XILINX
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Embedded Systems Software Design
Embedded Software 3

EMBD-SW-ILT (v1.0)

Course Specification

Course Description

This two-day course introduces you to software design and development for the Xilinx Zynq® All Programmable System on a Chip (SoC) and the Zynq UltraScale+™ MPSoC devices using the Xilinx Software Development Kit (SDK). You will learn the concepts, tools, and techniques required for the software phase of the design cycle.

Topics are comprehensive, covering the basics of SDK tool use, customization of the board support packages (BSP) for resource access and management of the Xilinx Standalone library. Major topics include device driver use, user application debugging and integration.

Practical implementation tips and best practices are also provided throughout to enable you to make good design decisions and keep your design cycles to a minimum. Sufficient practical information is provided to start developing software applications for the ARM® Cortex™-A9, Cortex-A53, Cortex-R5, and MicroBlaze™ processors.

While this course focuses on embedded systems using the processing system (PS), it also covers MicroBlaze processor development (both independent of the PS and in concert with the PS).

Level – Embedded Software 3

Course Duration – 2 days

Price – $1600 or 16 Xilinx Training Credits

Course Part Number – EMBD-SW-ILT

Who Should Attend? Software design engineers interested in system design and implementation and software application development and debugging using the Xilinx Standalone library

Prerequisites

- C or C++ programming experience, including general debugging techniques
- Conceptual understanding of embedded processing systems including device drivers, interrupt routines, writing and modifying scripts, user applications, and boot loader operation

Recommended

- Essentials of Microprocessors

Software Tools

- Vivado® Design or System Edition 2017.3

Hardware

- Architectures: Zynq-7000 All Programmable SoC (Cortex-A9 processor), Zynq UltraScale+ MPSoC (Cortex-A53 and Cortex-R5 processor), and MicroBlaze processor
- Demo board: Zynq-7000 All Programmable SoC ZC702 or ZedBoard

* This course focuses on the Zynq-7000 All Programmable SoC and the Zynq UltraScale+ MPSoC architectures. Check with North Pole Engineering, Inc. for the specifics of the in-class lab board or other customizations. Zynq UltraScale+ MPSoC designs are run using QEMU rather than a hardware platform.

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

- 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 the Xilinx Software Development Kit (SDK) and run it on an embedded system platform
- Use Xilinx debugger tools to troubleshoot user applications
- Apply software techniques to improve operability
- Maintain and update software projects with changing hardware

Course Outline

Day 1

- Overview of Embedded Software Development {Lecture}

- Embedded UltraFast Design Methodology {Lecture, Demo}
- Zynq-7000 All Programmable SoC Architecture Overview {Lecture, Lab, Demo}
- Zynq UltraScale+ MPSoC Architecture Overview {Lecture, Lab, Demo}
- MicroBlaze Processor Architecture Overview {Lecture, Lab}
- Driving the SDK Tool {Lecture, Lab}
- System Debugger {Lecture, Lab}
- Standalone Software Platform Development {Lecture, Lab, Demo}
- C Coding Support for Standalone {Lecture, Demo}
- Memory File System (Standalone) {Lecture, Lab}
- Using Linker Scripts {Lecture, Lab}
- Introduction to Interrupts {Lecture}
- Interrupts: Software Considerations {Lecture, Lab}

Day 2

- Operating Systems: Introduction and Concepts {Lecture}
- Linux: A High-Level Introduction {Lecture}
- Linux Software Application Development Overview {Lecture, Lab, Demo}
- Writing Code in the Xilinx Linux Environment {Lecture, Demo}
- Booting Overview {Lecture, Lab}
- Profiling Overview {Lecture, Lab, Demo}
- Understanding Device Drivers {Lecture, Demo}
- Custom Device Drivers {Lecture, Lab}

Topic Descriptions

Day 1

- Overview of Embedded Software Development – Overview of the process for building a user application.
- Embedded UltraFast Design Methodology – Outlines the different elements that comprise the Embedded Design Methodology.
- Zynq-7000 All Programmable SoC Architecture Overview – Overview of the Zynq-7000 All Programmable SoC architecture.
- Zynq UltraScale+ MPSoC Architecture Overview – Overview of the Zynq UltraScale+™ MPSoC architecture.
- MicroBlaze Processor Architecture Overview – Overview of the MicroBlaze processor architecture.
- Driving the SDK Tool – Introduces the basic behaviors required to drive the SDK tool to generate a debuggable C/C++ application.
- System Debugger – Describes the basics of actually running a debugger and illustrates the most commonly used debugging commands.
- Standalone Software Platform Development – Covers the various software components, or layers, supplied by Xilinx that aid in the creation of low-level software.
- 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.
- Introduction to Interrupts – Introduces the concept of interrupts, basic terminology, and generic implementation.
- Interrupts: Software Considerations – Describes many of the considerations that a software coder must take into account when supporting interrupts.

Day 2

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(952) 486-8881

- Operating Systems: Introduction and Concepts – Introduces the concept of the operating system and provides a simplified view into the generic way that operating systems work.
- Linux: A High-Level Introduction – Introduces the Linux operating system, a brief history, and how to use it.
- Linux Software Application Development Overview – Highlights important parts of the underlying Linux system as it pertains to applications.
- Writing Code in the Xilinx Linux Environment – Reviews the use of the Xilinx SDK tool for Linux software development.
- Booting Overview – Describes the main points to how booting a processor is handled for Zynq All Programmable SoC devices and MicroBlaze processors.
- Profiling Overview – Introduces the purpose and techniques for profiling a user application.
- Understanding Device Drivers – Explains the concept of a device driver and how it is used by embedded systems.
- Custom Device Drivers – Describes how to successfully write a custom device driver.

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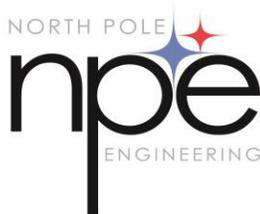
You must have your tuition payment information available when you enroll. We accept credit cards (Visa, MasterCard, or American Express) as well as purchase orders and Xilinx training credits.

Student Cancellation Policy

- Students cancellations received more than 7 days before the first day of class are entitled to a 100% refund. Refunds will be processed within 14 days.
- Student cancellations received less than 7 days before the first day of class are entitled to a 100% credit toward a future class.
- Student cancellations must be sent here.

NPE Course Cancellation Policy

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