

Multi-Core Debug API solves connection problems

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The SPRINT consortium announced today the publication of the *Multi-Core Debug (MCD) API v1.0*. The release is a result of the consortium's debug and analysis working group targeting the development of new debug and analysis interfaces. Its members contributed their expertise and knowledge in the field of application software debugging for System-on-Chip (SoC) designs. The API addresses debugging of multi-core platforms as both real hardware and software simulation. Adopting the interface on both tool- and target-side, debug and analysis solutions can be easily attached to the latest available SoC prototype, no matter if it is a virtual prototype (software simulation) or silicon. It has the potential to reduce expenses for tools and to increase the efficiency of software engineers with respect to application debugging and analysis throughout the entire process of the SoC design.

Today, SoC design flows span several levels of abstraction, ranging from high level simulations to the final integrated hardware. Throughout this design, various off-the-shelf components of intellectual property (IP) are assembled in order to achieve high quality designs in short time. The *Open SoC Design Platform for Reuse and Integration of IPs (SPRINT) Project* has taken the challenge to develop a standards-based platform supporting the creation of interoperable and reusable IP as well as their efficient integration into high class SoCs. The SPRINT consortium consists of numerous companies and research facilities from the IP business, including both providers and users.

Within the scope of this project, ARM, Infineon Technologies, Lauterbach, NXP Semiconductors, STMicroelectronics and TIMA Laboratory jointly created the MCD API. It was designed to provide debug tools with a unified debug interface to both real hardware and software simulations. This allows engineers to start the application development early in the SoC platform design flow without having to switch to other debug tools during the transition from virtual prototypes to real hardware. Furthermore, the MCD API addresses multi-core debugging which is inevitable due to the complexity of today's SoC designs. Experiments within the SPRINT project have proven the feasibility and applicability of the interface.

The MCD API is a powerful but simple C-interface. It provides the necessary means in order to perform efficient application debugging for multi-core SoCs and comes with a set of sub-APIs offering the following features:

- *Target Connection*: Connection/instantiation and configuration of debug servers in order to connect debug tools to multi-core systems; multiple cores of a system can be connected to a tool simultaneously.
- *Target System Description*: Retrieving information about the connected system through API function calls and IP-XACT descriptions (as specified by the SPIRIT consortium); enables retargetability of the debug tool and additional debug and analysis features.
- *Target Run Control*: Run control designed for multi-core systems; the reaction of a system's processing units to these calls can be configured core by core.
- *Trigger Support*: Generic trigger interface; offers predefined trigger types (e.g. for breakpoints) and allows customized ones; cross-triggering is possible via trigger buses.
- *Trace Support*: Generic trace interface; offers predefined trace sources and allows customized ones.
- *Memory and Register Accesses*: Unified memory and register access mechanism using transaction lists.
- *Communication Channels*: Various types of communication channels between debug tool and target system, e.g. for communication with applications running on the targeted core or for configuration of additional analysis resources.

"The MCD API allows our customers to use a seamless flow with the same software tools for simulation and silicon. In addition it enables Infineon to have a standard tool interface for cost effective microcontroller evaluation kits." says Dr. Albrecht Mayer, Senior Principal Emulation Systems and Tooling from Infineon Technologies, who lead the debug and analysis working group of the SPRINT project.

Stephan Lauterbach, General Manager of Lauterbach, sees the following benefit of the interface: "The lack of a feature rich standard API between debuggers and targets was a big problem for the use of virtual platforms in the industry till now. The MCD API is the standard that solves this problem. It will help us to provide advanced debug and trace features also for virtual targets."

"The MCD API is a good example of companies working together to solve a common problem", says Bart Vermeulen, Senior Scientist, NXP Semiconductors. "The adoption of the MCD API will lead to a reduction in tool configuration effort for the validation and debug of embedded systems, thereby saving development costs and improving time-to-market."

"The added value of the API is the time-to-market gain it can provide in the availability of development tools for a new target," said Serge De Paoli, Product Development Services & Subsystems, STMicroelectronics. "Unifying interfaces between development tools and targets aids software reuse and simplifies the validation process of the interface."

Joachim Krech, Product Manager at ARM, says: "We have successfully demonstrated the ability to debug an Infineon based hardware board using the MCD API and the ARM® Model Debugger for Fast Models."

Frédéric Pétrot, head of the SLS group of the TIMA lab says: "From the beginning, the MCD API was defined to *also* target Virtual Platforms, which makes it particularly useful to debug and profile MPSoC platforms and the applications that they are expected to run before their actual implementation. Since the API spans multiple levels of abstraction, the same tools can be used for all phases of the design. This is very attractive for the design teams."

Availability

The MCD API can be used under the terms of its license derived from the common BSD licence. A package including the API's header files and documentation can be freely downloaded at one of the following links:

www.infineon.com/DAS
www.lauterbach.com/mcd_api.html

About the SPRINT Project

The *Open SoC Design Platform for Reuse and Integration of IPs (SPRINT)* Project is an EU funded research project which has taken the challenge to enable Europe to be the leader in design productivity and quality of System-on-Chip (SOC) design. In order to cope with the design complexity of today's SoCs, the project partners target the development of a standards-based open design platform which supports the creation of interoperable and reusable IP and their efficient integration into high quality SoCs. (www.sprint-project.net)

About ARM

ARM designs the technology that lies at the heart of advanced digital products, from wireless, networking and consumer entertainment solutions to imaging, automotive, security and storage devices. ARM's comprehensive product offering includes 32-bit RISC microprocessors, graphics processors, enabling software, cell libraries, embedded memories, high-speed connectivity products, peripherals and development tools. Combined with comprehensive design services, training, support and maintenance, and the company's broad Partner community, they provide a total system solution that offers a fast, reliable path to market for leading electronics companies. More information on ARM is available at <http://www.arm.com>.

About Infineon Technologies

Infineon Technologies AG, Neubiberg, Germany, offers semiconductor and system solutions addressing three central challenges to modern society: energy efficiency, communications, and security. In the 2008 fiscal year (ending September), the company reported sales of Euro 4.3 billion with approximately 29,100 employees worldwide. With a global presence, Infineon operates through its subsidiaries in the U.S. from Milpitas, CA, in the Asia-Pacific region from Singapore, and in Japan from Tokyo. Infineon is listed on the Frankfurt Stock Exchange and on the New York Stock Exchange (ticker symbol: IFX). Further information is available at www.infineon.com.

About Lauterbach

Lauterbach is the leading manufacturer of complete, modular microprocessor development tools worldwide with 30 years experience in the field of embedded designs. It is an internationally well-established company with blue chip customers from every corner of the globe and close relationship with all semiconductor manufacturers. Besides the Headquarters in Hoehenkirchen, Germany, the company has its own branch offices in United Kingdom, Italy, France, on the East and West coasts of the United States, Japan and China. Highly qualified sales and support engineers are also available in many other countries.

About NXP Semiconductors

NXP is a leading semiconductor company founded by Philips more than 50 years ago. Headquartered in Europe, the company has about 33,500 employees working in more than 20 countries and posted sales of USD 6.3 billion (including the Mobile & Personal business) in 2007. NXP creates semiconductors, system solutions and software that deliver better sensory experiences in TVs, set-top boxes, identification applications, mobile phones, cars and a wide range of other electronic devices. News from NXP is located at www.nxp.com.

About STMicroelectronics

STMicroelectronics is a global leader in developing and delivering semiconductor solutions across the spectrum of microelectronics applications. An unrivalled combination of silicon and system expertise, manufacturing strength, Intellectual Property (IP) portfolio and strategic partners positions the Company at the forefront of System-on-Chip (SoC) technology and its products play a key role in enabling today's convergence markets. The Company's shares are traded on the New York Stock Exchange, on Euronext Paris and on the Milan Stock Exchange. In 2008, the Company's net revenues were \$9.84 billion. Further information on ST can be found at www.st.com.

About TIMA Laboratory

TIMA Laboratory, Grenoble, is a well know lab in the field of methodology, CAD tools and advanced design for integrated circuit and system. Further information on TIMA can be found at http://tima.imag.fr/about_us.

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