Compilation Games: Exploiting Synergies Across the CS Community

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Abstract

Developing a new programming language, constructing a new domain-specific compiler, writing a new verification tool, optimizing a large application, designing a microprocessor, or verifying some of its components, all of these tasks require today a multi-year project. While most of the underlying problems are inherently hard and cannot be accelerated magically, we are additionally slowed down by a lack of well- defined interfaces that prevent us to exploit synergies between CS sub-communities.

In this presentation, I raise the question of how we can accelerate the innovation speed of our CS technology stack to levels recently seen in deep learning, battery electric vehicles, or rocket launches. While I won't provide an answer, I will share the latest developments from the LLVM compiler community where the recent introduction of MLIR initiated the design of numerous IR abstractions that can be freely composed to build hybrid tools crossing community boundaries, that can be analyzed to gain a deep understanding of the various IR abstractions, and which may be the seed of a new abstraction sharing economy in our community. I will share some of my very own steps in this space on analyzing and understanding the various IR abstractions already in existence and will point out new cross-community collaboration opportunities. This talk concludes by raising the question of how we as researchers can build impactful and lasting open-source communities and will pitch the idea of a novel "MLIR centre of excellence" as a tool for UoE and its partners to become impactful players in the compilation game community.

About the Speaker

Dr. Tobias Grosser is a Reader in Compilers and Runtime Systems at Edinburgh. He is internationally known for his research on optimizing compilers and his contributions to open-source software. As author and development lead of the LLVM Polyhedral Loop Optimizer Polly, Tobias Grosser developed polyhedral loop optimizations techniques for production-grade compiler pipelines.

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