18-545 Lab 1 writeup
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1. FPGA choice and programming tools

We selected a Zynq-7000-based ZedBoard unit for our project due to the combination of its fairly high-end FPGA capabilities (useful for an experimental, architecture-oriented project), its wide range of peripheral options and FPGA-accessible controller units, and the partial-reconfiguration possibilities afforded due to the presence of dedicated ARM processing cores on-chip (should our project goals pivot or if we have extra time to experiment late in the semester). The programming tools, therefore, include the Xilinx toolchain i.e. Vivado (and perhaps its attached SDK).

2. Xilinx support forum information

Pete username: wpehrett
Brian username: brianjac
Amanda username: amarano94
Link to question: https://forums.xilinx.com/t5/Zynq-All-Programmable-SoC/Zynq-multicore-using-self-written-core/td-p/654646

3. Simple input-process-output system

For this part, we created a simple Verilog design to process switch input in blocks of 4 switches and display a result on the LEDs. LED[7:4] displays the XOR of SW[7:4] and SW[3:0], while LED[3:0] displays the AND of SW[7:4] and SW[3:0].

We encountered no significant issues in this part, although we did learn that the ZedBoard has two separate mini-USB connectors for computer interfacing. J14 provides COM control of the built-in Linux shell on the ZedBoard's SD card, but J17 is the port actually used to program the FPGA device.

4. Onboard LCD module

The ZedBoard's onboard Linux distro includes special scripts for manipulating the OLED display. unload_oled turns off the display, load_oled turns it back on, and by writing a particular file format to /dev/zed_oled, each of the 4096 pixels (128x32) can be individually written.

The display is monochrome; therefore, the file format defines 1 bit per pixel. Each individual byte is written vertically, and the bytes progress through four lines from right-to-left, top-to-bottom on the OLED.

The OLED can also be controlled with serial data from the FPGA; as we do not intend to use the OLED in our project, though, we did not test this functionality.

5. Other toolchain information

All sources and documentation will be kept in GitHub. Documentation will primarily be in plaintext files, although more complex formats (Word, PDF, LaTeX, etc.) will be used as needed.

Schedule plans are TBD, and will be discussed at greater length in next week's status report.