

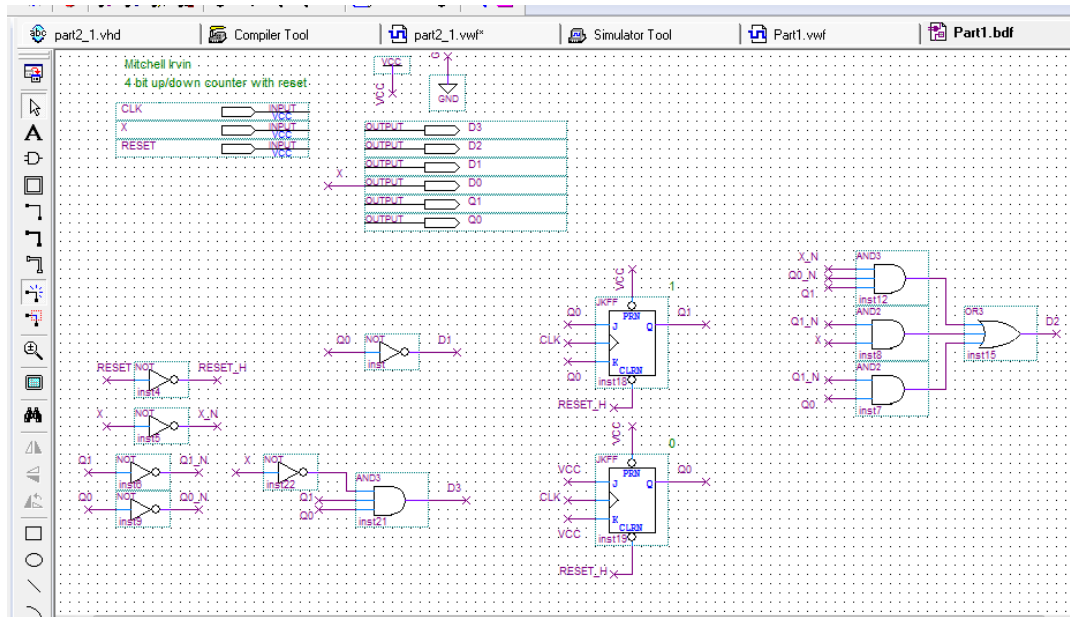
Lab 7 Summary
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Section 7441
3/18/16

PART 1

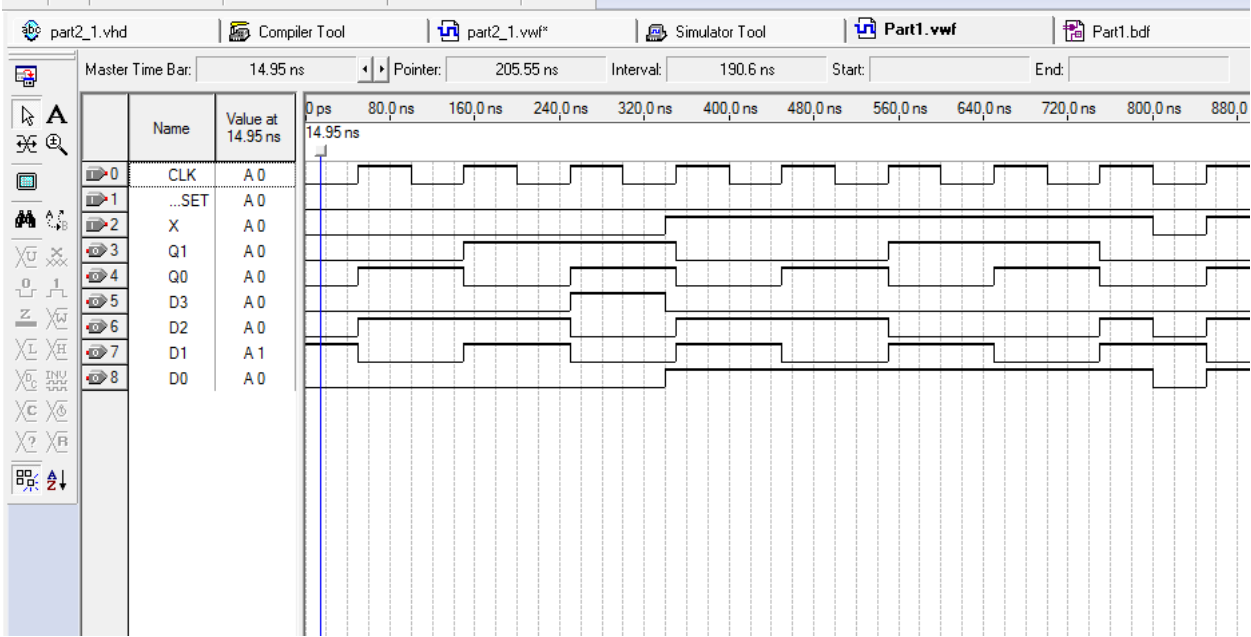
R	X	Q ₁	Q ₀	D ₃	D ₂	D ₁	D ₀	
0	0	0	0	0	0	1	0	$D_0 = X$
0	0	1	0	0	1	0	0	$D_1 = \bar{Q}_0$
0	1	0	0	0	1	1	0	$D_2 = \bar{X}\bar{Q}_0Q_1 + \bar{Q}_1X + \bar{Q}_1Q_0$
0	1	1	0	1	0	0	0	$D_2 = \bar{X}\bar{Q}_0Q_1 + \bar{Q}_1X + \bar{Q}_1Q_0$
1	X	0	0	0	0	0	0	
1	0	0	0	0	1	1	1	$J_1, K_1 = Q_0$
1	0	1	0	1	0	1	1	$J_0, K_0 = 1$
1	1	0	0	0	1	1	1	
1	1	1	0	0	0	1	1	
1	1	1	1	0	0	0	1	

Next state table for part 1 (counter) w/ simplified equations

BDF for counter



VWF simulation for counter



PART 2

$G = Q_2 Q_1 Q_0 \bar{E} V + \bar{Q}_2 \bar{Q}_1 Q_0 \bar{E} V + \bar{Q}_2 Q_1 \bar{Q}_0 \bar{E} V$
 $Y = \bar{Q}_2 \bar{Q}_1 \bar{Q}_0 \bar{E} V + \bar{Q}_2 \bar{Q}_1 Q_0 \bar{E} V + \bar{Q}_2 Q_1 \bar{Q}_0 \bar{E} V + \bar{Q}_2 Q_1 Q_0 \bar{E} V$
 $R = Q_2 \bar{Q}_1 \bar{Q}_0 + \bar{Q}_2 Q_1 \bar{Q}_0 + \bar{Q}_2 \bar{Q}_1 Q_0 + \bar{Q}_2 Q_1 Q_0$

Next State Table

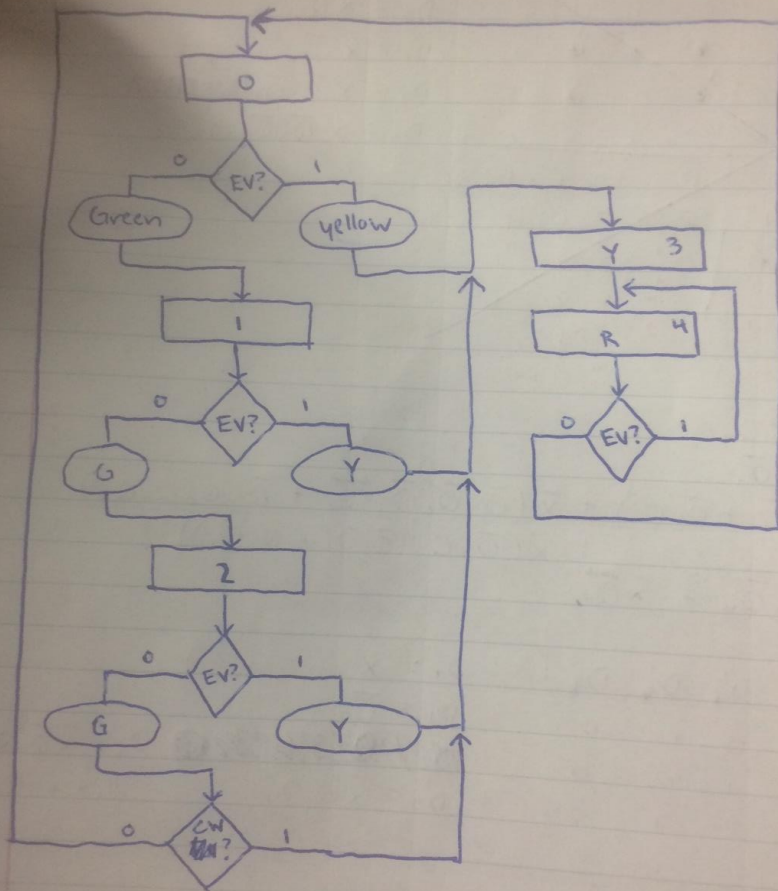
LOW TRUE

CW	EV	Q ₂	Q ₁	Q ₀	Q ₂ ⁺	Q ₁ ⁺	Q ₀ ⁺	G	Y	R
X	0	0	0	0	0	0	1	1	0	0
X	1	0	0	0	0	1	1	0	1	0
X	0	0	1	0	0	1	0	1	0	0
X	1	0	1	0	0	1	1	0	1	0
0	0	0	1	1	0	0	0	1	0	0
0	1	0	1	1	0	1	1	0	1	0
1	0	0	1	1	0	1	1	1	0	0
1	1	0	1	1	0	1	1	1	1	0
X	X	0	1	1	1	0	0	0	1	0
X	X	1	0	0	0	0	0	0	0	1
X	1	1	0	0	1	0	0	1	0	1
X	X	1	0	1	X	X	X	X	X	X
X	X	1	1	0	X	X	X	X	X	X
X	X	1	1	1	X	X	X	X	X	X

$Q_2^+ = \bar{Q}_2 Q_1 Q_0 + Q_2 \bar{Q}_1 \bar{Q}_0 EV$
 $Q_1^+ = \bar{Q}_2 \bar{Q}_1 \bar{Q}_0 EV + \bar{Q}_2 \bar{Q}_1 Q_0 \bar{E} V + \bar{Q}_2 \bar{Q}_1 Q_0 EV + \bar{Q}_2 Q_1 \bar{Q}_0 \bar{E} V + \bar{Q}_2 Q_1 \bar{Q}_0 EV + \bar{Q}_2 Q_1 Q_0 \bar{E} V$
 $Q_0^+ = \bar{Q}_2 \bar{Q}_1 \bar{Q}_0 \bar{E} V + \bar{Q}_2 \bar{Q}_1 \bar{Q}_0 EV + \bar{Q}_2 \bar{Q}_1 Q_0 \bar{E} V + \bar{Q}_2 \bar{Q}_1 Q_0 EV + \bar{Q}_2 Q_1 \bar{Q}_0 \bar{E} V + \bar{Q}_2 Q_1 \bar{Q}_0 EV + \bar{Q}_2 Q_1 Q_0 \bar{E} V$
 $Q_1^+ = \bar{Q}_2 \bar{Q}_1 (\bar{Q}_0 \bar{E} V + Q_0 \bar{E} V + Q_0 EV) + \bar{Q}_2 Q_1 \bar{Q}_0 (EV \bar{C} W + EV C W + EV C W)$
 $Q_1^+ = \bar{Q}_2 \bar{Q}_1 (EV + Q_0) + \bar{Q}_2 Q_1 \bar{Q}_0 (EV + C W)$
 $Q_0^+ = \bar{Q}_2 \bar{Q}_1 \bar{Q}_0 + \bar{Q}_2 \bar{Q}_1 Q_0 EV + \bar{Q}_2 Q_1 \bar{Q}_0 (C W + EV)$

next state table and simplified equations

ASM Chart for Traffic Controller



the ASM for the logic of part 2

VHD for part 2 logic

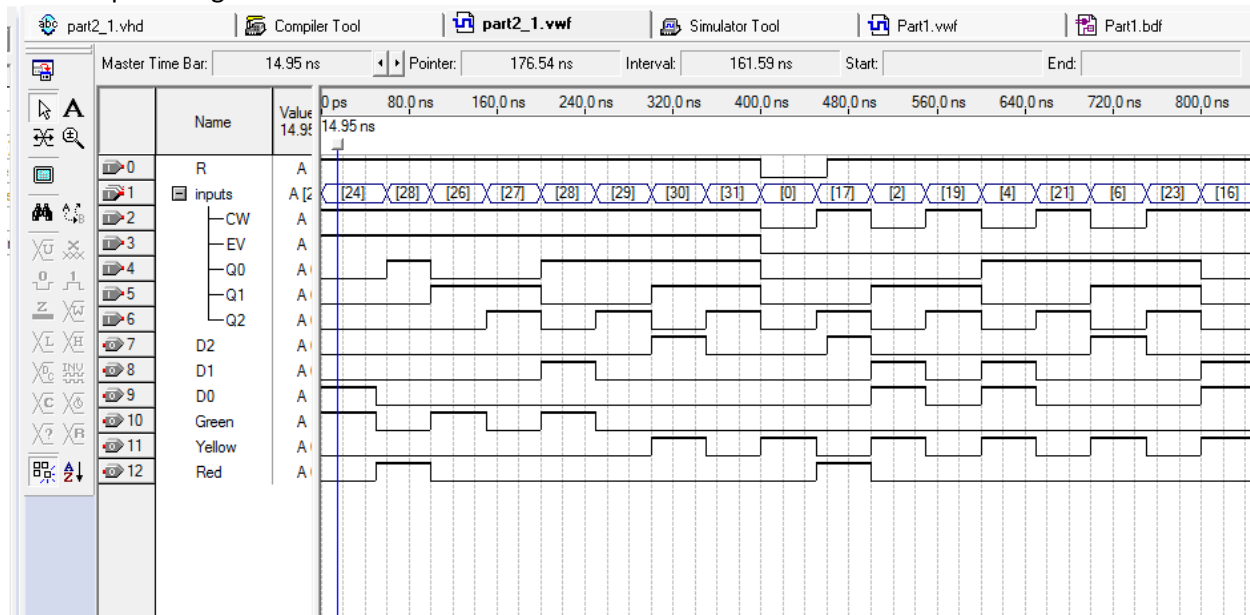
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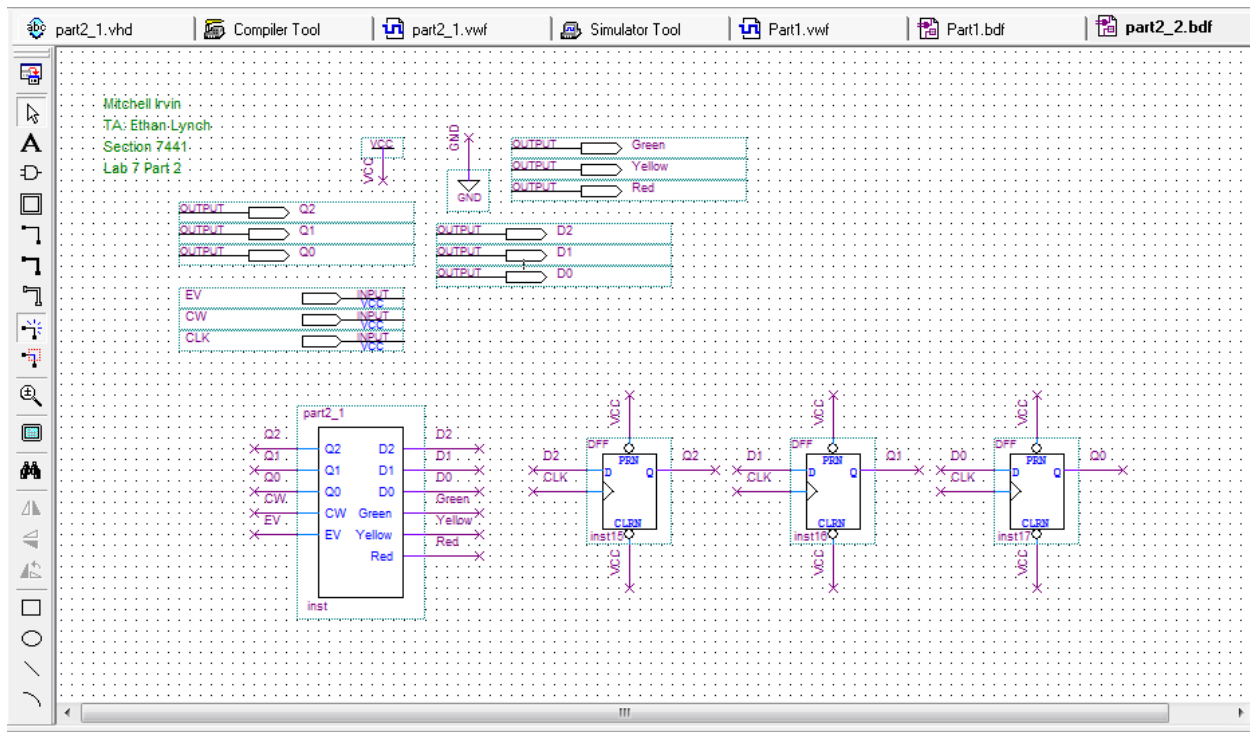
part2_1.vhd*  Compiler Tool  part2_1.vwf*  Simulator Tool  Part1.vwf  Part1.bdf

4  entity part2_1 is port (
5      Q2, Q1, Q0, CW, EV, R: in bit;
6      D2, D1, D0: out bit;
7      Green, Yellow, Red: out bit
8  );
9  end part2_1;
10
11  architecture logic OF part2_1 IS
12  begin
13
14      D2 <= (((not Q2) and Q1 and Q0) or
15          (Q2 and (not Q1) and (not Q0) and (not EV))) and R;
16
17      D1 <= (((not Q2) and (not Q1) and ((not EV) or Q0)) or
18          ((not Q2) and Q1 and (not Q0) and ((not EV) or (not CW)))) and R;
19
20      D0 <= (((not Q2) and (not Q1) and (not Q0)) or
21          ((not Q2) and (not Q1) and Q0 and (not EV)) or
22          (((not Q2) and Q1 and (not Q0)) and ((not CW) or (not EV)))) and R;
23
24      Green <= (((not Q2) and (not Q1) and (not Q0) and EV) or
25          ((not Q2) and (not Q1) and Q0 and EV) or
26          ((not Q2) and Q1 and (not Q0) and EV));
27
28      Yellow <= (((not Q2) and (not Q1) and (not Q0) and (not EV)) or
29          ((not Q2) and (not Q1) and Q0 and (not EV)) or
30          ((not Q2) and Q1 and (not Q0) and (not EV)) or
31          ((not Q2) and Q1 and Q0));
32
33      Red <= (Q2 and (not Q1) and (not Q0));

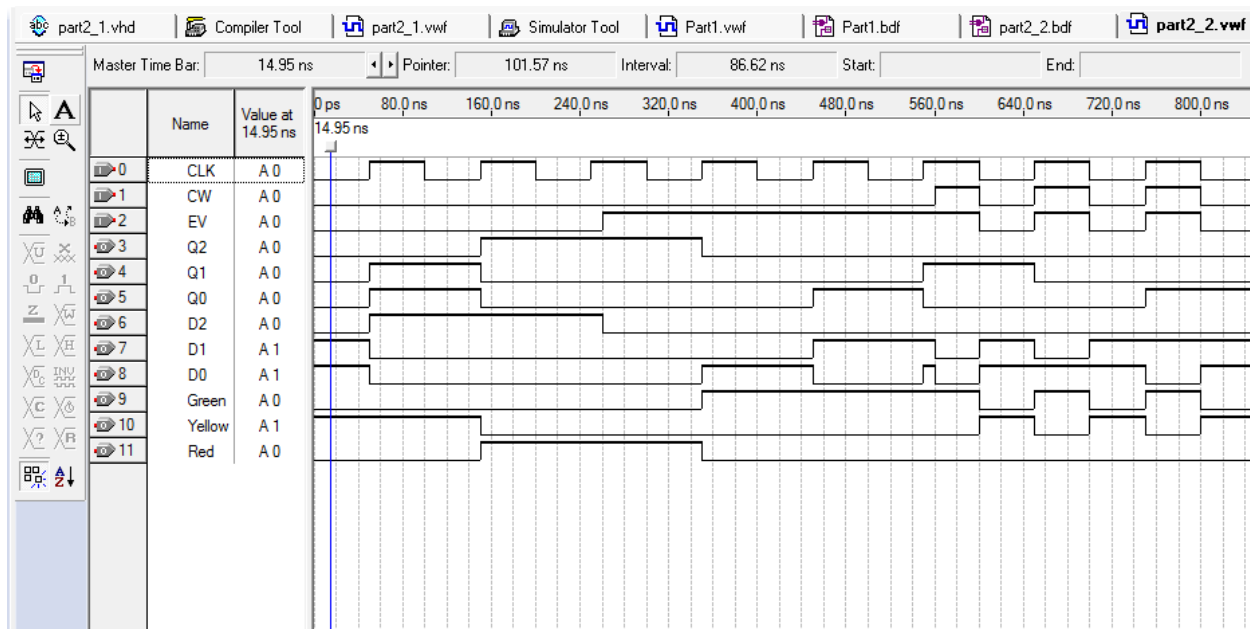
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VWF for part 2 logic





Part 2 implementation bdf



Part 2 implementation VWF

Memory table w/ addresses and Data bits

A ₃	A ₂	A ₁	A ₀	HEX	D ₃	D ₂	D ₁	D ₀	DATA
R	EV	CV	Q ₂ Q ₁ Q ₀		D ₂	D ₁	D ₀	G Y R	
0	0	1	0 0 0	1 8 8	0	0	1	1 0 0	0 C
0	0	1	0 0 1	1 8 9	0	1	0	1 0 0	1 4
0	0	1	0 1 0	1 8 A	0	0	0	1 0 0	0 4
0	1	1	0 1 1	1 8 B	1	0	0	0 1 0	2 2
0	1	1	1 0 0	1 8 C	0	0	0	0 0 1	0 1
0	1	1	1 0 1	1 8 D					
0	1	1	1 1 0	1 8 E					
0	1	1	1 1 1	1 8 F					
0	1	0	0 0 0	1 9 0	0	0	1	1 0 0	0 C
0	1	0	0 0 1	1 9 1	0	1	0	1 0 0	1 4
0	1	0	0 1 0	1 9 2	0	1	1	1 0 0	1 C
0	1	0	0 1 1	1 9 3	1	0	0	0 1 0	2 2
0	1	0	1 0 0	1 9 4	0	0	0	0 0 1	0 1
0	1	0	1 0 1	1 9 5					
0	1	0	1 1 0	1 9 6					
0	1	0	1 1 1	1 9 7					
0	0	1	0 0 0	0 8	0	1	1	0 1 0	1 A
0	0	1	0 0 1	0 9	0	1	1	0 1 0	1 A
0	0	1	0 1 0	0 A	0	1	1	0 1 0	1 A
0	0	1	0 1 1	0 B	1	0	0	0 1 0	2 2
0	0	0	1 0 0	0 C	1	0	0	0 0 1	2 1
0	0	0	1 0 1	0 D					
0	0	0	1 1 0	0 E					
0	0	0	1 1 1	0 F					
0	0	0	0 0 0	0 0	0	1	1	0 1 0	1 A
0	0	0	0 0 1	0 1	0	1	1	0 1 0	1 A
0	0	0	0 1 0	0 2	0	1	1	0 1 0	1 A
0	0	0	0 1 1	0 3	1	0	0	0 1 0	2 2
0	0	0	1 0 0	0 4	1	0	0	0 0 1	2 1
0	0	0	1 0 1	0 5					
0	0	0	1 1 0	0 6					
0	0	0	1 1 1	0 7					