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Subject: [NSCI] NSCI Seminar Series - Today - TOWARDS NEXT GENERATION OF COMPUTING
Date: Tuesday, April 25, 2017 10:42:29 AM
Attachments: ATT00001.txt

Towards Next Generation of Computing

Heike Riel
IBM

Tuesday, April 25, 2017

81-1A116: Boulder: 11:00 AM (MT)
Building 221, Room B-145, Gaithersburg: 1:00 PM (EST) – Speaking in Gaithersburg

In the past 50 years computing was driven by “smaller & denser” resulting in “faster & cheaper”. Cost per function has decreased tremendously, while system performance and reliability have been improved significantly. Dimension scaling alone is no longer sufficient and various paths are pursued to increase system performance. To further extend core logic and memory technology roadmaps significant innovation in materials, devices and architectures is required.

We are investigating key technologies to continue the roadmap, e.g., gate-all-around nanowires, III-V semiconducting nanowires for high-mobility field-effect transistors (FETs), III-V heterostructure tunnel FETs as steep slope devices or carbon nanotube FETs. In parallel other technologies to build new systems such as heterogeneous integration, 3D packaging, system-on-chip, silicon photonics and others are pushed to increase system level performance.

Yet despite these innovative technologies, the speed of increasing the density of transistors has slowed down. This raises the fundamental question of what is next? What is the future of information technology beyond scaling and traditional computing? In that regard, completely new computing paradigms are developed such as quantum computing and non-von Neumann computing. The latter is also driven by the fundamental changes of the workloads in cognitive computing and IoT. Accelerating machine learning and deep learning is a key requirement for new computer systems.

In this presentation, I will give an overview of our research activities in the field of extending the core logic/memory technology roadmaps and in the new paradigms of cognitive hardware technologies and quantum computing.

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