Design Tools Session

Rapid Prototyping with PARS (Parallel Application from Rapid Simulation) EDA tool

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Abstract

Today's complex applications require much more processing performance than what a single processor /DSP and/or FPGA can supply. In many applications using a single technology cannot address all the requirements and hence many applications use a set of processors, DSPs and FPGAs. Manual development of applications targeting multi processor/DSPs/FPGAs is complex, hard, error-prone, hard to debug and maintenance of the developed code is an art in itself. The developer of such an application has to learn many different tools and be intimately familiar with parallel processing techniques and its pitfalls. This is quite an undertaking for any engineer and can add considerable time to any project development. The Mathworks Simulink® is a well known and proven technology to develop applications using a model based design approach. We have developed a sophisticated, yet easy-to-use, software tool called PARS (Parallel Application from Rapid Simulation), which allows a user to target a Simulink® model to a heterogeneous multi processor/DSP/FPGA platform and automatically generate the complete parallel application. The application includes all the booting information for the multi-node hardware, inter-processor/FPGA communications and synchronizations. The application is developed from the model by this novel software tool within minutes and without the user writing a single line of C or VHDL, or any other code. Currently hardware systems comprising Xilinx FPGAs and Texas Instruments fixed and floating point DSPs are supported.

The software tool is completely developed and tested. It is in the market as a commercial offering and is being used by developers. It is being used by some of the world class companies and organizations for developing major projects. Amongst the users are US Navy, and Army. It can be used for developing Hardware-In-the-Loop (HIL) or embedded applications. It is important to note that the Simulink® model used by PARS is independent of target hardware an can easily be re-targeted.

One of the most costly components of any software development is engineering time and opportunity loss due to late entry of the intended product to the market, better known as 'time to market'. With our innovative tool the development engineer need not develop or maintain any code. They can concentrate on developing the application in a modeling environment like Simulink® and make sure the model is behaving as expected. At this stage the production code for the target parallel hardware can be generated including a test-bench within hours and the HIL capability can be used to test the application in real-time on real hardware. This will save much time spent on learning many tools and processes and will considerably reduce the development time. This can save any project much needed cash and facilitate future application maintenance at a much higher level than changing C or VHDL codes. Saving engineering time also improves the time to market and helps faster revenue generation and quicker return on investment.

In this paper features and power of PARS is presented through an example application. Features like support for HDLCoder® and System Generator from Xilinx, debugging, and profiling are discussed. The ease with which a parallel application is created from a model and use of PARS is demonstrated in this paper.