Electronic Design Automation Seminar

Title:
NETWORK-ON-CHIP CROSS-LAYER DESIGN AND OPTIMIZATION TO ENABLE FLEXIBLE SPACE AND TIME PARTITIONING IN MANY-CORE SYSTEMS

Speaker:
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Place: TU München (Room 4905)
Link to TUM roomfinder:
http://portal.mytum.de/campus/roomfinder/search_room_results?searchstring=4905&building=Alle&search=Suche+starten

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Abstract:
Many-core architectures represent today the reference design paradigm for high-end systems-on-chip, and for embedded GPUs in medium-to-high-end SoCs. It is highly unlikely that single applications can monolithically exploit the unprecedented level of hardware parallelism that these platforms are able to expose. As a consequence, the most likely paradigm for the successful exploitation of many-core architectures consists of space and time partitioning, combined with the custom adaptation of partition settings to the workload at hand. In this context, the on-chip interconnection network cannot be viewed as a simple communication fabric, but it takes on the role of system integration and control framework.

This presentation addresses both the integration and the runtime configuration challenge for networks-on-chip in the many-core era, by proposing ad-hoc design techniques at the most suitable abstraction layers. At the architectural level, industry-relevant asynchronous interconnect technology will be demonstrated to absorb system heterogeneity stemming from different operating voltages and speed. At the system level, overlapped static reconfiguration techniques will be presented, capable of achieving the runtime reconfiguration of the NoC routing function without draining the network from ongoing traffic. Last but not least, the programming model implications will be derived for general-purpose programmable accelerators to program and master such a highly dynamic environment.

The presentation will finally sketch the role that the emerging optical interconnect technology might play in this context, and its status with respect to the use of an aggressive electrical baseline.