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## openlab fellow, Havard Bjerke, delivers a tutorial on SIMD programming during the ALICE workshop

A first session of the ALICE Workshop on advanced programming was held 4th-6th December at CERN. The intent of the workshop was to teach advanced programming techniques to the physicists and programmers who are working on the most critical data source in the ALICE detector - the High-Level Trigger.

On the first day, Sverre Jarp, CERN openlab CTO, delivered an introduction to many-core programming and Volker Lindenstruth spoke about computer architecture.

Timm M. Steinbeck organized a tutorial focusing on debugging and general techniques the second day of the workshop.

A second tutorial, on SIMD programming, was organized on the third day by Havard Bjerke, CERN openlab fellow. The SIMD programming tutorial was split into lecture and hands-on sessions, beginning with some background on Intel's SSE standards and parallel programming. In a set of hands-on sessions, the attendees were given the opportunity to try some high-precision performance measurement techniques, including Perfmon2, and were taught about a range of options for SIMD programming provided by Intel's and GNU's compilers. By solving a set of problems using SIMD, the attendees were introduced to some SSE techniques and could see both the benefits and limitations of SIMD programming. They were also shown some glimpses of the future possibilities for SIMD. The tutorial ended with a competition for creating the fastest possible implementation of Game of Life, using all the techniques provided in the previous sessions. A copy of the multi-core programming book, Intel Threading Building Blocks was awarded to the winner of the competition.

Various universities connected to the ALICE experiment plan to hold this workshop in a near future.

Havard Bjerke, CERN openlab