

FairRoot and ALICE O2 multithreading simulation

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To address the challenges of the major upgrade of the experiment, the ALICE simulations must be able to make efficient use of computing and opportunistic supercomputing resources available on the GRID. The Geant4 transport package, the performance of which has been demonstrated in a hybrid multithreading (MT) and multiprocessing (MPI) environment with up to $\frac{1}{4}$ million threads, is therefore of a particular interest.

The O2 simulation framework is based on FairRoot, which itself is based on the Virtual Monte Carlo (VMC). The integration of MT into the VMC design and its impact on the Geant4 VMC was presented at CHEP 2014. Geant4 VMC MT and the scaling behavior of the computing time with the number of cores have been then tested using a simplified but realistic multithreaded simulation application.

The focus was then put on the integration of MT in FairRoot classes as the necessary step towards MT in the FairRoot based experimental frameworks. The new O2 framework is the first one the migration to MT of which is achieved for all actually included detectors. The planned integration of the Geant4 MT mode in the standard FairRoot and O2 testing suites should allow to keep this mode operational during the period of further developments and enhancements in 2018.

In this contribution we will present the progress with the integration of MT in FairRoot classes, the work for thread-safety in the O2 simulation classes and the experience with the integration of the MT mode in testing. We will also discuss plans for the further performance studies with a realistic detector setup.

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