



Design Techniques for Lower Cost

LOWCOST-10000-8-MOD (v1.0)

Course Specification

Course Description

This course will appeal to engineers who have an interest in developing low-cost products, particularly in high-volume markets. The course and exercises cover several different design techniques, which will be interesting and challenging for any digital designer regardless of the final application.

Level – Fundamental

Course Duration – 1 day

Who Should Attend? – Engineers wanting to develop low-cost products, particularly in high-volume markets, and product designers who need to accurately estimate the size of devices required to implement products to predict costs without requiring the actual design to be implemented

Prerequisites

- An understanding of digital logic design and the concept of an FPGA
- An appreciation of VHDL and CAE design flows is beneficial, but not vital

Supported Devices

Note: No software is needed to run this workshop.

- Spartan™-3
- Spartan-II(E)

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

- Describe the features of the Spartan-II(E) and Spartan-3 devices
- Accurately estimate design size to aid in predicting product costs
- Apply design techniques that result in low-cost implementations
- Explore creative ways to use the FPGA memory resources to reduce design costs

Course Outline

- What is an FPGA?
- Spartan Family
- CLBs, Slices and BRAM
- Multiplexers
- Flip-Flop Controls
- Synchronous Timing vs. Asynchronous Timing
- Digital Clock Managers
- Dedicated Carry Logic
- Counters
- Wired Carry Gates
- Block Memory
- Distributed RAM
- FIFO
- Dual Port Memory
- PicoBlaze™ Microcontroller Processor
- State Machines
- Design Challenges

Exercises

- **Exercise 1:** Exploring the Slice
- **Exercise 2:** Logic Levels
- **Exercise 3:** Dedicated Multiplexers
- **Exercise 4:** Performance by Design
- **Exercise 5:** Clocks
- **Exercise 6:** Counters
- **Exercise 7:** Aspect Ratios
- **Exercise 8:** Replacing Logic with Block RAM
- **Exercise 9:** Distributed RAM
- **Exercise 10:** Essence of FIFO
- **Exercise 11:** Delay
- **Exercise 12:** PicoBlaze Microprocessor
- **Exercise 13:** State Machines
- **Design Challenges**
 - Rotational Trigger
 - Operation Clock
 - LED Wall Display
 - Electronic Keyboard

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Malaysia

Xilinx Education Services
Symmid Corporation Sdn. Bhd.
Unit B-G-11, Jalan SS6/20,
Dataran Glomac, Kelana Jaya, 47301 Petaling Jaya,
Selangor Darul Ehsan.
Tel : +603 7880 6040 ext Hairol-203 / Lily-106
Fax : +603 7880 6141
E-mail : register@symmid.com
Web : <http://www.symmid.com>