Adaptive Instruction Cache Optimizations

By Maxime Chevalier-Boisvert
Supervised by Prof. Clark Verbrugge

The memory alignment of executable code can have unforeseen effects on the run-time performance of programs through its influence on instruction cache operation. This fact has been known for a long time and several algorithms were devised to optimize the memory layout of compiled code to maximize instruction cache performance. Most of these use simple heuristics in order to approximate an optimal solution to this problem, which resembles an NP-complete packing problem. We take a different approach and attempt to examine this problem from a new angle, with the aim of better assessing the true impact of code alignment and the hope of discovering a more general, more powerful instruction cache optimization algorithm.