

## LAB6 - Barrel Shifter

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This lab6 is about designing a Barrel Shifter that has multiple functions of mode(auto/manual), load, rotation/shift, left/right, and etc... by instantiation using vivado software and test the results with FPGA board.

	15 SW	14 SW	13 SW	12 SW	11 SW	10 SW	9 SW	8 SW
1	auto	load	rotate	left	4 input			
0	manual		shift	right				

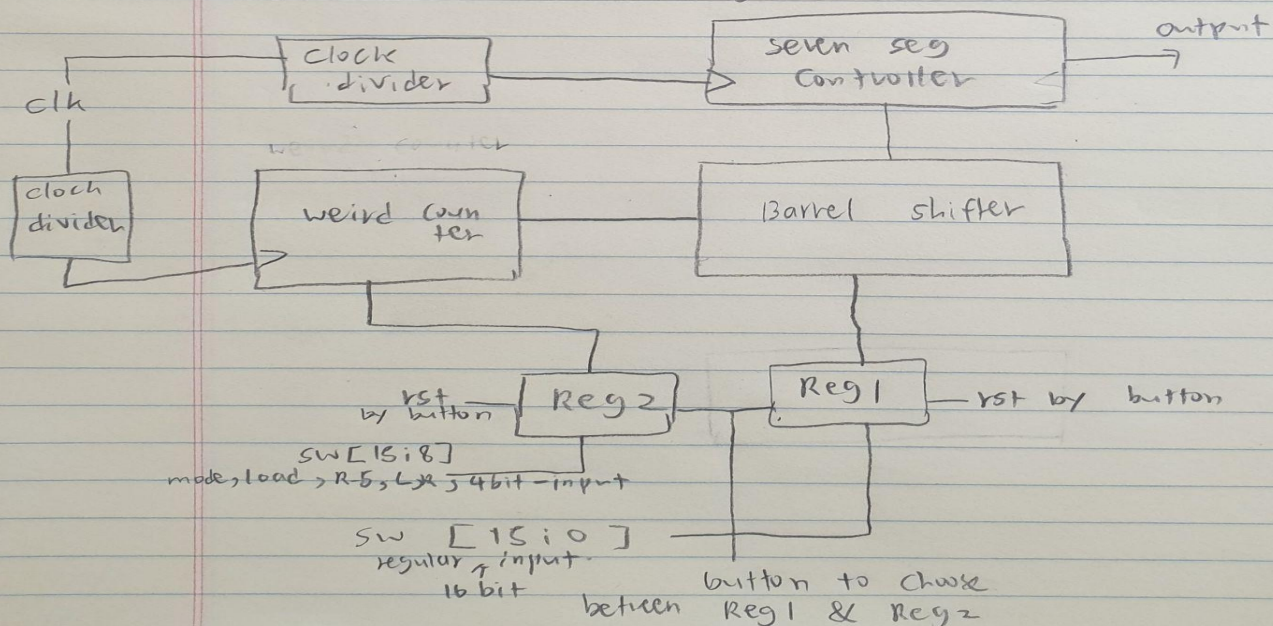
SW 16 ~ 0  $\Rightarrow$  regular [16:0] input  $\Rightarrow$  Reg1

left LED  $\Rightarrow$  shows if we are in Reg1 or Reg2 (LED on) (LED off)

left button  $\Rightarrow$  pressed  $\Rightarrow$  Reg1  
not pressed  $\Rightarrow$  Reg2

middle button  $\Rightarrow$  reset reg1

right button  $\Rightarrow$  reset reg2



1) n-bit register module was created to be able to save the data and used for any amount of bit I need to use for later instantiation

(input clk, input [SIZE-1:0] in, input en, input rst, output reg [SIZE-1:0] out)

2) weird\_4bit\_counter module was created, as it was explained, it controls mode, load and 4 bit input and saves data into register2. In past 2 labs, I have been using refresh counter module to divide the clock, this time, following the lecture example of clock divider

(input clk, input autoORmanual, input load, input [3:0] in, output reg [3:0] out)

3) nbit\_barrelshifter module was created to have logic of left/right rotation and left/right shift.

(input RorS, input LorR, input [\$clog2(SIZE)-1:0] howmany, input [SIZE-1:0] in, output reg [SIZE-1:0] out)

4) seven\_seg\_controller module was created to control the output for seven\_seg. This was basically reused code from past 2 labs.

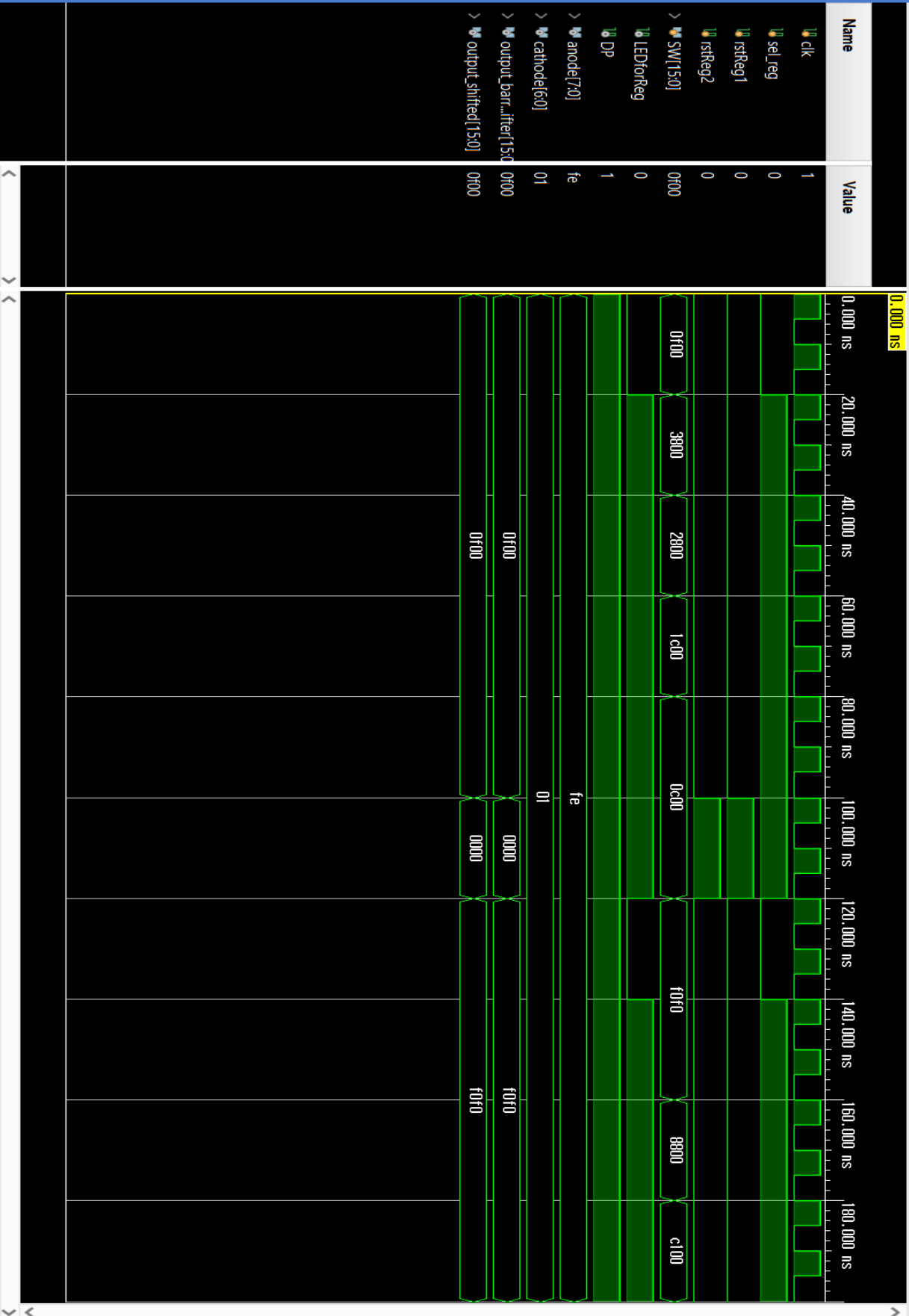
(input clk, input [15:0] in, output DP, output reg [7:0] anode, output reg [6:0] cathode)

5) top module was created to connect everything together.

(input clk, input rstReg1, input rstReg2, input sel\_reg, input [15:0] SW, output LEDforReg, output DP, output [7:0] anode, output [6:0] cathode)

6) top.xdc file was created and connected to the correct ports.

7) simulation was performed,



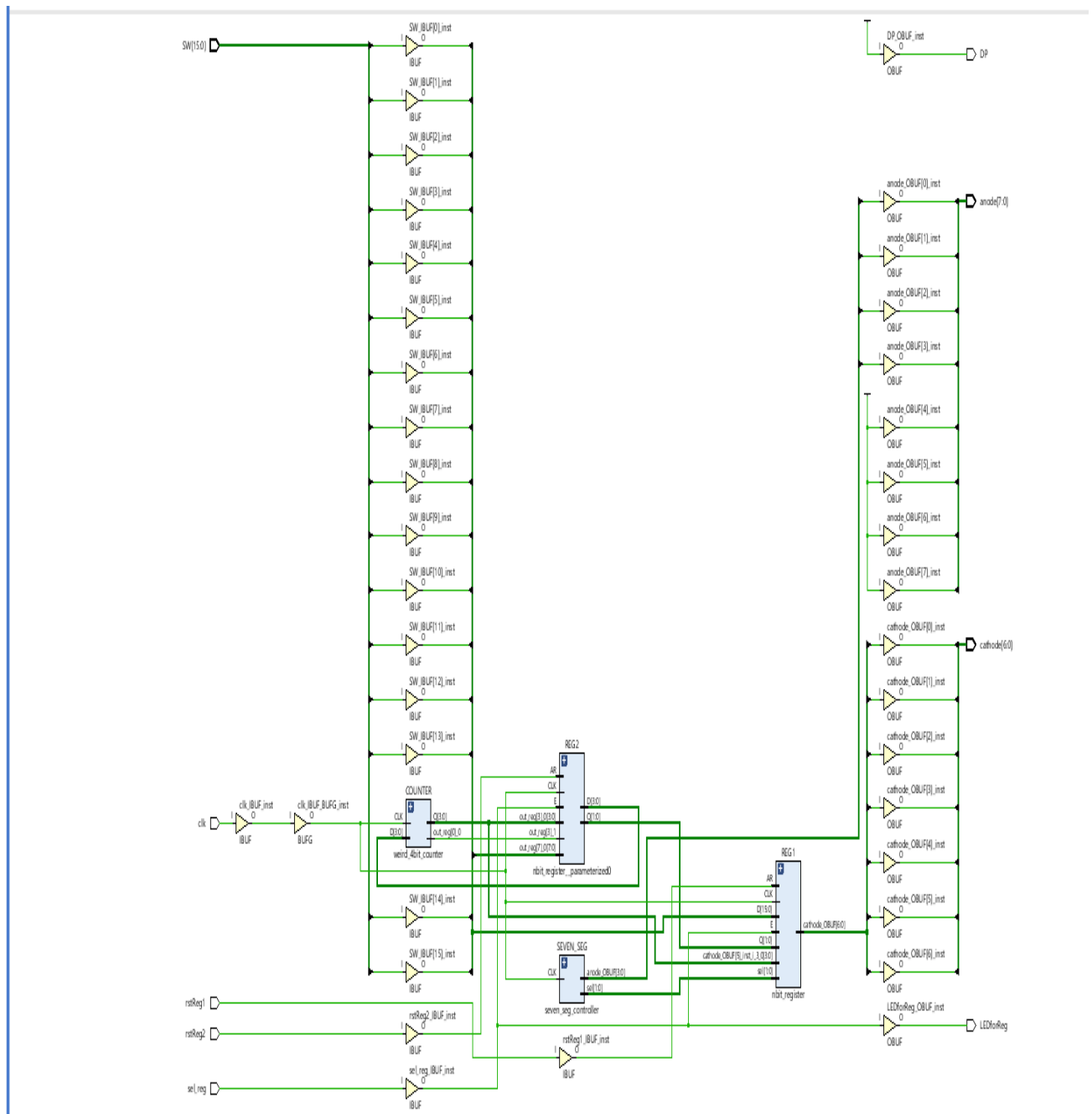
Video link:

<https://youtu.be/nYmKyMC1K2k>

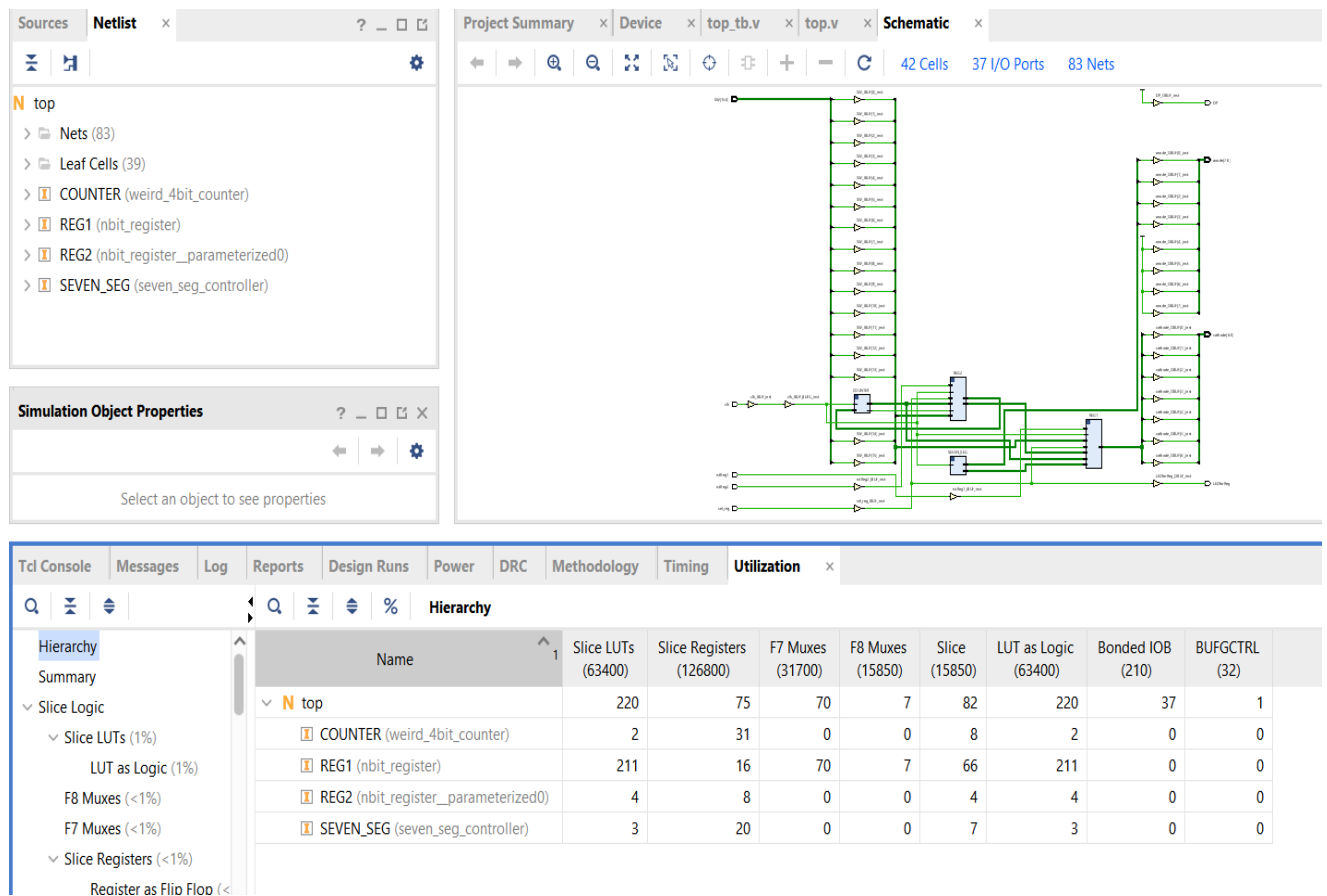
or

[https://drive.google.com/file/d/1pFKh9gAu\\_zoc07pPiJ2JiMsee6YaX43e/view?usp=sharing](https://drive.google.com/file/d/1pFKh9gAu_zoc07pPiJ2JiMsee6YaX43e/view?usp=sharing)

### Elaborated Design:



## Utilization:



## Power report:

