Laboratory Exercise 4

This is an exercise in using registers and counters.

Part I

We wish to display the hexadecimal value of a 16-bit number A on the four 7-segment displays, $HEX7-4$, We also wish to display the hex value of a 16-bit number B on the four 7-segment displays, $HEX3-0$. The values of A and B are inputs to the circuit which are provided by means of switches SW_{15-0}. This is to be done by first setting the switches to the value of A and then setting the switches to the value of B; therefore, the value of A must be stored in the circuit.

1. Create a new project which will be used to implement the desired circuit on the Altera DE2 board.
2. Write a Verilog file that provides the necessary functionality.
3. Include the Verilog file in your project and compile the circuit.
4. Assign the pins on the FPGA to connect to the switches and 7-segment displays, as indicated in the User Manual for the DE2 board.
5. Recompile the circuit and download it into the FPGA chip.
6. Test the functionality of your design by toggling the switches and observing the output display.

Part II

Design and implement a circuit that successively flashes digits 0 through 9 on the 7-segment display $HEX0$. Each digit should be displayed for one second. Use a counter to determine the one-second intervals. The counter should be incremented by the 50-MHz clock signal provided on the board.

Part III

Design and implement a circuit that displays the word HELLO, in ticker tape fashion, on the eight 7-segment displays $HEX7-0$. Make the letters move from right to left in intervals of one second.