

Title:

Bambu – A Free Source Framework for the High-Level Synthesis of Complex Applications

Abstract:

There is a growing consensus among VLSI designers that one of the most effective methods to handle the complexity of today's system-on-chip designs is to use techniques, such as High-Level Synthesis, that start with an abstract behavioral or algorithmic description of a circuit and automatically synthesize a structural description of a digital circuit that realizes the behavior. In fact, the designer of the applications is usually able to program in a High-Level Language (e.g., C language), but he/she has often a limited experience in hardware design.

This talk presents bambu, a tool for the high-level synthesis currently under development at Politecnico di Milano in the context of the Panda framework (<http://panda.dei.polimi.it/>). It integrates compiler optimizations by interfacing with the GCC compiler and implements a novel memory architecture to synthesize complex C constructs (e.g., function calls, pointers, multi-dimensional arrays, structs, ...) without requiring three-states for its implementation. It also integrates floating-point units and thus deals with different data types, generating the proper architectures. Moreover, it is also possible to target both ASIC and FPGA technologies by automatically generating customizable scripts for commercial logic and physical synthesis tools. It is also possible to generate different implementation solutions by trading off latency and resource occupation, to support the hardware/software partitioning on heterogeneous platforms. Finally, thanks to its modular organization, it can be easily extended with new algorithms, architectures or methodologies, targeting different application domains or user's requirements. Constraints, options and synthesis scripts are easily configurable via XML files and it is also possible to generate test benches for automatically comparing the results with the software counterpart.

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