

A direct approach in the education of FPGA-Prototyping by VHDL

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The development of microelectronic circuits is dominated by two trends these days: An intense increase in design complexity with – at the same time – shorter development cycles, i.e. reduced time-to-market [1]. In combination with the fact, that many consumer products are mass market products, this leads to the fact that CPLDs, FPGAs and ASICs gain more and more importance in electronics developments. Hence, this trend needs to be reflected in today's education of skilled electronics engineers.

VHDL is one of the most common hardware description languages being used in many companies to design various types of microelectronic devices. Although VHDL as such is addressed in more and more textbooks on digital circuits (e.g. [2][3]) recently, the approach to describe VHDL and its use is often dominated by concepts and syntax of VHDL. However, in the author's opinion it is beneficial to use a "learning by doing"-approach [4], i.e. to bring the direct application of VHDL onto specific FPGAs more into the students focus instead of a well-defined theoretical approach.

This has been done with great success in a lecture on FPGA Prototyping by VHDL in summer semester 2010 at the University of Applied Sciences Kiel. Throughout this lecture, the students were challenged with several VHDL projects, they were requested to implement and verify on a XILINX Spartan 3e-Board. It is the aim of this paper to describe this direct approach in the education of FPGA Prototyping and to encourage anyone interested in this "Learning by doing"-approach to apply the same concept and ideas.

References:

- [1] "VHDL-Synthese – Entwurf digitaler Schaltungen und Systeme", Authors: Jürgen Reichardt, Bernd Schwarz, Oldenbourg Verlag, 5th edition, 2009
- [2] „Digitaltechnik – Ein Lehr- und Übungsbuch“, Authors: Roland Woitowitz, Klaus Urbanski, Springer Verlag, 5th edition, 2007
- [3] „Lehrbuch Digitaltechnik – Eine Einführung mit VHDL“, Author: Jürgen Reichardt, Oldenbourg Verlag, 2009
- [4] „FPGA Prototyping by VHDL Examples“, Author: Pong P. Chu, Wiley & Sons, 2008