imperas

Application: Pre-silicon Software Development

Industry: SoC FPGA

ALTERA®

Customer Challenge

Altera needed a solution for pre-silicon software development for their complex, core-based SoC FPGAs that would span both the semiconductor vendor software team and the embedded system provider software development team. Altera's applications included porting SMP Linux and AMP Linux/RTOS to an ARM Cortex™-A9MPx2 / Nios II based platform, validation and debugging of operating systems, drivers and firmware, and compatibility testing of hardware with software stacks delivered to users.

Imperas Solution

Altera used an Imperas virtual platform with M*SDK and OVP Fast Processor Models for pre-silicon software development and debug. The fast performance of Imperas simulation was key for debug, along with OS-aware capabilities and monitors of important blocks in the simulation of the virtual platform. Imperas facilitated Altera's OS porting and debug, finding bugs in Linux and RTOS, as well as boot code. Altera used Imperas OS-aware tool capabilities to debug OS boot issues, and rapidly found bugs by creating a custom memory access monitor to ensure that different operating systems did not access forbidden memory segments.

Benefits

Imperas OS-aware capabilities reduced OS bug discovery from 2 weeks to 2 days: a 5X improvement. The high-performance Imperas simulator detected a critical bug that went previously undetected with a low-performance (non-Imperas) virtual platform. A custom memory access monitor in the Imperas platform also revealed previously undetected bugs.

Business Challenges
- Rigorous, comprehensive testing of software stacks for SoC FPGAs across a wide variety of customer applications
- Fast validation and debugging of operating systems, drivers and firmware

Design Challenges
- Porting SMP Linux and AMP Linux/RTOS to an ARM-based FPGA platform
- Debug and test of Linux and RTOS, as well as OS boot issues, and preventing OS access of forbidden memory
- Compatibility testing of hardware and software stacks

Results
- OS-aware capabilities accelerated OS bug discovery from 2 weeks to 2 days: a 5X improvement
- High-performance Imperas simulator detected critical, previously undetected bug
- Custom memory access monitor revealed previously undetected bugs

"Given the wide variety of customer applications for our SoC FPGAs, our software stacks require rigorous and comprehensive testing. Imperas' M*SDK has proven to be an outstanding environment for the validation and analysis of operating systems, drivers and firmware. Verification using the Imperas solution not only accelerates software bug discovery, but also provides a rapid understanding of the root cause of problems."
Premal Buch, VP Software, Altera