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Development of a lightweight database interface for accessing JUNO conditions and parameters data

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The Jiangmen Underground Neutrino Observatory (JUNO) has a very rich physics program which primarily aims to the determination of the neutrino mass ordering and to the precisely measurement of oscillation parameters. It is under construction in South China at a depth of about 700~m underground. As data taking will start in 2023, a complete data processing chain is developed before the data taking. Conditions and parameters data, as non-event data, are one of important parts in the data processing chain, which are used by reconstruction and simulation. These data could be accessed via Frontier on JUNO-DCI (Distributed Computing Infrastructure), or via databases, such as MySQL and SQLite in local clusters.

In this contribution, the latest development of a lightweight database interface (DBI) for JUNO conditions and parameters data management system will be shown. This interface provides a unified method to access data from different backends, such as Frontier, MySQL and SQLite: production jobs could run on JUNO-DCI with Frontier; testing jobs could run in a local cluster with MySQL to validate the conditions and parameters data; fast reconstruction could run in a DAQ environment onsite using SQLite without any connections to remote database. Modern C++ template techniques are used in DBI: extension of a new backend is defined by a simple \texttt{struct} with two methods \texttt{doConnect} and \texttt{doQuery}; result sets are binding to \texttt{std::tuple} and the types of all the elements are known at compile-time. Finally, DBI is used by high-level user interfaces: data models in the database are mapping to normal C++ classes, so that users could access these objects without knowing DBI.

Significance

In CHEP 2019, our group give an oral on JUNO Conditions Database Management System. In the recent years, we add the support of the parameters data. Therefore, a unified database interface is necessary to support both conditions and parameters data. We also support the multiple database backends, including Frontier, MySQL and SQLite. These backends could be used in difference cases. Even though it is developed for JUNO, this database interface could be also used by other experiments.

References

1. Xingtao Huang (JUNO Collaboration), EPJ Web Conf. 245 (2020) 04030

Experiment context, if any

JUNO

Primary authors: Mr ZOU, Jiaheng; MA, Qiumei (IHEP China); LIN, Tao (Chinese Academy of Sciences (CN)); Dr LI, Teng (Shandong University, CN); Dr LI, Weidong (Chinese Academy of Sciences (CN)); HUANG,

Wenhao (Shandong University); ZHANG, Xiaomei (Chinese Academy of Sciences (CN)); HUANG, Xingtao (Shandong University); DENG, Ziyan

Presenter: LIN, Tao (Chinese Academy of Sciences (CN))

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