

Efficient Context Switching for the Stack Cache: Implementation and Analysis - DTU Orbit (08/11/2017)

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The design of tailored hardware has proven a successful strategy to reduce the timing analysis overhead for (hard) real-time systems. The stack cache is an example of such a design that has been proven to provide good average-case performance, while being easy to analyze.

So far, however, the analysis of the stack cache was limited to individual tasks, ignoring aspects related to multitasking. A major drawback of the original stack cache design is that, due to its simplicity, it cannot hold the data of multiple tasks at the same time. Consequently, the entire cache content needs to be saved and restored when a task is preempted.

We propose (a) an analysis exploiting the simplicity of the stack cache to bound the overhead induced by task pre-emption and (b) an extension of the design that allows to (partially) hide the overhead by virtualizing stack caches.

General information

State: Published

Organisations: Department of Applied Mathematics and Computer Science , Embedded Systems Engineering, ENSTA ParisTech, French Alternative Energies and Atomic Energy Commission

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Pages: 119-128

Publication date: 2015

Host publication information

Title of host publication: Proceedings of the 23rd International Conference on Real Time and Networks Systems (RTNS 2015)

Publisher: Association for Computing Machinery

ISBN (Print): 978-1-4503-3591-1

Main Research Area: Technical/natural sciences

Conference: 23rd International Conference on Real-Time Networks and Systems , Lille, France, 04/11/2015 - 04/11/2015

Program Analysis, Stack Cache, Cache-Related Preemption Delays, Real-Time Systems

DOIs:

10.1145/2834848.2834861

Source: PublicationPreSubmission

Source-ID: 119639599

Publication: Research - peer-review › Article in proceedings – Annual report year: 2015