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-- Name: Chris Coulston

-- Date: Jan 10, 2015

-- File: lec3.vhdl

-- HW: Lecture 3

-- Crs: ECE 383

-- Purp: Illustrate difference between unsigned and signed operations

-- Documentation: No help, I based this off the class notes and readings.

-- Academic Integrity Statement: I certify that, while others may have

-- assisted me in brain storming, debugging and validating this program,

-- the program itself is my own work. I understand that submitting code

-- which is the work of other individuals is a violation of the honor

-- code. I also understand that if I knowingly give my original work to

-- another individual is also a violation of the honor code.

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library IEEE;

use IEEE.std\_logic\_1164.all;

use IEEE.NUMERIC\_STD.ALL;

entity lec3 is

 port( au, bu: in unsigned(3 downto 0);

 cu,du,su: out unsigned(3 downto 0);

 as, bs: in signed(3 downto 0);

 cs,ds,ss: out signed(3 downto 0));

end lec3;

architecture structure of lec3 is

begin

 cu <= "1000" when (au > bu) else

 "0110" when (au = bu) else

 "0001";

 su <= au + bu;

 du <= au - bu;

 cs <= "1000" when (as > bs) else

 "0110" when (as = bs) else

 "0001";

 ss <= as + bs;

 ds <= as - bs;

end structure;

Unsigned

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A | B | Value A | Value B | A >? B | A =? B | A <? B | A + B | A - B |
| 0010 | 0100 |  |  |  |  |  |  |  |
| 1011 | 0001 |  |  |  |  |  |  |  |
| 0110 | 1010 |  |  |  |  |  |  |  |
| 0111 | 1000 |  |  |  |  |  |  |  |

Signed

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A | B | Value A | Value B | A >? B | A =? B | A <? B | A + B | A - B |
| 0010 | 0100 |  |  |  |  |  |  |  |
| 1011 | 0001 |  |  |  |  |  |  |  |
| 0110 | 1010 |  |  |  |  |  |  |  |
| 0111 | 1000 |  |  |  |  |  |  |  |

Page 18-19 from: **Nexys Video™ Board Reference Manual**



# This is slide switch SW0 #IO\_L22P\_T3\_16 Sch=sw[0]

set\_property -dict { PACKAGE\_PIN E22 IOSTANDARD LVCMOS12 } [get\_ports { a }];

# This is slide switch SW1 #IO\_25\_16 Sch=sw[1]

set\_property -dict { PACKAGE\_PIN F21 IOSTANDARD LVCMOS12 } [get\_ports { b }];

# This is slide switch SW2 #IO\_L24P\_T3\_16 Sch=sw[2]

set\_property -dict { PACKAGE\_PIN G21 IOSTANDARD LVCMOS12 } [get\_ports { c }];

# This is LED Led(0) #IO\_L15P\_T2\_DQS\_13 Sch=led[0]

set\_property -dict { PACKAGE\_PIN T14 IOSTANDARD LVCMOS25 } [get\_ports { f }];