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Improving robustness and computational efficiency using modern C++ (video conference)

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For nearly two decades, the C++ programming language has been the dominant programming language for experimental HEP. The publication of ISO/IEC 14882:2011, the current version of the international standard for the C++ programming language, makes available a variety of language and library facilities for improving the robustness, expressiveness, and computational efficiency of C++ code. However, much of the C++ written by the experimental HEP community does not take advantage of the features of the language to obtain these benefits, either due to lack of familiarity with these features or concern that these features must somehow be computationally inefficient.

In this paper, we address some of the features of modern C++, and show how they can be used to make programs that are both robust and computationally efficient. We compare and contrast simple yet realistic examples of some common implementation patterns in C, currently-typical C++, and modern C++, and show (when necessary, down to the level of generated assembly language code) the quality of the executable code produced by recent C++ compilers, with the aim of allowing the HEP community to make informed decisions on the costs and benefits of the use of modern C++.

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