

COST-STSM-IC1202-16366

Scientific Report

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The purpose of the *Short-Term Scientific Missions COST-STSM-IC1202-16366* was to foster existing, and to explore future collaborations with the Real-Time Systems Group in York and in particular with Robert Davis. Claire Maiza from Grenoble INP/Ensimag Verimag has also visited the Real-Time Systems Group during at same time and participated in the discussions and the research.

We focused i) on various aspects of cache-related preemption delay [1] and ii) on the analysis of randomized caches [2]:

Cache-related preemption delay In previous research, we have gained an in-depth understanding of i) how the effect of pre-emption to the cache can be analysed and bounded [1, 4] and ii) how these bounds can be integrated into a schedulability analysis [3]. We discussed two concrete extensions of this line of research: i) CRPD-aware schedulability analysis for of hierarchical scheduling [6] and ii) the evaluation of cache partitioning [5] (compared to a precise CRPD analysis) as a means to increase the predictability of pre-emptively scheduled hard real-time systems. Hierarchical scheduling and cache partitioning are both typically used to ensure temporal and spatial isolation in safety-critical real-time systems (see for instance [7]). In both cases, we plan to publish the results of our research. Furthermore, we explored the application of the CRPD analysis on multicore systems and intend to focus on this topic in the near future.

Analysis of Randomized Caches In [2], we have studied existing approaches towards the static probabilistic timing analysis for randomized caches and developed two new analysis. The analysis presented in [2], however, is restricted to single traces only and does not allow for an efficient analysis of generic control-flow graphs. During the short-term scientific mission, we developed an extension of the existing analysis to control-flow graphs to lift this restriction. We will tackle the implementation and evaluation of this extension within the near future and plan to publish an extended version of [2].

Furthermore, I have given a presentation to the Real-Time Systems group titled “On the correctness, optimality and precision of static probabilistic timing analysis” during the stay at York University.

Overall, the short-term scientific mission has been very successful and we plan to continue and extend the very productive collaboration.

References

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