FPGA Design

Philip Simpson

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Best Practices for Team-based Design

Springer

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ISBN 978-1-4419-6338-3 e-ISBN 978-1-4419-6339-0
DOI 10.1007/978-1-4419-6339-0
Springer New York Dordrecht Heidelberg London

Library of Congress Control Number: 2010930598

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

In August of 2006, an engineering VP from one of Altera's customers approached Misha Burich, VP of Engineering at Altera, asking for help in reliably being able to predict the cost, schedule and quality of system designs reliant on FPGA designs.

At this time, I was responsible for defining the design flow requirements for the Altera design software and was tasked with investigating this further.

As I worked with the customer to understand what worked and what did not work reliably in their FPGA design process, I noted that this problem was not unique to this one customer. The characteristics of the problem are shared by many Corporations that implement designs in FPGAs. The Corporation has many design teams at different locations and the success of the FPGA projects vary between the teams. There is a wide range of design experience across the teams. There is no working process for sharing design blocks between engineering teams.

As I analyzed the data that I had received from hundreds of customer visits in the past, I noticed that design reuse among engineering teams was a challenge. I also noticed that many of the design teams at the same Companies and even within the same design team used different design methodologies.

Altera had recently solved this problem as part of its own FPGA design software and IP development process.

I worked with the top talent in Altera Engineering to develop a Best Practices Design methodology based upon Altera's experience and the techniques used by many customers successfully in FPGA design. The resulting methodology was presented and implemented at the customer, with great success.

Through the analysis of past customer data and feedback from customers over the last 3 years, it has become clear that this challenge exists broadly in the industry. The challenge is not specific to one specific FPGA vendor; it is an industry wide challenge.

As such, I have tuned the Best practices FPGA design methodology over the last 3 years and deployed it at several customers with great success.

This book captures the Best Practices FPGA design methodology and now makes it available to all design teams implementing system designs in FPGA devices.

San Jose, CA Philip Simpson

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1.1 Introduction

This book which describes the Best Practices for successful FPGA design is the result of meetings with hundreds of customers on the challenges facing each of their FPGA design teams. By gaining an understanding into their design environments, processes, what works, what does not work, I have been able to identify the areas of concern in implementing System designs. More importantly, it has enabled me to document a recommended methodology that provides guidance in applying a best practices design methodology to overcome the challenges.

This material has a strong focus on design teams that are across sites. The goal being to increase the productivity of FPGA design teams by establishing a common methodology across design teams; enabling the exchange of design blocks across teams.

Best Practices establishes a roadmap to predictability for implementing system designs in a FPGA.

The three steps (Fig. 1.1) to predictable results are:

1. Proper project planning and scoping
2. Choosing the right FPGA device to ensure that the right technology is available for today's and tomorrow's projects
3. Following the best practices for FPGA design development in order to shorten the design cycle and to ensure that your designs are complete on schedule and that the design blocks can be re-used on future projects with minimal effort

All three elements need work together smoothly to guarantee a successful FPGA design.

The choice of vendor should be a long-term partnership between the Companies. By sharing roadmaps and jointly managing existing projects, you can ensure that not only is the current project a success but provide the right solutions on time for future projects. A process of fine tuning based on experience working together to guarantee success on projects.

These two topics are touched upon briefly in the Best Practices for Successful FPGA Design methodology.

P. Simpson, *FPGA Design: Best Practices for Team-based Design*,
DOI 10.1007/978-1-4419-6339-0_1,