Contribution ID: **41**   Type: **Poster**

Offline data processing in the First JUNO Data Challenge

Monday 11 March 2024 16:15 (30 minutes)

The Jiangmen Underground Neutrino Observatory (JUNO) is currently under construction in southern China, with the primary goals of the determining the neutrino mass ordering and the precisely measurement of oscillation parameters. The data processing in JUNO is challenging. When JUNO starts data taking in the late 2024, the expected event rate is about 1 kHz, which is about 31.5 billions of events per year. About 60 MB of byte-stream raw data is produced every second, which is about 2 PB per year. The raw data is transferred from the JUNO onsite to the IHEP data center via a dedicated network. At IHEP data center, the raw data is preprocessed and converted to the ROOT-based raw data format (RTRAW). Then both raw and RTRAW data are replicated to the other data centers, including CC-IN2P3, INFN-CNAF and JINR. There are several critical components in the data processing, such as data quality monitoring (DQM), keep up reconstruction (KUP) and physics production (PP).

A series of JUNO Data Challenges are proposed to evaluate and validate the complete data processing chain in advance. In this contribution, the offline data processing in the first JUNO Data Challenge (DC-1) will be presented. The major goal of DC-1 is processing 1-week of RTRAW data with conditions database and multi-threaded reconstruction. The workflow consists of production of the 45 TB of simulated RTRAW data and reconstruction of the RTRAW data in DQM, KUP and PP. In order to test the conditions database, 7 batches of conditions data are prepared and added in the simulation, then these conditions data are loaded from database in the reconstruction. The tests show that the conditions data are loaded correctly when new events are loaded. A JUNO-Hackathon is organized to let the core software experts and algorithm developers work together in order to support the multi-threaded reconstruction algorithms in the DC-1. The multi-threaded reconstructions are performed well within local computing resources and distributed computing resources respectively.

Significance

This contribution will summarize the current status of the JUNO Data Challege before data taking.

References

Experiment context, if any

JUNO

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