

ECE3300L

Summer 2025 Semester

Lab 1

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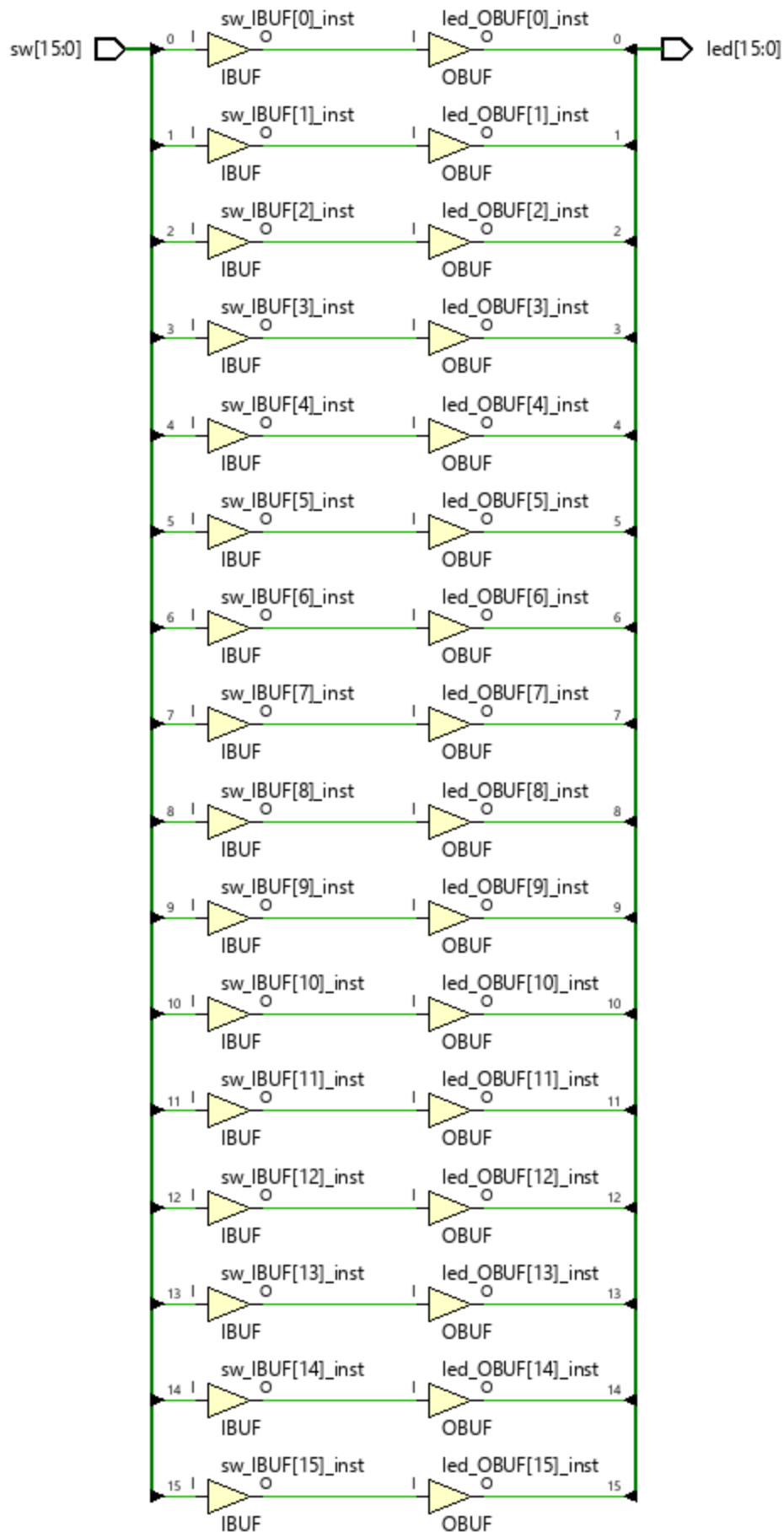
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For the first lab, we were given code to control the switches and leds on the Artix7 100T. This lab was more focused on understanding how to set up the code and the software, specifically parts such as running synthesis and uploading the bitstream to the board. The code given was:

```
module Switch_LED(  
input wire [15:0] sw,  
output wire [15:0] led  
);  
assign led = sw;  
endmodule
```

With this code we could run the synthesis which resulted in a LUT of:



The LUT looks correct, where we see every switch was mapped to one led. Now we could try to upload to the board, but first we had to set up our xdc file in order for the board to understand which switches and leds we are using and referencing in the code. The xdc file was edited to show:

```
set_property -dict { PACKAGE_PIN J15  IOSTANDARD LVCMOS33 } [get_ports { sw[0] }];
#IO_L24N_T3_RS0_15 Sch=sw[0]
set_property -dict { PACKAGE_PIN L16  IOSTANDARD LVCMOS33 } [get_ports { sw[1] }];
#IO_L3N_T0_DQS_EMCCLK_14 Sch=sw[1]
set_property -dict { PACKAGE_PIN M13  IOSTANDARD LVCMOS33 } [get_ports { sw[2] }];
#IO_L6N_T0_D08_VREF_14 Sch=sw[2]
set_property -dict { PACKAGE_PIN R15  IOSTANDARD LVCMOS33 } [get_ports { sw[3] }];
#IO_L13N_T2_MRCC_14 Sch=sw[3]
set_property -dict { PACKAGE_PIN R17  IOSTANDARD LVCMOS33 } [get_ports { sw[4] }];
#IO_L12N_T1_MRCC_14 Sch=sw[4]
set_property -dict { PACKAGE_PIN T18  IOSTANDARD LVCMOS33 } [get_ports { sw[5] }];
#IO_L7N_T1_D10_14 Sch=sw[5]
set_property -dict { PACKAGE_PIN U18  IOSTANDARD LVCMOS33 } [get_ports { sw[6] }];
#IO_L17N_T2_A13_D29_14 Sch=sw[6]
set_property -dict { PACKAGE_PIN R13  IOSTANDARD LVCMOS33 } [get_ports { sw[7] }];
#IO_L5N_T0_D07_14 Sch=sw[7]
set_property -dict { PACKAGE_PIN T8   IOSTANDARD LVCMOS18 } [get_ports { sw[8] }];
#IO_L24N_T3_34 Sch=sw[8]
set_property -dict { PACKAGE_PIN U8   IOSTANDARD LVCMOS18 } [get_ports { sw[9] }];
#IO_25_34 Sch=sw[9]
set_property -dict { PACKAGE_PIN R16  IOSTANDARD LVCMOS33 } [get_ports { sw[10] }];
#IO_L15P_T2_DQS_RDWR_B_14 Sch=sw[10]
set_property -dict { PACKAGE_PIN T13  IOSTANDARD LVCMOS33 } [get_ports { sw[11] }];
#IO_L23P_T3_A03_D19_14 Sch=sw[11]
set_property -dict { PACKAGE_PIN H6   IOSTANDARD LVCMOS33 } [get_ports { sw[12] }];
#IO_L24P_T3_35 Sch=sw[12]
set_property -dict { PACKAGE_PIN U12  IOSTANDARD LVCMOS33 } [get_ports { sw[13] }];
#IO_L20P_T3_A08_D24_14 Sch=sw[13]
set_property -dict { PACKAGE_PIN U11  IOSTANDARD LVCMOS33 } [get_ports { sw[14] }];
#IO_L19N_T3_A09_D25_VREF_14 Sch=sw[14]
set_property -dict { PACKAGE_PIN V10  IOSTANDARD LVCMOS33 } [get_ports { sw[15] }];
#IO_L21P_T3_DQS_14 Sch=sw[15]

## LEDs
set_property -dict { PACKAGE_PIN H17  IOSTANDARD LVCMOS33 } [get_ports { led[0] }];
#IO_L18P_T2_A24_15 Sch=led[0]
set_property -dict { PACKAGE_PIN K15  IOSTANDARD LVCMOS33 } [get_ports { led[1] }];
#IO_L24P_T3_RS1_15 Sch=led[1]
```

```

set_property -dict { PACKAGE_PIN J13  IOSTANDARD LVCMOS33 } [get_ports { led[2] }];
#IO_L17N_T2_A25_15 Sch=led[2]
set_property -dict { PACKAGE_PIN N14  IOSTANDARD LVCMOS33 } [get_ports { led[3] }];
#IO_L8P_T1_D11_14 Sch=led[3]
set_property -dict { PACKAGE_PIN R18  IOSTANDARD LVCMOS33 } [get_ports { led[4] }];
#IO_L7P_T1_D09_14 Sch=led[4]
set_property -dict { PACKAGE_PIN V17  IOSTANDARD LVCMOS33 } [get_ports { led[5] }];
#IO_L18N_T2_A11_D27_14 Sch=led[5]
set_property -dict { PACKAGE_PIN U17  IOSTANDARD LVCMOS33 } [get_ports { led[6] }];
#IO_L17P_T2_A14_D30_14 Sch=led[6]
set_property -dict { PACKAGE_PIN U16  IOSTANDARD LVCMOS33 } [get_ports { led[7] }];
#IO_L18P_T2_A12_D28_14 Sch=led[7]
set_property -dict { PACKAGE_PIN V16  IOSTANDARD LVCMOS33 } [get_ports { led[8] }];
#IO_L16N_T2_A15_D31_14 Sch=led[8]
set_property -dict { PACKAGE_PIN T15  IOSTANDARD LVCMOS33 } [get_ports { led[9] }];
#IO_L14N_T2_SRCC_14 Sch=led[9]
set_property -dict { PACKAGE_PIN U14  IOSTANDARD LVCMOS33 } [get_ports { led[10] }];
#IO_L22P_T3_A05_D21_14 Sch=led[10]
set_property -dict { PACKAGE_PIN T16  IOSTANDARD LVCMOS33 } [get_ports { led[11] }];
#IO_L15N_T2_DQS_DOUT_CSO_B_14 Sch=led[11]
set_property -dict { PACKAGE_PIN V15  IOSTANDARD LVCMOS33 } [get_ports { led[12] }];
#IO_L16P_T2_CSI_B_14 Sch=led[12]
set_property -dict { PACKAGE_PIN V14  IOSTANDARD LVCMOS33 } [get_ports { led[13] }];
#IO_L22N_T3_A04_D20_14 Sch=led[13]
set_property -dict { PACKAGE_PIN V12  IOSTANDARD LVCMOS33 } [get_ports { led[14] }];
#IO_L20N_T3_A07_D23_14 Sch=led[14]
set_property -dict { PACKAGE_PIN V11  IOSTANDARD LVCMOS33 } [get_ports { led[15] }];
#IO_L21N_T3_DQS_A06_D22_14 Sch=led[15]

```

We had to modify the names of the switch and led as they were originally SW and LED, but in our code we reference them as sw and led. Leaving it as it was originally caused issues as the board did not know what we were referencing.

Once this was all set up, we can program it to the board and the result was that each of the 16 switches when switched on would result in the corresponding led to turn on. This can be seen in our demo video which we linked at the bottom of the report.

In conclusion, even though we were given the code, this lab was still important in understanding how to use the board and understanding different functions in the software such as running synthesis and the resulting schematic that we can use to troubleshoot our code. It was also important to learn how to actually upload our program into the board as we will have to do that for the rest of the class. Overall, we are confident in our basic understanding of this first lab.

Youtube link: <https://youtu.be/VtE164iUIQI>

