

Design Tools Session

Multicube Explorer - A Design Space Exploration Framework for Embedded Systems-on-Chip

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Abstract

Multicube Explorer is an interactive program that lets the designer explore a design space of configurations for a parameterized architecture for which an executable model (use case simulator) exists. Multicube explorer is an advanced multi-objective optimization framework which is entirely command-line/script driven and can be retargeted to any configurable platform by writing a suitable XML design space definition file and providing a configurable simulator.

The overall goal of the open source design space exploration framework aims at providing a retargetable tool to drive the designer towards near-optimal solutions to the architectural exploration problem, with the given multiple constraints. The final product of the framework is a Pareto set of configurations within the design evaluation space of the given architecture. Besides, the following goals have been addressed:

- *Automatic design space exploration*
One of the goals of the open source tool is to provide a command line interface to the exploration kernel that allows the construction of automated exploration strategies.
- *Portability*
Another goal of the open source tool is to be portable across a wide range of systems by using the standard ANSI C++ programming language.
- *Modular composition*
Simulator, optimization algorithms and other design space exploration components are dynamically linked at run-time, without the need of recompiling the entire code base.

The design space exploration is performed by using the simulation abstraction layer exported by the XML driver to the optimizer plug-ins. The optimizer instantiates a set of architectural configurations by means of the design space iterators, and passes the corresponding representation to the XML driver which will execute the simulator. Information about simulator runs are displayed directly in the Multicube Explorer shell.

