Titel des Beitrags: Invasive computing for timing-predictable stream processing on MPSoCs

Abstract:
Multi-Processor Systems-on-a-Chip (MPSoCs) provide sufficient computing power for many applications in scientific as well as embedded applications. Unfortunately, when real-time requirements need to be guaranteed, applications suffer from the interference with other applications, uncertainty of dynamic workload and state of the hardware. Composable application/architecture design and timing analysis is therefore a must for guaranteeing real-time applications to satisfy their timing requirements independent from dynamic workload. Here, Invasive Computing is used as the key enabler for compositional timing analysis on MPSoCs, as it provides the required isolation of resources allocated to each application. On the basis of this paradigm, this work proposes a hybrid application mapping methodology that combines design-time analysis of application mappings with run-time management. Design space exploration delivers several resource reservation configurations with verified...
real-time guarantees for individual applications. These timing properties can then be guaranteed at run-time, as long as dynamic resource allocations comply with the offline analyzed resource configurations. This article describes our methodology and presents programming, optimization, analysis, and hardware techniques for enforcing timing predictability. A case study illustrates the timing-predictable management of real-time computer vision applications in dynamic robot system scenarios.

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