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Status of parallelized JUNO simulation software

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The Jiangmen Underground Neutrino Observatory (JUNO) is a multi-purpose neutrino experiment. It consists of a central detector, a water pool and a top tracker. The central detector, which is used for neutrino detection, consists of 20 kt liquid scintillator (LS) and about 18,000 20-inch photomultiplier tubes (PMTs) to collect lights from LS.
Simulation software is one of the important parts in JUNO offline software. To speed up simulation, a parallelized simulation framework has been developed based on the SNiPER framework and Geant4 version 10. The SNiPER task components are in charge of event loop, which can run in sequential mode, Intel TBB mode and other modes. Based on SNiPER, the simulation framework and its underlying parallel libraries have been decoupled. However parallelized simulation of events with correlation is a challenge. In order to keep the correct events order, a component called global buffer is developed in SNiPER.
In this presentation, an overview of parallelized JUNO simulation framework will be presented first. The global buffer is used in the parallelized event correlation simulation. An event generator produces events with timestamps in sequential mode. These events are put into global buffer and simulated by detector simulation algorithms in different tasks. After simulation, these events are saved into ROOT files with I/O services running in extra threads. Finally, we will present the software performance.

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