

For ISE 12.1 release

Xilinx Embedded Academy Description:

The 4 day Xilinx Embedded Academy consists of 2 packaged courses including:

- Embedded Systems Development (2 Days)
- Advanced Features and Techniques of Embedded Systems Development (2 Days)

Price: \$2600 + GST for the full 4 day Academy or \$1400 + GST per 2 day course. Xilinx Training Credits accepted at 7 TC's per day.

Embedded Systems Development

Xilinx FPGAs provide a new level of system design capabilities through soft MicroBlaze™ processors, hard PowerPC® processors, and silicon-efficient architectural resources. This course brings experienced FPGA designers up to speed on developing embedded systems using the Embedded Development Kit (EDK). The features and capabilities of the Xilinx MicroBlaze soft processor and the PowerPC 440 processor are also included in the lectures and labs. The hands-on labs provide experience with the development, debugging, and simulation of an embedded system.

Level –Intermediate

Who Should Attend? – Engineers who are interested in developing embedded systems with the Xilinx MicroBlaze soft processor or PPC 440 core using the Embedded Development Kit and a Xilinx FPGA

Prerequisites

- FPGA design experience including Xilinx Academy I with some HDL modeling experience, or Equivalent
- Basic understanding of C programming

Software Tools

- Xilinx ISE Design Suite: Embedded or System Edition 12.1
- Mentor Graphics ModelSim simulator

Hardware

- Architecture: Spartan®-6, Virtex®-5, and Virtex-6 FPGAs*
- Demo board used: Spartan-6 FPGA SP605,

* This course focuses on Spartan-6, Virtex-5, and Virtex-6. However Spartan 6 demo boards are used for any downloading Labs

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

- Describe the various tools that encompass the Xilinx Embedded Development Kit (EDK)
- Rapidly architect an embedded system containing a MicroBlaze or IBM PowerPC processor and Xilinx-supplied CoreConnect bus architecture IP by using the Base System Builder (BSB)
- Utilize the Eclipse-based Software Development Kit (SDK) to develop software applications and debug software
- Create and integrate your own IP into the Project Navigator environment
- Simulate your own custom peripherals with Bus Functional Models (BFMs)

Course Outline

Day 1

- EDK Overview
- Base System Builder
- **Lab 1:** Hardware Construction with the Base System Builder

Course Specification

- Software Development Using SDK
- **Lab 2:** Adding and Downloading Software
- System Buses
- Processor Basics
- Interrupts
- Adding Hardware to an Embedded Design
- **Lab 3:** Adding IP to a Hardware Design

Day 2

- Interfacing to the Processor System
- Designing Your Own Peripheral Using the IPIC Interface
- Installing Your Own Peripheral Using the IPIC Interface
- **Lab 4:** Building Custom IP for an Embedded System – PLB v46 Bus
- Bus Functional Model Simulation
- **Lab 5:** BFM Simulation
- Adding Your Own IP to the Embedded System
- **Lab 6:** Integrating a Custom Peripheral

Lab Descriptions

Both the MicroBlaze and PowerPC 440 processors are supported in the labs.

- **Lab 1:** Hardware Construction with the Base System Builder – Create an XPS project by using the Base System Builder to develop a basic hardware system and generate a series of netlists for the embedded design.
- **Lab 2:** Adding and Downloading Software – Complete the processes begun in Lab 1 using the SDK tools to create a software BSP and sample application. Configure the FPGA and download the application.
- **Lab 3:** Adding IP to a Hardware Design – Learn to add IP from the many choices in the IP library. Use the GUI to add a general-purpose I/O module and access internal block RAM directly from the MHS file.
- **Lab 4:** Building Custom IP for an Embedded System – Create and add a custom PLB bus peripheral (LCD interface) to your design by using the Create or Import Peripheral Wizard.
- **Lab 5:** BFM Simulation – Use the ModelSim simulator to perform Bus Functional Model simulation to verify functionality of the LCD bus peripheral added in the preceding lab.
- **Lab 6:** Integrating a Custom Peripheral – Put it all together: add custom IP to the processor system, then integrate the processor sub-system with other logic in an ISE design project.

Advanced Features and Techniques of Embedded Systems Development

Advanced Features and Techniques of Embedded Systems Development provides embedded systems developers the necessary skills to develop complex embedded systems and enables them to improve their designs by using the tools available in the Embedded Development Kit (EDK). This course also helps developers understand and utilize advanced components of embedded systems design for architecting a complex system.

This course builds on the skills gained in the *Embedded Systems Development* course. Labs provide hands-on experience with the development, verification, debugging, and simulation of an embedded system. Labs use the Spartan®-6 FPGA SP605 demo boards in which designs are downloaded and verified.

Level – Advanced

Who Should Attend? – FPGA design engineers, system architects, and system engineers who are interested in Xilinx embedded systems development flow

Prerequisites

- *Embedded Systems Development* course or experience with embedded systems design and Xilinx EDK tools
- Basic microprocessor experience and understanding of PowerPC®-processor and MicroBlaze™-processor systems

Software Tools

- Xilinx ISE® Design Suite: Embedded or System Edition 12.1
- Mentor Graphics ModelSim simulator 6.4b or later

Hardware

- Architecture: Spartan®-6, Virtex®-5, and Virtex-6 FPGAs*
- Demo board used: Spartan®-6 FPGA SP605

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

- Assemble an advanced embedded system
- Take advantage of the various Virtex and Spartan FPGA and PowerPC 440 and MicroBlaze processor features, including the crossbar and multi-port memory controller
- Apply advanced debugging techniques, including the use of the ChipScope™ tool for debugging an embedded system and HDL system simulation of processor-based designs
- Identify the steps involved in integrating a memory controller into an embedded system using the PowerPC 440 and the MicroBlaze processors
- Integrate an interrupt controller and interrupt handler into your embedded design
- Design a Flash memory-based system and boot load from off-chip Flash memory
- Perform HDL-based system simulation

Course Outline

Day 1

- Embedded Systems Development Review
- **Lab 1:** Building a Complete Embedded System
- PowerPC 440 Processor Crossbar
- Debugging Using the ChipScope Pro Analyzer
- **Lab 2:** Debugging Using the ChipScope Pro Analyzer
- Block RAM Memory Controllers
- Multi-Channel External Memory Controller for Static Memory
- PowerPC 440 Processor DDR2 Memory Controller for the Crossbar MCI
- Multi-Port Memory Controller for Dynamic RAM
- **Lab 3:** Instantiating a DDR Memory Controller

Day 2

- Interrupts
- Fast Simplex Links
- Advanced Processor and Peripheral Interface Options
- **Lab 4:** Interfacing an Embedded System to FPGA Fabric
- Advanced Processor Configurations
- Boot Loader
- **Lab 5:** Boot Loading from Flash Memory
- HDL System Simulation in XPS
- **Lab 6:** Simulating an Embedded Processor System

Lab Descriptions

- **Lab 1:** Building a Complete Embedded System – Develop hardware that incorporates IP cores to interface to push buttons, a rotary switch, LEDs, an LCD display, and serial communication. Use the SDK development tools to create an embedded software application project for the hardware built.
- **Lab 2:** Debugging Using the ChipScope Pro Analyzer – Perform simultaneous hardware and software debugging with the ChipScope™ Pro Analyzer, SDK Debug perspective, and XMD.
- **Lab 3:** Instantiating a DDR Memory Controller – Use XPS to instantiate a DDR memory controller. Explore memory device configurations and proper memory controller clocking procedures.
- **Lab 4:** Interfacing an Embedded System to FPGA Fabric – Move data between an embedded system and FPGA fabric via an FSL and a dual-port block RAM. Implement an interrupt controller and an interrupt handler.
- **Lab 5:** Boot Loading from Flash Memory – Develop an application that is stored in flash memory, load it through a boot loader program, and execute the software from external memory.
- **Lab 6:** Simulating an Embedded Processor System – Set up and perform HDL-based simulation on a design that contains an embedded processor system. Explore the tool flow for performing embedded processor simulation as part of a Project Navigator design in the ISE software.

Register Today

Black Box Consulting delivers public and private courses in locations throughout Australia and New Zealand, and live, instructor led training to attendee's worldwide via a browser based delivery solution

For more information, such as our range of courses, current schedules, and other services including consulting and recruitment/training packages, please use one of the contact methods below:

Black Box Consulting
PO Box 1147
Stafford City
QLD 4053

Tel: +61 7 3137 0905

Fax: +61 7 3 3103 4297

info@blackboxconsulting.com.au

www.blackboxconsulting.com.au



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Training



Xilinx education courses are conducted throughout Australia and New Zealand and are presented by Xilinx FPGA experts.

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Design Support Consulting



Have a Xilinx expert working on your FPGA project along side your team either onsite or remotely. Short term assistance available via our remote assistance and training technology

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