**Embedded Design Flow Workshop**

**Nexys3 Board**

**COURSE DESCRIPTION**

Embedded Systems Development brings experienced FPGA designers up to speed on the capabilities and characteristics of the Xilinx MicroBlaze™ 32-bit soft processor core and the Embedded Development Kit (EDK) design environment. Developing embedded systems using the MicroBlaze and a set of soft peripherals is also included in the lectures and labs.

# Install Xilinx software

Professors may submit the online donation request form at [www.xilinx.com/university](http://www.xilinx.com/university) to obtain the latest Xilinx software. The workshop was tested on a PC running MicroSoft Windows XP professional edition. Debug is verified using Hyper Terminal program.

* V13.2 EDK
* V13.2 ISE Foundation Software
* V13.2 Chipscope-Pro
* Download and install software drivers, for serial communication using mini-USB2 cable, available at <http://www.ftdichip.com/Drivers/VCP.htm>
* Download and install Adept driver and software available at <http://www.digilentinc.com/Products/Detail.cfm?NavPath=2,66,828&Prod=ADEPT2>
* Download and install the latest “Digilent Plugin for Xilinx Tools” available at <http://www.digilentinc.com/Products/Detail.cfm?NavPath=2,66,768&Prod=DIGILENT-PLUGIN>

1. **Setup hardware**

Connect Nexys3 Board

* 1. Connect programming cable between configuration port of Nexys3 Board and PC
  2. Connect another micro USB cable between Nexys3 Board’s UART port and PC USB port
  3. Connect the power supply and power on the board

1. **Install distribution**

Extract the labsource.zip file in c:\xup\embedded directory. This will generate source folder and also place Digilent.zip file. Extract Digilent.zip file into <Xilinx\_13\_2\_install\_Dir>\ISE\_DS\EDK\board folder.

The docs\_pdf.zip file consists of lab documents and presentations in PDF format. Extract this zip file in c:\xup\embedded\ directory or any directory of your choice.

1. **For Professors only**

Download the labsolution.zip and docs\_source.zip files using your membership account. Do not distribute them to students or post them on a web site. The docs\_source.zip file contains lab documents in Microsoft Word and presentations in PowerPoint format for you to use in your classroom.

1. **Get Started**

Review the presentation slides (see course agenda) and step through the lab exercises (see lab descriptions) to complete the labs.

# COURSE AGENDA

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| **Day 1 Agenda** | **Day 1 Materials** |
| Class Intro | 11\_class\_intro.pptx |
| EDK Overview | 12\_edk\_overview.ppt x |
| Lab 1: Basic Hardware Design | 12a\_lab1\_intro.pptx  Lab1.docx |
| Hardware Design | 13\_hardware\_design.pptx |
| Hardware Design Using EDK | 14\_HW\_design\_edk.pptx |
| Lab 2: Adding IP to a Hardware Design | 14a\_lab2\_intro.pptx  Lab2.docx |
| Adding Your Own IP to the OPB Bus | 15\_adding\_ip.pptx |
| Lab 3: Adding Custom IP | 15a\_lab3\_intro.pptx  Lab3.docx |
| **Day 2 Agenda** | **Day 2 Materials** |
| Software Development -Basic | 21\_software\_design\_basic.pptx |
| Software Development -Advanced | 22\_software\_design\_advanced.pptx |
| Lab 4: Writing Basic Software Application | 22a\_lab4\_intro.pptx  Lab4.docx |
| Address Management | 23\_address\_management.pptx |
| Software Development and Debug using SDK | 24\_debug.ppt |
| Lab 5: Advanced Software Writing | 24a\_lab5\_into.pptx  Lab5.docx |
| Lab 6: Cross Debug | 24b\_lab6\_intro.pptx  Lab6.docx |
| Course Review | 25\_course\_review.pptx |

**LAB** **DESCRIPTIONS**

Lab 1 - Basic Hardware Design: Create an XPS project using Base System Builder to develop a basic system for a target board.

Lab 2 - Adding IP to a MicroBlaze Design: Learn to add IP such as bridges, OPB peripherals, OPB bus, and others to the basic hardware design.

Lab 3 - Adding Custom IP: Explore adding a custom IP to your design, using the Creating/Importing Peripheral Wizard.

Lab 4 - Writing Basic Software Application: Write a basic C application that utilizes the UART and GPIO.

Lab 5 - Advanced Software Writing: Use the XPS Timer and the interrupt service routine.

Lab 6 - Verification: Perform cross debug with Chipscope-Pro and GDB debugger via SDK

1. **Contact XUP**

Send an email to [xup@xilinx.com](mailto:xup@xilinx.com) for questions or comments