Chip Specification Brief Overview

CECS 460

What is a Chip Specification?

- Design team creates the “official document” for the SOC/Chip design
- It contains all of the information that one would need to know in order to include the SOC/Chip into a design
- The information needs to address several areas:
  - The physical characteristics (package type, pin count, pin out, current requirements, etc.)
  - The hardware implementation (what does the chip contain, what can one do with it, etc.)
  - The software interface (how does one program the device, what are the register addresses/contents)

Chip Specification in 460

- The goal of 460 is to produce an SOC (chip design)
- We write our own IP (AISO, UART, etc.)
- We instantiate commercially available IP (PicoBlaze)
- We interface to external devices (memory)
- The Chip Spec is the final deliverable for your work this semester and should be prepared with care
- It should document the design through the work you have accomplished.

Examples

- For the LPC2148 the chip specification is the UM10139 document (the more functionality contained within a device the more information needs to be included in the specification)

- For the Spartan-3E FPGA there is the Spartan-3 Generation FPGA User Guide

- Every device meant for public consumption must have a well written chip specification. This will enable the users to quickly integrate the device into their own designs with as little confusion as possible

Our Class

- I worked for a company, Valence Semiconductors (now defunct), that needed a clear methodology documented for the engineering organization

- We produced a Chip Specification Template that has been placed in the lectures folder on BeachBoard.

- This is for reference only - there is way too much information required that we will not need to document

- The next page will outline the contents of our chip spec that will be expected to be included

Valence SEMICONDUCTOR

Chip Specification Template

Verilog Source Code

- The chip specification should thoroughly define the design of the chip as a written document

- The reader should understand what are the components of the design and what the purpose of each is

- The Verilog is for reference and should be included as an organized appendix

- The assembly code is also for reference and should also be included as an organized appendix

- The assembly code should be thoroughly described under the banner of “software”

Chip Spec Outline

I. Introduction
II. Documents
    A. Applicable External Documents
    B. Applicable Internal Documents
III. Requirements
IV. Top Level Design
    A. Description
    B. Block Diagram
    C. Data Flow Description
    D. I/O
        1. Signal Names
        2. Pin Assignments
        3. Electrical Characteristics
    E. Clocks
    F. Resets
    G. Software
V. Externally Developed Blocks
    A. Description
    B. Block Diagram
    C. I/O
    D. Register Map
VI. Internally Developed Blocks
    A. Description
    B. Block Diagram
    C. I/O
    D. State Machines
    E. Register Map
    F. Verification
VII. Chip Level Verification
VIII. Chip Level Test