

Zynq Smarter Solutions – Software Workshop

Course Description

This one-day workshop introduces you to software design and development for the Zynq® All Programmable System on a Chip (SoC) using the Xilinx Software Development Kit (SDK). The focus is on the basic features and capabilities of the Zynq All Programmable SoC as well as the tools and techniques required for the software phase of the design cycle.

The hands-on labs provide students experience with the design and implementation of the software application and the board support package (BSP) for resource access and management of the Xilinx Standalone library. Labs also include debugging a remote server Linux application, profiling for performance, and interrupts.

Level: Embedded Software 2

Training Duration: 1 day

Who Should Attend?

Engineers who are interested in developing embedded systems with the Xilinx Zynq All Programmable SoC processor core using the Vivado® IP integrator.

Prerequisites:

- FPGA design experience
- Completion of the Essentials of FPGA Design course or equivalent knowledge of Xilinx Vivado software implementation tools
- Basic understanding of C programming
- Basic understanding of microprocessors
- Some HDL modeling experience

Software Tools:

- Vivado Design or System Edition 2015.1

Hardware:

- Architecture: Zynq-7000 All Programmable SoC and 7 series FPGAs*
- Demo board: Zynq-7000 All Programmable SoC ZedBoard*

Skills Gained: After completing this training, you will be able to:

- Describe the various tools that encompass a Xilinx embedded design
- Rapidly architect an embedded system containing a Cortex™-A9 processor by using the Vivado IP Integrator and Customization Wizard
- Apply debugging techniques, including the use of the Vivado logic analyzer tool for cross triggering an embedded system
- Implement an effective software design environment for a Xilinx embedded system using the Xilinx SDK tools
- Write a basic user application (under Standalone or Linux) using SDK and run it on an embedded system platform
- Use the Xilinx debugger tools to troubleshoot user applications
- Apply software techniques like profiling to improve performance

Course Outline

1. Smarter Systems Workshop Overview
2. Lab 1: Building a Basic Zynq AP SoC Design
3. Verification and Debug of a Zynq AP SoC Design
4. Lab 2: Debugging on the Zynq AP SoC
5. Designing with the Zynq AP SoC – Tools and Ecosystem
6. Zynq AP SoC Boot Process
7. Lab 3: Running and Debugging a Linux Application on the Zynq AP SoC
8. Zynq AP SoC: Design for Performance – Considerations
9. Lab 4: Using DMA on the Zynq AP SoC
10. Lab 5: Software Interrupts (optional)

Lab Description

Lab 1: Building a Basic Zynq AP SoC Design – Create a project using the IP integrator to develop a basic hardware system and generate a series of netlists for the embedded design. Complete the processes using the SDK tools to create a software BSP and sample application. Configure the device and download the application

Lab 2: Debugging on the Zynq AP SoC – Evaluate debugging the hardware and software components of a Zynq All Programmable SoC design.

Lab 3: Running and Debugging a Linux Application on the Zynq AP SoC – Create a simple hello_world application using SDK. The evaluation board will automatically boot from an SD card with the Linux kernel installed as part of the boot image.

Lab 4: Using DMA on the Zynq AP SoC – Experiment with effectively using the PS DMA controller to move data between DDRx memory and a custom PL peripheral.

Lab 5: Software Interrupts – Replace a software timing loop with an interrupt-driven timer. Add the timer software and implement an interrupt handler for the timer. Download into hardware and test the application.