

The George Washington University
Department of Electrical and Computer Engineering
ECE 2140: Design of Logic Systems I

Experiment 14

Equipment and Parts Required

- ♣ Digilent Basys (or Basys2) FPGA Board
 - If you have a **Basys** board, refer to this datasheet:
http://digilentinc.com/Data/Products/BASYS/BASYS_E_RM.pdf (pins on Page 11, make sure your frequency select jumper (blue) is set to 25 MHz)
 - If you have a **Basys2** board, refer to this datasheet:
http://www.digilentinc.com/Data/Products/BASYS2/Basys2_rm.pdf (pins on Page 11)
- ♣ Xilinx ISE software

Procedure

1 Counter

Build a counter that increments each time a button is pressed on the FPGA board. Use the LEDs to display the result. Hint: Use a switch as the En and Rst inputs, a button as the Clk input, and the LEDs for the Count output.

Note that when trying to run “Implement Top Module”, you will get an error about not setting the clock to the designated clock pin on the board. To avoid this error, add the project_name.ucf file located in the same folder where your project_name.v file is stored, and add this line to it:

NET "Clk" CLOCK_DEDICATED_ROUTE = FALSE;

```
module counter(
    input En,           // notice the declaration of all inputs, outputs, and regs here ...
    input Rst,
    input Clk,
    output reg [1:0] Count
);
    // ... rather than on this line here

always @ (posedge Clk)
begin
    if (Rst)
        Count <= 0;
    else if (En) begin
        Count <= Count + 1;
    end
end
endmodule
```

2 Timer

Design a timer that blinks a LED every 1 second when SW0 is on. You will need to use a counter that counts the number of clock ticks in each second. Hint: the built-in clock frequency is 25 MHz.