Title: Reconfigurable Parallel Computing

Speaker:
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Abstract:
The dynamic reconfiguration of hardware stands for the change of hardware while the system is operating. Its benefit is the adaption to different computing requirements. For instance, an improved use of communication networks can be achieved: Many networks reveal the characteristic that connections between specific communication partners show a smaller latency than others. These localities (connections with a small latency) can be used for those communication partners who communicate heavily with each other. If several applications run in parallel on the system and a part of applications change, this can implicate that after the change, new partners with heavy communication cannot use a connection of small latency. Then, a dynamic reconfiguration of the network can help.

Open questions are, when does a reconfiguration make sense and which network architecture is to be used at what time. In this context, the varying spatial traffic distribution caused by changing applications plays an important role, and thus, the application area. Another question is, what happens with the messages that are already within the network at the beginning of the reconfiguration. The reconfiguration may destroy their chosen path.

Switching and routing must also be part of the investigation. New switching and routing strategies must be developed. A form of reconfiguration management must be added to the system, which is possible in the context of a hardware operating system.

Further applications of the dynamic reconfiguration are, for instance, fault tolerance (isolation of faulty components by reconfiguration) and self-organization (automatic optimization of the system architecture).

This talk will introduce into dynamic reconfiguration of parallel systems, including multiprocessor system-on-chip (MPSoC) architectures. Design and performance issues are discussed.

About the speaker:
Dietmar Tutsch received the diploma degree Dipl.-Ing. in Electrical Engineering from the University of Saarbrücken (Germany) in 1993. In 1998 and in 2005 he received his Ph.D. and his Habilitation degree, respectively, in computer science from TU Berlin. There, he held a professorship in architecture of embedded systems from 2007 to 2008. Since 2008, he has been a full professor at the University of Wuppertal (Germany). Dietmar Tutsch holds the chair of automation and computer science. His research interests are reconfiguration, modeling, simulation, and performance evaluation of computer architectures, systems on chip, embedded systems and parallel and distributed systems.