SoftJin
Enabling Electronic Design

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ENABLING FASTER TIME-TO-MARKET FOR PACT'S RECONFIGURABLE PLATFORM

PACT

- **PACT decreased its time-to-market by retaining SoftJin with co-development of the application development suite for its reconfigurable platform architecture.**
- **SoftJin developed an Integrated Graphical debugger and a SystemC based Co-simulation environment for the application development suite.**

Customer Overview

PACT is an intellectual property vendor that develops and markets extreme performance processor solutions. The company's patented breakthrough technology results in a new class of processor, which delivers extreme bandwidth and processing performance. This technology is suited for implementation of computationally intensive designs, such as multimedia applications. The architecture is known as the eXtreme Processing Platform [XPP]. XPP consists of an array of processing elements that are runtime-reconfigurable.

For any reconfigurable platform architecture to gain customer acceptance, a tool flow is required for application developers to map their applications onto the resources offered by the platform. While the platform itself might be source of revenues for platform providers, it is the availability of easy- to-use tools that are customized for these platforms that will drive the adoption of these platforms. In this regard, PACT realized that its core expertise is design and implementation of its unique architecture. PACT partnered with SoftJin to develop tools for enabling development and verification of systems based on XPP architecture.

At the time of beginning the engagement with SoftJin, PACT had itself developed its development tool suite (XDS). SoftJin was engaged to enhance some of the existing tools in the tool suite and develop some additional tools. The rest of the Case Study explains the overall XDS tool suite flow with focus on the key tools developed by SoftJin.

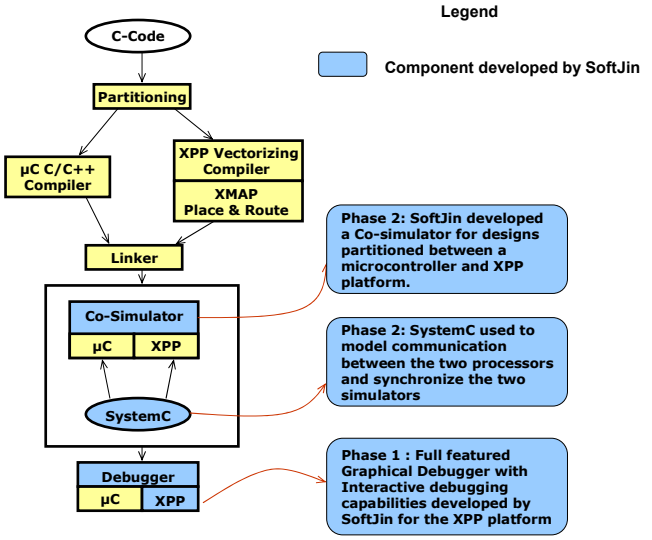


Figure 1:High-level representation of the application development flow with PACT

Solution

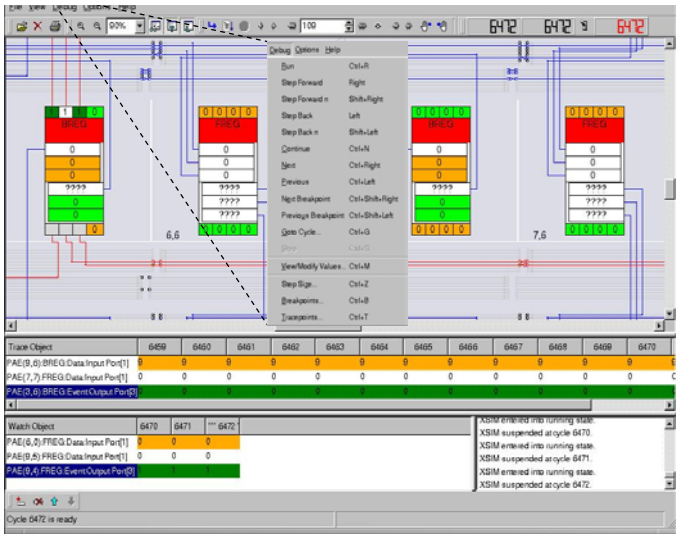
The flow for development of a system using the XPP platform is depicted at a high-level in Figure 1. In this flow, the XPP array is used as a co-processor along with a commercial MIPS processor. The design is partitioned so that the control dominated portions are executed on the micro-controller and the data flow intensive portions can be mapped on to run on the XPP array.

Solution - Phase I: Interactive Graphical Debugger

The design mapped onto XPP processing elements has to be simulated using a XPP simulator. SoftJin developed a simulation and debugging environment in the first phase of the engagement with PACT.

Prior to this, the existing version of the Development Framework with PACT had separate simulation and visualization environments, which were not integrated. This process reduced the debugging time as the designer could make changes to the input of the simulation and view the results in the same

Figure 2: GUI of the Interactive Debugger developed for PACT



environment.

An integrated debugging environment was created by SoftJin that integrated the existing simulation and visualization environments and also enhanced them to implement aids to make the process more developer – friendly.

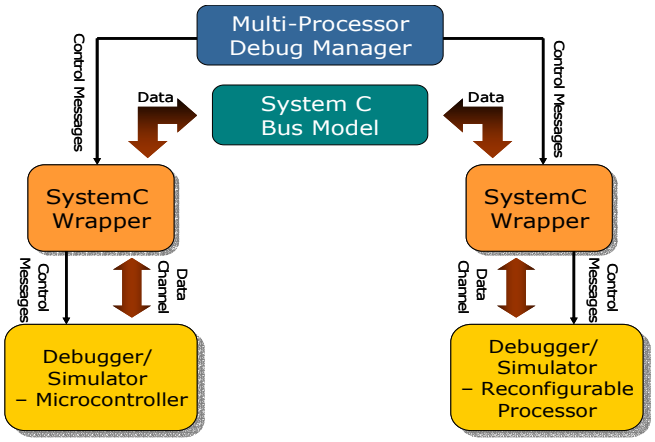
Following is the list of controls that could be invoked from the XPP debugging environment:

- *Step Through* Simulation Cycles were enabled
  - Both Forward and Backward
- *Breakpoints* could be set
  - By Active Objects
  - By Change in Values
  - On Read and/or Write of Values
- *Trace points* could be set
  - The Values at a node / point are output to a file
- *Watch* windows
  - Track a node simultaneously on the GUI.
- View / Modify Values of the Simulation run
  - On-the-Fly Input or Change of values enabled

Solution - Phase II: SystemC based Co-simulation Environment

SoftJin has also developed co-simulation environment where the XPP simulator/ debugger developed during Phase-I could be co-simulated alongwith the MIPS ISS.

Figure 3: Architecture of the SystemC based Co-simulation environment



SoftJin developed a clock accurate co-simulator that enabled the two simulators to execute in step, and models the data and control signals communicating between them using System C. The MIPS simulator acts as a master for the whole simulation process and issues control signals for the XPP simulator whenever it is required to execute.

The debug manager developed by SoftJin enables the designer to view both the MIPS / XPP simulation GUI's and control the simulation run.The GUI of the debug manager provides navigation buttons for co-simulating an application. The co-simulation environment can be easily extended to support other microcontrollers, DSP's and also can be used to debug the actual hardware board.

Figure 4: GUI of the Debug Manager

Approach

The project team at SoftJin had to understand existing application design flow. This was accomplished with the help of initial face to face meetings with PACT at our office in Bangalore. The rest of the execution of the project by our team was carried out off-shore at our office in Bangalore.

Results

Phase I of the project was completed On Time in 7 months. SoftJin not only delivered the project On Time and with Fixed Price, but also gave valuable suggestions to PACT for further to enhancements in the architecture of the Development Framework. The co-simulation environment was developed on Windows 2000, Windows XP and Linux platforms. The total elapsed timeframe for delivery was six months.

The engagements have enabled PACT to take advantage of the off-shore EDA software development services of SoftJin. The Turnkey Project (Fixed Price) business model of SoftJin reduced PACT's risk and helped achieve its XDS tool suite related development goals on time and with lower cost than in-house development.

This is what Martin Vorbach, CTO, PACT Corporation has to say: **"We are impressed with SoftJin's understanding of tool flows required for design using a reconfigurable architecture such as ours and their expertise in delivering these tools. SoftJin's EDA software development services enabled us to get a customized solution that met our specific requirements and was delivered on time and with quality that met our expectations"**

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