

- For full credit, turn in a copy of your code to the instructor and demo its operation.

1. Create a VHDL circuit that has a single bit input (**a**) of type `std_logic`, and a 8-bit bus output (**b**) of type `std_logic_vector`. The 8-bit output bus should have the initial state of zero. The circuit is to act as an “incrementer”, that is; each time the input bit switches from low to high, the output should increment its value by one. So, the first time **a** goes high, **b** should output “00000001”. Implement this code on a FPGA board, where you set the value of **a** from a button, and where you represent the binary value using the 8 LEDs. Hint: As we discussed in the fourth class, Spartan-3 buttons are not debounced, so you will have to find a way to work around it.

Extra-credit:

2. Using the 8 switches on our FPGA boards you can encode a binary number. Using our boards, find a way to represent those binary numbers and display the decimal equivalent in the seven segment displays. For example, if the switches are all down, then a “0000” must be displayed in the seven segment display. However, if all digits are all up, then the value to be displayed must be “0255”.