

# COLLOQUE DU DIRO

**Conférencier :** Christopher Anand (McMaster University)

**Titre :** Coconut : An experiment in safe, high-performance code generation

## Résumé

I will describe the Coconut (COde CONstructing User Tool) project, from initial goals and design philosophy to successes and failures in implementation. Our hope has been that the apparent opposition of safety and performance is an artifact of the way programming languages and compilers have evolved, and by rethinking some of the underlying processes and intermediate objects, we can achieve both. Our correctness strategy is simply to allow only code optimizations in the form of semantics-preserving (hyper-)graph transformations. I will show how even software pipelining can fit into this framework. Our programmability strategy is to use typically pure functional syntax and semantics as much as possible. I will show some examples of this. Our high performance strategy is to expose the tools programmers need, like wide-register formats and instructions to access them, while allowing the programmer to capture patterns of efficient implementation in higher-order functions. At the lowest level of parallelization, this leads to declarative assembly language.

Finally, I will show that incomplete as it is, our tool is already able to outperform the competition by a wide margin on the generation of special function libraries.

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