SoC-ESS: Essential HW and SW for Embedded Systems with AMD adaptive SOC

SoC-ESS: Sistemas Embebidos en SOC adaptativos de AMD-Xilinx: SOC Esencial

Language: The classes are in Spanish, but working material is in English (available also in English at In-Company).

Who Should Attend Engineers who are interested in developing embedded systems with the Zynq UltraScale+ MPSoC, Zynq SoC, and/or MicroBlaze soft processor core. This course would be useful for hardware, system and software engineers' team.

Duration: 24 h (3 days, 8 h/day).

Prerequisites: FPGA design basics (completion of the Essentials of FPGA Design course or equivalent knowledge of Xilinx Vivado), basic understanding of C (or C++) programming, Conceptual understanding of embedded processing systems and microprocessors, Some HDL modeling knowledge.

Introduction: This course introduces the concepts, tools, and techniques required for hardware and software design and development for the Adaptive SoCs (System on a Chip) using the Vivado Design Suite and the Vitis Software environment. This course focuses on the Zynq UltraScale+ MPSoC and Zynq-7000 SoC. Versal and Microblaze are covered. Designs are run using hardware platform (ZCU104, Ultra96v2, Zybo-Z and QEMU (Quick Emulator). The emphasis is on:

- Designing, expanding, and modifying embedded systems utilizing the features and capabilities of the Zynq UltraScale+ MPSoC, Zynq System on a Chip (SoC), or MicroBlaze soft processor
- Adding and simulating AXI-based peripherals using bus functional model (BFM) simulation
- Reviewing of Vitis (replacing SDK) tool use

- Customizing board support packages (BSPs) for resource access and management of the Xilinx Standalone library
- Utilizing device drivers effectively
- Developing software applications for the ARM Corte-A9/A53/R5 and MicroBlaze processors
- Debugging and integrating user applications

Skills Gained: After completing this comprehensive training, you will have the necessary skills to:

- Describe the various tools that encompass a AMD-Xilinx embedded design
- Rapidly architect an embedded system containing a Cortex-A9/A53/A72/R5 or MicroBlaze processor using the Vivado IP integrator and Customization Wizard
- Develop software applications utilizing the Eclipse-based Unified Software Platform (VITIS)
- Write a basic user application (under Standalone or Linux) using the Unified Software Platform (VITIS) and run it on an embedded system platform
- Create and integrate an IP-based processing system component in the Vivado Design Suite
- Design and add a custom AXI interface-based peripheral to the embedded processing system
- Simulate a custom AXI interface-based peripheral using verification IP (VIP)
- Use Xilinx debugger tools to troubleshoot user applications
- Apply software techniques to improve operability
- Maintain and update software projects with changing hardware

Topics Covered: This course covers the following topics and concepts:

- Embedded UltraFast Design Methodology – Outlines the different elements that comprise the Embedded Design Methodology.
- Overview of the embedded hardware development flow. Driving the IP Integrator (IPI) Tool
- Overview of Embedded Software Development – Reviews the process of building a user application.
- Driving the Vitis Tool – Introduces the basic behaviors required to drive the SDK tool to generate a debuggable C/C++ application.
- Overview and characteristics of Zynq UltraScale+ MPSoC, Zynq-7000 SoC, Versal, and MicroBlaze Processor Architectures
- AXI: Introduction and Variations among the three primary AXI (Advanced eXtensible Interface) variations. (AXI, AXI-Lite, AXI-Stream)
- AXI: Transactions – Describes different types of AXI transactions.
- Interrupts: concept of interrupts, basic terminology, and generic implementation. Hardware Architecture and Support. Software considerations that must to be tacked into account.
- Using the Create and Import Wizard to Create a New AXI IP. Connecting AXI IP –
- AXI: BFM Simulation Using Verification IP
- System Debugger. Illustrates the most commonly used debugging commands.
- Standalone Software Platform Development
- C Coding Support for Standalone – Reviews the basic services (libraries) available when coding in the Standalone environment.
- Memory File System (Standalone) – Introduces the memory file system (MFS) from the Standalone library, which provides drivers and utilities for effectively converting a region of memory into a file system.

- Using Linker Scripts – Overview of the purpose and typical use of a linker script.
- Operating Systems: Introduction and Concepts.
- Linux: A High-Level Introduction and Linux Software Application Development.
- Writing Code in the AMD-Vitis Linux Environment.
- QEMU Introduction to the Quick Emulator.
- Booting Overview – Main points to how booting a processor is handled for Zynq SoC / MPSoC devices and MicroBlaze processors.
- Profiling Overview
- Device Drivers. Basic concepts and Describes how to successfully write a custom device driver.

Related Courses:

SoC-ADV: Advanced HW and SW of Embedded Systems Design

HLS01: High Level Synthesis for Xilinx FPGAs using Vitis-HLS

SoC-RF: Designing with the Zynq UltraScale+ RFSoC

VIV-ESS: Designing FPGAs Using the Vivado design Suite Essential

VIV-ADV: Designing FPGAs Using the Vivado design Suite Advanced

Dates, location and registration:

Visit www.electratraining.org

Price & Course Packs and Discounts:

- *SoC-ESS: 1230€*
- *SoC-ADV: 1240€*
- *SoC-ESS + SoC-ADV: (-20%): 1980€*

For more than one engineer from same company / institution additional discounts.