

Simulation and Synthesis of a Stored Program Computer Architecture

- Simulate an example program for PicoBlaze
- Write a PicoBlaze assembly language program to perform hexadecimal to 7-segment display conversion
- Simulate, debug, and verify the operation of your design
- Download, debug and verify the operation of your program on the Spartan 3 FPGA

PicoBlaze Microcontroller

- Pre-Lab exercise:
 - Read the PicoBlaze User's Guide Chapters 10-12 (19 pages)
 - Read the PicoBlaze tutorial (3 pages)
 - Study PicoBlaze architecture and instruction set
 - Write an assembly language program for PicoBlaze to implement a hexadecimal to 7-segment decoder with
 - HEX input IN_PORT
 - 7-segment data on OUT_PORT

PicoBlaze Microcontroller

- Lab exercise:
 - Download & extract the PicoBlaze.zip file from class web page
 - Simulate tutorial.psm program using pBlazeIDE and assemble program using KCPSM2
 - Synthesize and download PicoBlaze with assembled tutorial.psm program with input port connected to switches and output port connected to LEDs
 - Record the number of slices from the synthesis report
 - Demonstrate synthesized circuitry to GTA
 - Simulate and debug your PicoBlaze program for hex-to-7segment decoder via pBlazeIDE
 - Assemble, synthesize, and download your PicoBlaze based decoder on Spartan 3 PCB
 - Demonstrate synthesized circuitry to GTA
- Note: increasing the number of “output” instructions will increase the brightness of the display

PicoBlaze Microcontroller

Post-lab assignment:

- Lab report should include:
 - A description of your assembly language program and how it works
 - Your PicoBlaze program(s) should be included
 - A description of the design verification simulation you did
 - A discussion of the synthesis, and download to the FPGA
 - What went right and wrong in your design and program
- Lab report is due at beginning of the next lab session