Π-Ware: An Embedded Hardware Description Language using Dependent Types

Author: João Paulo Pizani Flor
<joaopizani@uu.nl>

Supervisor: Wouter Swierstra
<w.s.swierstra@uu.nl>

Department of Information and Computing Sciences
Utrecht University

Friday 22nd August, 2014

Universiteit Utrecht

Table of Contents

Introduction

Section 1

Introduction

Hardware Design

- ▶ Hardware acceleration has growing applicability
- ▶ Implementing algorithms in hardware is *harder*
  - · Intel FDIV

Hardware Description Languages

- *De facto* industry standards: VHDL and Verilog
- Were intended for *simulation*, not modelling or synthesis
    - *Unsynthesizable* constructs
    - Widely variable tool support

Universiteit Utrecht

Functional Programming

- Easier to *reason* about program properties
- Inherently *parallel* and *stateless* semantics
  - In contrast to imperative programming

Universiteit Utrecht

Functional Hardware Description

- A functional program describes a circuit
- Several *functional* HDLs during the 1980s
- For example, FP [Sheeran, 1984]

Universiteit Utrecht

Background

Lorem ipsum...

Universiteit Utrecht

Π-Ware

Lorem ipsum...

Conclusion

Lorem ipsum…

Universiteit Utrecht

Future work

Lorem ipsum...

Thank you!

Questions?

References I

📄 Sheeran, M. (1984).
MuFP, a language for VLSI design.
In *Proceedings of the 1984 ACM Symposium on LISP and Functional Programming*, LFP '84, pages 104–112, New York, NY, USA. ACM.