

## **To Inline or Not to Inline? Enhanced Inlining Decisions**

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### **Abstract**

The decision to inline a procedure in the Open Research Compiler (ORC) was based on a temperature heuristics that takes into consideration the time spent in a procedure and the size of the procedure. In this paper we describe the trade-off that has to be worked out to make the correct inlining decisions. We introduce two new heuristics to enhance the ORC inlining heuristics: *adaptation* and *cycle\_density*. With *adaptation* we are allowed to vary the temperature threshold and prevent penalizing small benchmarks. With *cycle\_density* we prevent the inlining of procedures that have a high temperature in spite of being called infrequently. We implemented our improved heuristics in the ORC and tested them for the Intel Itanium Processor Family Platform using the SPEC INT2000 benchmark suite. While *adaptation* improves the speedup obtained with inlining across the SPEC2000 suite, *cycle\_density* reduces significantly both the code growth and compilation time increase caused by inlining. We then characterize the SPEC INT2000 benchmarks according to the inlining potential of their function calls. Our enhancement is released in the ORC 2.0.