Chip Specification
Brief Overview

CSULB
CECS 460

What is a Chip Specification?

- The design team creates the "official document" for the SOC/Chip design
- It contains all 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 (TramelBlaze)
- We interface to 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 that you have accomplished
- You should do your best to follow the recommended format

Examples

- For the LPC2148 the chip specification is the UM10139 document (the more functionality contained within a device the more information that needs to be included in the specification)
- For the Artix 7 FPGA there is the Artix 7 users 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

Chip Spec Components

- The chip specification should thoroughly define the design of the chip as a written document
- The reader should understand what wre the components of the design, what the purpose of each is, and how the information flows together
- The Verilog code is for reference and should be included as and organized appendix - keep the flow clear
- The assembly code should also be included in the appendix but should be thoroughly described under the banner of “software”

Format

- The document should have a table of contents identifying which page number each item may be found on
- This means that every page must have a page number
- Do your best to make it a professional looking document

Due Date

- The project due date will be defined as the last day of class. My desire is that no one works on the project during finals
- The Chip Spec will be due at the beginning of the final exam

Chip Specification 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