A Compilation- and Simulation-Oriented Architecture Description Language for Multicore Systems

(Invited Paper)

Timo Stripf, Oliver Oey, Thomas Bruckschloegl, Ralf Koenig, Juergen Becker
Karlsruhe Institute of Technology, Germany
{stripf, oey, bruckschloegl, ralf.koenig, becker}@kit.edu

Jordy Potman, Kim Sunesen
Recore Systems, The Netherlands
{jordy.potman, kim.sunesen}@recoresystems.com

George Goulas, Panayiotis Alefragis, Nikolaos S. Voros
Technological Educational Institute of Mesolonghi, Greece
{ggoulas, alefrag, voros}@teimes.gr

Steven Derrien, Olivier Sentieys
Université de Rennes I, INRIA Research Institute, France
{steven.derrien, olivier.sentieys}@irisa.fr

Abstract—Today’s reconfigurable multicore architectures become more and more complex. They consist of several processing units, not necessarily identical, different interconnecting modules, memories and possibly other components. Programming such kind of architectures requires deep knowledge of the underlying hardware and is thus very time consuming and error prone. On the other hand, automated toolchains that target multicore architectures are typically tailored to one specific architecture type and require a platform-specific programming model. Within the EU FP7 project Architecture oriented parallelization for high performance embedded Multicore systems using scilAb (ALMA) we address this shortcoming by a flexible toolchain featuring platform-independence on the architecture level as well as on the programming model. Thus, the toolchain is kept retargetable by using a novel architecture description language (ADL) for multiprocessor system on chip devices. Applications are expressed using the Scilab programming language allowing the end user to develop optimized programs without specific knowledge of the target architectures. Thereby, the ADL guides the code generation of the integrated toolflow through coarse- and fine-grain parallelism extraction, parallel code optimizations and multicore simulations.