In this paper we propose a system-level synthesis for MPSoCs that integrates multiple Application Specific Instruction Set Processors (ASIPs). Each ASIP is customized for a specific set of tasks. The system-level synthesis is responsible for assigning the tasks to the ASIPs, exploring different platform alternatives. We can allocate tasks to the different ASIPs and determine if the applications are schedulable only knowing the worst-case execution time (WCET) of each task. We can estimate the WCET only after establishing the micro-architecture of the ASIP. At the same time, an ASIP micro-architecture can be derived only knowing the assignment of tasks to ASIP. To address this circular dependency, we propose an Uncertainty Model for the WCETs, which captures the performance of tasks running on a range of possible ASIP implementations. We propose a novel stochastic schedulability analysis to evaluate each multi-ASIP platform. We use an Evolutionary Algorithm-based approach to explore the design space of macro-architecture possibilities and we evaluate it using real case studies.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Embedded Systems Engineering
Contributors: Micconi, L., Madsen, J., Pop, P.
Pages: 118-138
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Integration
Volume: 51
ISSN (Print): 0167-9260
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 1.26 SJR 0.223 SNIP 0.869
Web of Science (2017): Impact factor 0.906
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.25 SJR 0.215 SNIP 1.035
Web of Science (2016): Impact factor 1
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.09 SJR 0.246 SNIP 1.123
Web of Science (2015): Impact factor 0.703
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.19 SJR 0.295 SNIP 1.168
Web of Science (2014): Impact factor 0.659
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.28 SJR 0.306 SNIP 0.986
Web of Science (2013): Impact factor 0.529
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 1.19 SJR 0.228 SNIP 1.183
Web of Science (2012): Impact factor 0.414
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 1.23 SJR 0.299 SNIP 0.826
Web of Science (2011): Impact factor 0.646
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.255 SNIP 0.895
Web of Science (2010): Impact factor 0.663