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In this seminar, I will demonstrate System-on-Chip (SoC) design with the new tool Synthagate from our company Synthezza www.synthezza.com.

The electronic industry needs High-level synthesis tools. Why? The tremendous achievements in chip technology allow the production of chips with billions of gates. At the same time, the design technology of these circuits was only slightly improved in the last ten years, especially at the highest system level. The traditional digital system design flow contains the manual creation of a system description at RTL (Register Transfer Level) with Verilog or VHDL code. As a result, the time-to-market is increased three to four times for complex SoCs (Systems-on-Chip). The only way to reduce the gap between the future technological capability and the lagging designer productivity is to raise the design from the current RTL to the algorithmic or behavior level and to develop High-level synthesis (HLS) tools.

State of the art. Several companies such as Cadence, Xilinx, Altera, Mentor Graphics, and Forte Design Systems over the last ten years produced several HLS tools. However, according to analysts in the Electronic Design Automation (EDA) industry, all these tools present the third generation of HLS tools oriented to designing a very restricted class of digital systems (Data Path dominated). These analysts predict that the fourth generation of HLS tools for designing any digital system (Data Path and Control dominated) will appear only in several years.

The main difference between Synthagate and other design tools is that *the designer is not required to use hardware description languages*. Instead, Synthagate uses Algorithmic State Machines (ASMs) at the different design steps. Synthagate covers most digital system designs from DSP to Processing Units. This tool can be used in the design of robots, controllers, processors, IoT & AI systems, video and voice processing systems, digital systems for automated and autonomous cars, et cetera. Most importantly, not only experienced hardware designers but application engineers can design complex digital systems with Synthagate. Synthagate can also be helpful for students and educators of universities and colleges in courses such as Digital system design, Systems on the chips, VLSI system design, Embedded systems, Computer system architecture, and many others.

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