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Bachelor's Thesis

A Benchmark Suite to Evaluate the Bottlenecks of Ant Tracks

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Ant Tracks is a low performance overhead tracing mechanism built into the Hotspot Java Virtual Machine, able to track object allocations as well as object moves throughout the heap. This is done incrementally, i.e., by firing an event for each allocation or move. In order to keep the overhead low, building the event as well as firing it must be done as efficient as possible. As of now, multiple optimizations are implemented to achieve the necessary performance, i.e., asynchronous IO and thread-local buffers to keep the application threads from stalling, variable-sized buffers to reduce lock contention on shared datastructures, and special precompilable event formats for reoccurring events. However, most of these optimizations aim at reducing the overhead of the „common case“, sacrificing corner case performance in the process.

The goal of this thesis is to examine the optimizations implemented critically and to build a set of applications, i.e., benchmarks, specifically designed to exploit these optimizations, i.e., break them. In order to do so, a set of potential bottlenecks must be defined and at least on exploit implemented for each one of them. Consequently, each benchmark should show the „worst case“ negative impact of a single optimization or system property. The written thesis should describe each individual benchmark and argue which behavior it triggers. Furthermore, it should include the results as well as potential conclusions drawn from the results.

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