

Experiences of Timing Analysis of Parallel Embedded Software

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Abstract : The execution time analysis is fundamental to the successful design and execution of real-time embedded software. In such analysis, the Worst-Case Execution Time (WCET) of a program is a key measure, on the basis of which system tasks are scheduled. The WCET analysis of embedded software is also needed for system understanding and to guarantee its behavior. WCET analysis can be performed statically (without executing the program) or dynamically (through measurement). Traditionally, research on the WCET analysis assumes sequential code running on single-core platforms. However, as computation is steadily moving towards using a combination of parallel programs and multi-core hardware, new challenges in WCET analysis need to be addressed. In this article, we report our experiences of performing the WCET analysis of Parallel Embedded Software (PES) running on multi-core platform. The primary purpose was to investigate how WCET estimates of PES can be computed statically, and how they can be derived dynamically. Our experiences, as reported in this article, include the challenges we faced, possible suggestions to these challenges and the workarounds that were developed. This article also provides observations on the benefits and drawbacks of deriving the WCET estimates using the said methods and provides useful recommendations for further research in this area.

Keywords : embedded software, worst-case execution-time analysis, static flow analysis, measurement-based analysis, parallel computing

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