector Control System, Embedded System, Data Acquisition, Distributed Sharing Data System, Remote Control

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