Class:	CPE-300L	Semester:	Spring 2020

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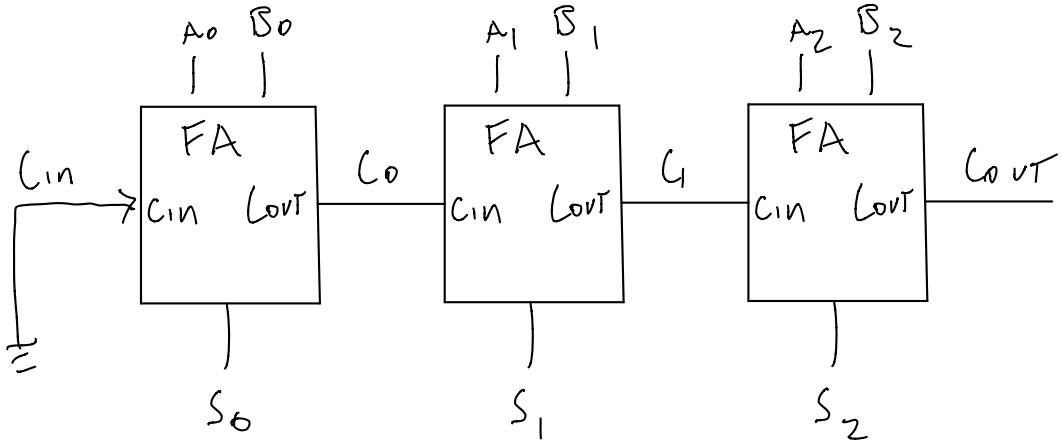
Instructor's comments:

Introduction / Theory of operation

- For lab experiment #3 we will be getting familiar with ModelSim and its software for testbenches. We will also be reviewing and designing combinational circuits. Some of the circuits being designed are Ripple adder, ALU, implementing 7-seg on DE2 board, and Comparator.

Prelab main content

1. 3-bit ripple carry adder



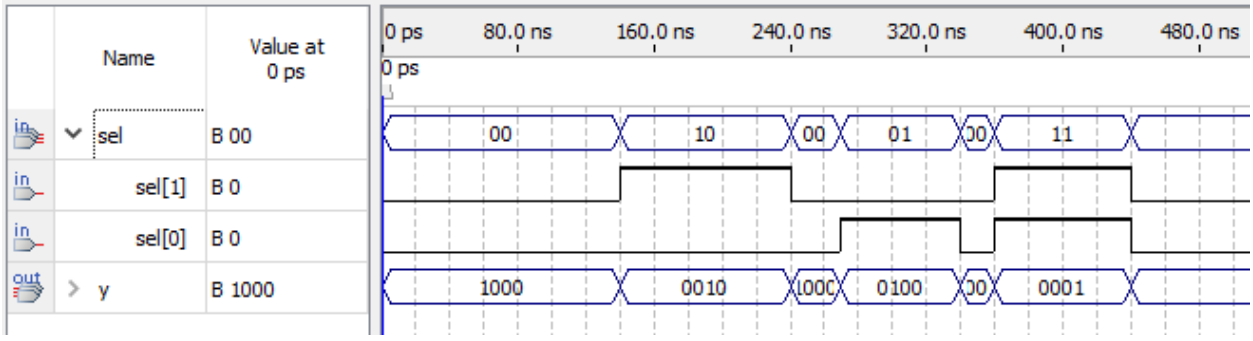
2. Decoder of

a	b	y_1	y_2	y_3	y_4
0	0	1	0	0	0
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	1

- Code

```
1   module decoder(sel, y);
2      input[1:0] sel;
3      reg[3:0] y;
4      output [3:0] y;
5      always@(*)
6      case(sel)
7      2'b00: y = 4'b1000;
8      2'b01: y = 4'b0100;
9      2'b10: y = 4'b0010;
10     2'b11: y = 4'b0001;
11     endcase
12  endmodule
13
```

- Waveform

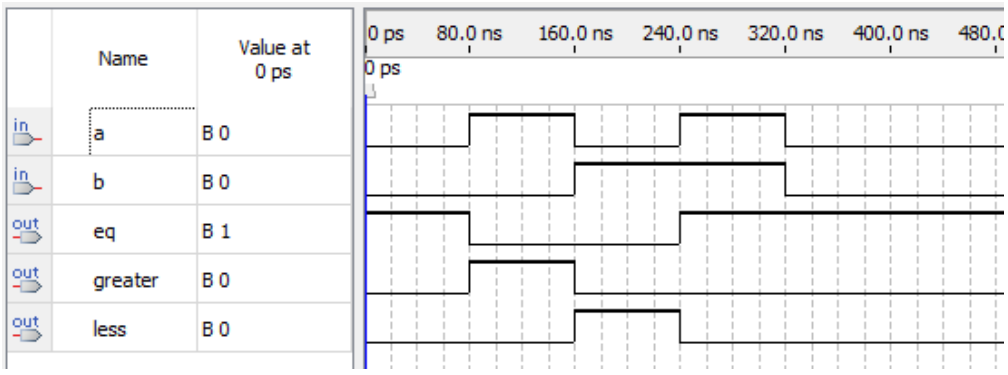


3. Magnitude Comparator

- Code

```
module Compare(a,b,less,eq,greater);
    input a, b;
    output less, eq, greater;
    wire x1, x2;
    not N1(x1,a);
    not N2(x2,b);
    and A1(less, x1, b);
    and A2(greater, x2, a);
    xnor F1(eq, a, b);
endmodule
```

- Waveform



4. Completed Altera ModelSim Tutorial