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Lab # 1 Report

Summary:

1. Expriment # 1: We implemented a simple inverter that takes the logic from a switch on the Nexys 7 A7 board and inverts it. We know the output by mapping the output of the Verilog module to an led. The led lights up when the switch is off and dims when the switch is on.
2. Experiment # 2: We implemented a driver for one of the 4-digit 7-segment displays on the board. Since all the digits share the same cathode pins, we must activate each digit alone, then activate the one next to it. We do this in a rotational pattern. We reduce flickering by reducing the 100 MHz internal clock of the board to 95 Hz. This is done by using dividing the internal clock by using a 20 bit counter. We can then activate each digit for a period of 2.6 ms by using the 2 MSB of the 20 bit counter. We change the active digit as soon as the 2 MSB change. The input for the module consists of the following:
   1. CLK100MHZ: internal clock of the board
   2. SW: 13 bit number that we can change by toggling each bit using 13 of the switches on the board
   3. AN: 4 bit number that chooses which anode to activate
   4. SEG: 7 bit number that chooses which segments on the digit to activate

The variable used are as follows:

1. LED\_BCD: 4 bit number that represents the digit between 0 and 9 to be displayed.
2. Refresh\_counter: 20 bit number that is used to divide the clock and change anodes activated.
3. LED\_activating\_counter: 2 MSBs of refresh\_counter.

The digits from the 13 bit number were extracted using the division and modulus operators in this experiment.

Results: Code worked as expected, we used the switches to toggle the number that should be displayed on the display and it changed accordingly.

1. Experiment # 3: In this experiment, we implemented the same thing as experiment 2 but we used a different method to extract the digits of the number. We used the shift and add 3 algorithm. We copied the code for