Disallowing Same-program Co-schedules to Improve Efficiency in Quad-core Servers

Abstract:
Programs running on different cores in a multicore server are often forced to share resources like off-chip memory, caches, I/O devices, etc. This resource sharing often leads to degraded performance, a slowdown, for the programs that share the resources. A job scheduler can improve performance by co-scheduling programs that use different resources on the same server. The most common approach to solve this co-scheduling problem has been to make job-schedulers resource aware, finding ways to characterize and quantify a program's resource usage. We have earlier suggested a simple, program and resource agnostic, scheme as a stepping stone to solving this problem: Avoid Terrible Twins, i.e., avoid co-schedules that contain several instances from the same program. This scheme showed promising results when applied to dual-core servers. In this paper, we extend the analysis and evaluation to also cover quad-core servers. We present a probabilistic model and empirical data that show that execution slowdowns get worse as the number of instances of the same program increases. Our scheduling simulations show that if all co-schedules containing multiple instances of the same program are removed, the
average slowdown is decreased from 54% to 46% and that the worst case slowdown is decreased from 173% to 108%.

Stichworte:
Co-scheduling; Same Process; Scheduling; Allocation; Multicore; Slowdown; Cluster; Cloud

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Clauss, Carsten; Lankes, Stefan; Trinitis, Carsten; Weidendorfer, Josef

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