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Type: **Parallel**

Parallelization of the AliRoot event reconstruction by performing a semi- automatic source-code transformation

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Chip multiprocessors are going to support massive parallelism to provide further processing capacities by adding more and more physical and logical cores. Unfortunately the growing number of cores come along with slower advances in speed and size of the main memory, the cache hierarchy, the front-side bus or processor interconnections. Parallelism can only result in performance gain, if the memory usage is optimized, memory locality improved and the communication between threads is minimized. But the domain of concurrent programming has become a field for highly skilled experts, as the implementation of multithreading is difficult, error prone and labor intensive. A full re-implementation for parallel execution of existing offline frameworks, like AliRoot in ALICE, is thus unaffordable. An alternative method, is to use a semi-automatic source-to-source transformation for getting a simple parallel design, with almost no interference between threads. This reduces the need of rewriting the developed software and avoids excessive communication between threads.

This paper evaluates the adaption of the AliRoot event reconstruction, by taking the following steps: introduction of thread-safety to bring the original sequential and thread unaware source-code into the position of using multithreading; identification of classes that can be shared between threads as a method to reduce the memory footprint; transformation of the source code to share these classes; verification of the resulting code to localize and eliminate any remaining interferences between threads.

Student? Enter 'yes'. See <http://goo.gl/MVv53>

yes

Summary

This work is about the content of my ongoing PhD thesis at the ALICE experiment at CERN to provide methods for a better exploitation of the available and prospective CPUs. It is following the idea to introduce scalable multithreading by using a source-to-source transformation. First results and upcoming problems will be presented.

Author: LOHN, Stefan (Universitaet Bonn (DE))

Co-authors: Mr CARMINATI, Federico (CERN); DONG, Xin (Northeastern University)

Presenter: LOHN, Stefan (Universitaet Bonn (DE))

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