Lab 2 Intro

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Lab 2 Intro

- Goal: Walk through most of the Digital Logic design process
  - Create, Simulate, Implement, and Validate a design
    - Using Quartus for Design Capture and Simulation
    - Implement and Validate using the DE10 FPGA
  - Why does the goal say 'most'
    - In this lab we are not truly creating a design, we are just copying an already designed schematic
  - At this point in the class – you are not expected to understand the logic design you are implementing

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- Project:
  - Quartus uses projects to collect all of the files associated with a design
- Schematic:
  - A schematic is a graphical representation of a design
    - Uses standard symbols to represent electronic Components (parts)
    - Components are connected through Wires
    - External connections are implemented with Pins
- Simulation:
  - A simulation is a computer program used to test your design before you commit it to hardware
    - Your design is converted to a mathematical model (synthesized)
    - You provide a series of input waveforms and the simulator provides associated output values

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- Implement:
  - Create a hardware based version of your design
    - This could involve a breadboard, IC components and jumper wires
    - This could be done using a configurable piece of hardware (FPGA)
    - Inputs can be connected to: wires to VDD and Gnd, an Analog Discovery waveform output, built in switches, …
    - Outputs can be viewed with: an Analog Discovery scope or voltmeter, built in LEDs, …
- Validate:
  - Compare the actual results to the expected results

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- Process
  - Create a new Project - Lab2_Part1
    - Follow the directions in the Quartus Project Setup slides
    - Show your professor your Quartus project before proceeding
  - Create a new Schematic for part 1
    - Use the Lab2 Multiplexer Schematic
      - Note: this is identical to the Capture_Demo schematic
    - Yours should be called lab2_mux_sch.bdf
    - Follow the directions in the Schematic Generation slides
  - Simulate your schematic (design)
    - Follow the directions in the Schematic Simulation via University Waveform Viewer slides
      - Use the design name (lab2_mux_sch_vwf.vwf)
      - You will need to reference the University Waveform Viewer – Input Setup slides to create your input waveforms
  - Validate your schematic (design)
    - Follow the directions in the Schematic to DE10 slides
      - Demo your working design
  - Repeat for the Lab2 Mystery Schematic

Lab 2 Intro

- DE10 Lite
  - The DE10 Lite device is a re-configurable piece of hardware that can implement your logic without you needing to wire up a breadboard
  - It includes additional components to exercise (test) your logic
    - We will use switches and buttons as inputs
    - We will use LEDs as outputs
  - Refer to the DE10 Lite User Manual for more details

*** NEVER handle your DE10 Lite board by the bottom ***

This can cause it to fail to work

Always handle it by the edges