DATE 16

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Virtual Platforms in the Internet-of-Things Era – State of the Art and New Perspectives

DATE 2016 Monday Tutorial, March 14th, 2016

Smart embedded systems are the building blocks of the so-called Internet-of-Things (IoT). They communicate each other and interact with the physical environment. In embedded system design, it is well known that the software development effort has overtaken the hardware effort. Virtual platforms can address this mismatch by parallelizing software and hardware development. Verification and testing of applications based on IoT and smart embedded systems require a continuous evolution of virtual platform methodologies:

▸ the ever more powerful MPSoCs allow exploiting concurrency which must be handled in platform simulation;
▸ executing multiple applications on the same chip could lead to interferences and impact on extra-functional properties (e.g., time, power and temperature) which must be analyzed;
▸ new operating systems and hypervisors, for improved control of the system and for improved security and safety, must be ported and tested;
▸ smart systems are ever more connected with components or external environment with continuous-time behavior that must be simulated together with discrete-time models;
▸ interaction among systems is becoming a crucial aspect to be verified in a full realistic network scenario;
▸ integration of legacy RTL components into abstract virtual platform is desired to further reduce the time-to-market.

This tutorial will give insights into which changes to expect in new virtual platforms regarding efficient CPU simulation, analog-mixed-signal modeling, simulation of extra-functional properties and network simulation. Speakers are expert in such topics; they ported research ideas into successful tools and therefore they can provide a scientific and industrial perspective supported by real case studies. Researchers and practitioners will learn how these changes can help to design tomorrow's embedded systems more efficiently.

The tutorial aims at explaining the following concepts:

▸ virtual platform concept and architecture
▸ execution and verification of embedded software by using virtual platforms
▸ simulation of extra-functional properties of embedded platforms
▸ simulation of analog-mixed-signal behavior in virtual platforms
▸ simulation of realistic network scenarios
▸ integration of legacy components in standard virtual platforms

AGENDA AND SPEAKERS

Session 1

14:30	Welcome and Overview	*Kim Grüttner* (OFFIS), *Davide Quaglia* (EDALab)
14:45	Introduction to virtual platforms: Embedded software development, debugging, analysis, and verification with virtual platforms supporting today's MPSoCs	*Simon Davidmann* (Imperas)
15:30	The notion of time in virtual platforms and extraction of extra-functional properties	*Kim Grüttner* (OFFIS)
16:00	Coffee Break	

Session 2

16:30	Modelling complex analog and digital systems: COSIDE – The design environment for heterogeneous systems	*Karsten Einwich* (COSEDA)
17:15	Generation and integration of components into virtual platforms: RTL-to-TLM abstraction, simulation of analog components, network scenario, extra-functional properties	*Davide Quaglia* (EDALab)
18:00	End	

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