UCSD CSE140L Spring 2014

LAB#3 Report

Demonstration Date : / /14 Student CID____________________________

Student Name: ____
first M.I. Last

TED Submission Date & Time :

(FILLED BY Student BEFORE DEMO)

Self-test Report

Working Not working

Part1: _________ ________

Part2: _________ _________

Part3: _________ _________

Part4: _________ _________

Part5: _________ ________

(*** FILLED BY TUTOR/INSTRUCTOR ***)

Demo Reviewer
Name : ____________________________

Demo score	**Report** score
_________/**3**	a)_________/**1**
_________/**3**	b) _________/**1**
_________/**3**	c) _________/**2**
_________/**3**	d)_________/**1**
_________ /**3**	
Subtotal	**Subtotal**
________/**15**	_____________/**5**

TOTAL Score: ________________/**20**

a) Description:

a. In the precondition, I have everything I use in all the other parts being initialized and set all the lights to be off. I have my CID displaying.

b. In part one, I used key[1], sw[2:0] and key[1] was for entering money. The switches are for nickel, dime, and quarter input.

c. In part two, I used sw[9] which is a counter for the number of times coin inputs reach 35 cents.

d. In part three, I used sw[8] & sw[4] for credit card and reset inputs.

e. In part four, I used sw[3] for one-dollar inputs.

f. In part five, I used all HEX's to display "Err" when an error has occurred.

b) Verilog code

```
`d`define BLANK 7'b1111111
`define ZERO 7'b1000000
`define ONE 7'b1111001
`define TWO 7'b0100100
`define THREE 7'b0110000
`define FOUR 7'b0011001
`define FIVE 7'b0010010
`define SIX 7'b0000010
`define SEVEN 7'b1111000
`define EIGHT 7'b0000000
`define NINE 7'b0011000
`define A 7'b0001000
`define b 7'b0000011
`define C 7'b1000110
`define d 7'b0100001
`define E 7'b0000110
`define F 7'b0001110
`define H 7'b0001001
`define L 7'b1000111
`define r 7'b0101111

module L3C580                               // where 580
= CID
(
input [9:0]sw,              // ten up-down switches, SW9 -
SW0
input [3:0]key,             // four pushbutton swithes, KEY3 -
KEY0
input clock,                // 24MHz clock source on Altera
DE1 board
output reg [9:0]ledr,       // ten Red LEDs, LEDR9 - LEDR0
output reg [7:0]ledg,       // eight Green LEDs, LEDG8 -
LEDG0
output reg [6:0]hex3,hex2,hex1,hex0         // four 7-
segment, HEX3 - HEX0
);
parameter zero = 3'b000, one = 3'b001, two = 3'b010, three
= 3'b011, four = 3'b100, five = 3'b101, six = 3'b110, seven =
3'b111;
parameter none = 9'b000000000, nickel = 9'b000000001,
dime = 9'b000000010, quarter = 9'b000000100, dollar =
9'b000001000, credit_card = 9'b000010000, reset =
9'b100000000;
integer in;

reg[3:0] state, next_state;

reg [6:0] h3, h2, h1, h0;

integer VM = 0;
reg[3:0] counter = 0;
integer err = 0;
integer cycle = 0;
integer rep = 0;
integer flag = 0;
integer clear = 0;


always @(posedge clock) begin
state = next_state;
if (flag == 1) begin
h3 = `THREE;
h2 = `FIVE;
clear = 1;
end
if (sw[9] == 1 && err == 0 && rep == 0) begin
rep <= 1;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
hex3 <= `BLANK;
hex2 <= `BLANK;
hex1 <= `BLANK;
case (counter)
0: begin
hex0 <= `ZERO;
end
1: begin
hex0 <= `ONE;
end
2: begin
hex0 <= `TWO;
end
3: begin
hex0 <= `THREE;
end
4: begin
hex0 <= `FOUR;
end
5: begin
hex0 <= `FIVE;
end
6: begin
hex0 <= `SIX;
end
7: begin
hex0 <= `SEVEN;
end
8: begin
hex0 <= `EIGHT;
end
9: begin
hex0 <= `NINE;
```

```
end
10: begin
hex0 <= `A;
end
11: begin
hex0 <= `b;
end
12: begin
hex0 <= `C;
end
13: begin
hex0 <= `d;
end
14: begin
hex0 <= `E;
end
15: begin
hex0 <= `F;
end
endcase
end
else if (VM == 1 && sw[9] == 0) begin
rep = 0;
if (err == 0) begin
case(state)
zero: begin
hex3 <= `ZERO;
hex2 <= `ZERO;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
cycle = 0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
one: begin
hex3 <= `ZERO;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
two: begin
hex3 <= `ONE;
hex2 <= `ZERO;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
three: begin
hex3 <= `ONE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
four: begin
hex3 <= `TWO;
hex2 <= `ZERO;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
five: begin
hex3 <= `TWO;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
six: begin
hex3 <= `THREE;
hex2 <= `ZERO;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
seven: begin
cycle <= cycle + 1;
case (in)
none: begin
hex3 <= h3;
hex2 <= h2;
hex1 <= h1;
hex0 <= h0;
end
nickel: begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
end
dime: begin
if (h3 == `THREE && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `FIVE;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
end
else if (h3 == `TWO && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
end
else begin
hex3 <= h3;
hex2 <= h2;
hex1 <= h1;
```

```
hex0 <= h0;
end
end
quarter: begin
if (h3 == `ONE && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
end
else if (h3 == `ONE && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `FIVE;
end
else if (h3 == `TWO && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ONE;
hex0 <= `ZERO;
end
else if (h3 == `TWO && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ONE;
hex0 <= `FIVE;
end
else if (h3 == `THREE && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `TWO;
hex0 <= `ZERO;
end
else begin
hex3 <= h3;
hex2 <= h2;
hex1 <= h1;
hex0 <= h0;
end
end
dollar: begin
if (h3 == `ZERO && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `SIX;
hex0 <= `FIVE;
end
else if (h3 == `ZERO && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `SEVEN;
hex0 <= `ZERO;
end
else if (h3 == `ONE && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `SEVEN;
hex0 <= `FIVE;
end
else if (h3 == `ONE && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `EIGHT;
hex0 <= `ZERO;
end
else if (h3 == `TWO && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `EIGHT;
hex0 <= `FIVE;
end
else if (h3 == `TWO && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `NINE;
hex0 <= `ZERO;
end
else if (h3 == `THREE && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `NINE;
hex0 <= `FIVE;
end
else if (h3 == `THREE && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `SIX;
hex0 <= `FIVE;
end
else begin
hex3 <= h3;
hex2 <= h2;
hex1 <= h1;
hex0 <= h0;
end
end
credit_card: begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
end
default: begin
hex3 <= h3;
hex2 <= h2;
hex1 <= h1;
hex0 <= h0;

end
endcase
if (cycle == 6000000) begin
ledg[0] <= 1;
ledg[1] <= 1;
ledg[2] <= 1;
ledg[3] <= 1;
ledg[4] <= 1;
ledg[5] <= 1;
ledg[6] <= 1;
ledg[7] <= 1;
end
else if (cycle == 12000000) begin
ledg <= 0;
cycle <= 0;
end
ledr[9:0] <= 0;
end
default: begin
end
endcase
end
else if (err == 1) begin
cycle <= 0;
ledg <= 0;
hex3 <= `E;
hex2 <= `r;
hex1 <= `r;
hex0 <= `BLANK;
state <= zero;
end
end
else if (VM == 0 && sw[9] == 0) begin
hex3 <= `ZERO;
hex2 <= `FIVE;
hex1 <= `EIGHT;
hex0 <= `ZERO;
end
end

always @(negedge key[1]) begin
```

```
if (clear == 1) begin
flag = 0;
end
if (VM == 0) begin
VM = 1;
next_state = zero;
end
else if (VM == 1) begin
if (state != seven && err == 0) begin
case(sw[8:0])
none: begin
in = none;
end
nickel: begin
in = nickel;
if (state < seven) begin
if (state == six) begin
counter = counter + 1;
next_state = seven;
end
next_state = state + one;
end
end
dime: begin
in = dime;
if (state < six) begin
next_state = state + two;
end
else begin
next_state = seven;
counter = counter + 1;
end
end
quarter: begin
in = quarter;
if (state < three) begin
next_state = state + five;
end
else begin
next_state = seven;
counter = counter + 1;
end
end
dollar: begin
in = dollar;
next_state = seven;
counter = counter + 1;
end
credit_card: begin
in = credit_card;
next_state = seven;
end
reset: begin
in = reset;
next_state = zero;
end
default: begin
err = 1;
next_state = zero;
end
endcase
end
else if (state == seven && err == 0) begin
case(sw[8:0])
none: begin
in = none;
end
nickel: begin
in = nickel;
next_state = one;
end
dime: begin
in = dime;
next_state = two;
end
quarter: begin
in = quarter;
next_state = five;
end
dollar: begin
in = dollar;
if (hex1 != `ZERO && hex1 != `ONE && hex1 != `TWO)
begin
err = 1;
next_state = zero;
end
else if (hex1 == `ZERO || hex1 == `ONE || hex1 == `TWO)
begin
next_state = seven;
flag = 1;
err = 0;
end
end
credit_card: begin
in = credit_card;
if (hex1 == `ZERO && hex0 == `ZERO) begin
next_state = zero;
err = 1;
end
else if (hex1 != `ZERO && hex0 != `ZERO) begin
next_state = seven;
flag = 1;
err = 0;
end
end
reset: begin
next_state = zero;
end
default: begin
err = 1;
next_state = zero;
end
endcase
end
else if (err == 1) begin
next_state = zero;
err = 0;
end
end
end
endmodule
efine BLANK 7'b1111111
`define ZERO 7'b1000000
`define ONE 7'b1111001
`define TWO 7'b0100100
`define THREE 7'b0110000
`define FOUR 7'b0011001
`define FIVE 7'b0010010
`define SIX 7'b0000010
`define SEVEN 7'b1111000
`define EIGHT 7'b0000000
`define NINE 7'b0011000
`define A 7'b0001000
`define b 7'b0000011
`define C 7'b1000110
`define d 7'b0100001
`define E 7'b0000110
`define F 7'b0001110
`define H 7'b0001001
`define L 7'b1000111
`define r 7'b0101111

module L3C580                                  // where 580
= CID
(
input [9:0]sw,                  // ten up-down switches, SW9 -
SW0
input [3:0]key,                 // four pushbutton swithes, KEY3 -
KEY0
input clock,                    // 24MHz clock source on Altera DE1 board
output reg [9:0]ledr,           // ten Red LEDs, LEDR9 - LEDR0
output reg [7:0]ledg,           // eight Green LEDs, LEDG8 - LEDG0
output reg [6:0]hex3,hex2,hex1,hex0             // four 7-segment, HEX3 - HEX0
);
parameter zero = 3'b000, one = 3'b001, two = 3'b010, three = 3'b011, four = 3'b100, five = 3'b101, six = 3'b110, seven = 3'b111;
parameter none = 9'b000000000, nickel = 9'b000000001, dime = 9'b000000010, quarter = 9'b000000100, dollar = 9'b000001000, credit_card = 9'b000010000, reset = 9'b100000000;
integer in;

reg[3:0] state, next_state;

reg [6:0] h3, h2, h1, h0;

integer VM = 0;
reg[3:0] counter = 0;
integer err = 0;
integer cycle = 0;
integer rep = 0;
integer flag = 0;
integer clear = 0;



always @(posedge clock) begin
state = next_state;
if (flag == 1) begin
h3 = `THREE;
h2 = `FIVE;
clear = 1;
end
if (sw[9] == 1 && err == 0 && rep == 0) begin
rep <= 1;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
hex3 <= `BLANK;
hex2 <= `BLANK;
hex1 <= `BLANK;
case (counter)
0: begin
hex0 <= `ZERO;
end
1: begin
hex0 <= `ONE;
end
2: begin
hex0 <= `TWO;
end
3: begin
hex0 <= `THREE;
end
4: begin
hex0 <= `FOUR;
end
5: begin
hex0 <= `FIVE;
end
6: begin
hex0 <= `SIX;
end
7: begin
hex0 <= `SEVEN;
end
8: begin
hex0 <= `EIGHT;
end
9: begin
hex0 <= `NINE;
end
10: begin
hex0 <= `A;
end
11: begin
hex0 <= `b;
end
12: begin
hex0 <= `C;
end
13: begin
hex0 <= `d;
end
14: begin
hex0 <= `E;
end
15: begin
hex0 <= `F;
end
endcase
end
else if (VM == 1 && sw[9] == 0) begin
rep = 0;
if (err == 0) begin
case(state)
zero: begin
hex3 <= `ZERO;
hex2 <= `ZERO;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
cycle = 0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
one: begin
hex3 <= `ZERO;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
two: begin
hex3 <= `ONE;
hex2 <= `ZERO;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
three: begin
hex3 <= `ONE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
```

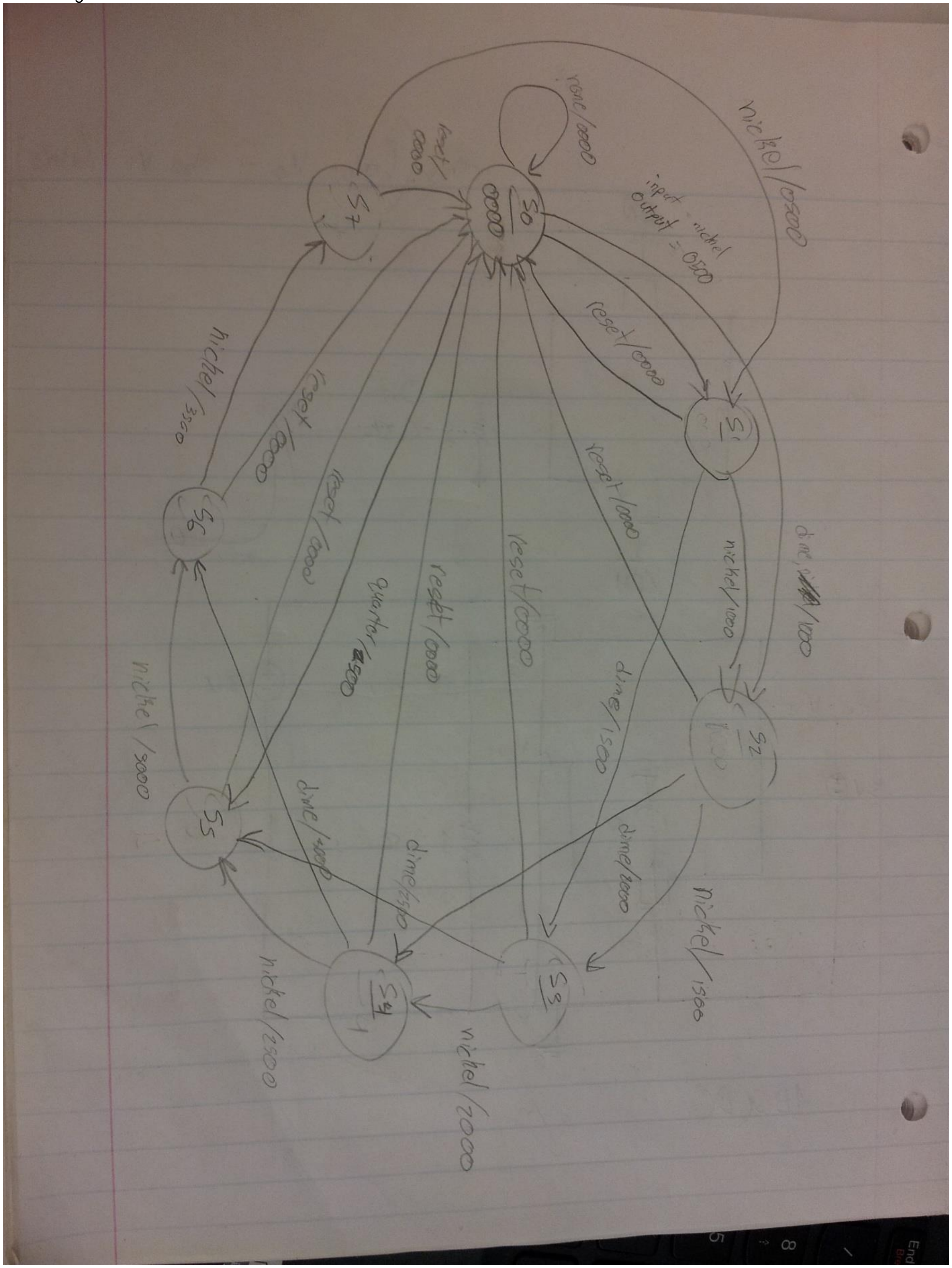
```
end
four: begin
hex3 <= `TWO;
hex2 <= `ZERO;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
five: begin
hex3 <= `TWO;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
six: begin
hex3 <= `THREE;
hex2 <= `ZERO;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
ledg[7:0] <= 0;
ledr[9:0] <= 0;
end
seven: begin
cycle <= cycle + 1;
case (in)
none: begin
hex3 <= h3;
hex2 <= h2;
hex1 <= h1;
hex0 <= h0;
end
nickel: begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
end
dime: begin
if (h3 == `THREE && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `FIVE;
h3 <= hex3;
h2 <= hex2;
h1 <= hex1;
h0 <= hex0;
end
else if (h3 == `TWO && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
end
else begin
hex3 <= h3;
hex2 <= h2;
hex1 <= h1;
hex0 <= h0;
end
end
quarter: begin
if (h3 == `ONE && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
end
else if (h3 == `ONE && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `FIVE;
end
else if (h3 == `TWO && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ONE;
hex0 <= `ZERO;
end
else if (h3 == `TWO && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ONE;
hex0 <= `FIVE;
end
else if (h3 == `THREE && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `TWO;
hex0 <= `ZERO;
end
else begin
hex3 <= h3;
hex2 <= h2;
hex1 <= h1;
hex0 <= h0;
end
end
dollar: begin
if (h3 == `ZERO && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `SIX;
hex0 <= `FIVE;
end
else if (h3 == `ZERO && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `SEVEN;
hex0 <= `ZERO;
end
else if (h3 == `ONE && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `SEVEN;
hex0 <= `FIVE;
end
else if (h3 == `ONE && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `EIGHT;
hex0 <= `ZERO;
end
else if (h3 == `TWO && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `EIGHT;
hex0 <= `FIVE;
end
else if (h3 == `TWO && h2 == `FIVE) begin
```

```
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `NINE;
hex0 <= `ZERO;
end
else if (h3 == `THREE && h2 == `ZERO) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `NINE;
hex0 <= `FIVE;
end
else if (h3 == `THREE && h2 == `FIVE) begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `SIX;
hex0 <= `FIVE;
end
else begin
hex3 <= h3;
hex2 <= h2;
hex1 <= h1;
hex0 <= h0;
end
end
credit_card: begin
hex3 <= `THREE;
hex2 <= `FIVE;
hex1 <= `ZERO;
hex0 <= `ZERO;
end
default: begin
hex3 <= h3;
hex2 <= h2;
hex1 <= h1;
hex0 <= h0;

end
endcase
if (cycle == 6000000) begin
ledg[0] <= 1;
ledg[1] <= 1;
ledg[2] <= 1;
ledg[3] <= 1;
ledg[4] <= 1;
ledg[5] <= 1;
ledg[6] <= 1;
ledg[7] <= 1;
end
else if (cycle == 12000000) begin
ledg <= 0;
cycle <= 0;
end
ledr[9:0] <= 0;
end
default: begin
end
endcase
end
else if (err == 1) begin
cycle <= 0;
ledg <= 0;
hex3 <= `E;
hex2 <= `r;
hex1 <= `r;
hex0 <= `BLANK;
state <= zero;
end
end
else if (VM == 0 && sw[9] == 0) begin
hex3 <= `ZERO;
hex2 <= `FIVE;
hex1 <= `EIGHT;
hex0 <= `ZERO;
end
end
```

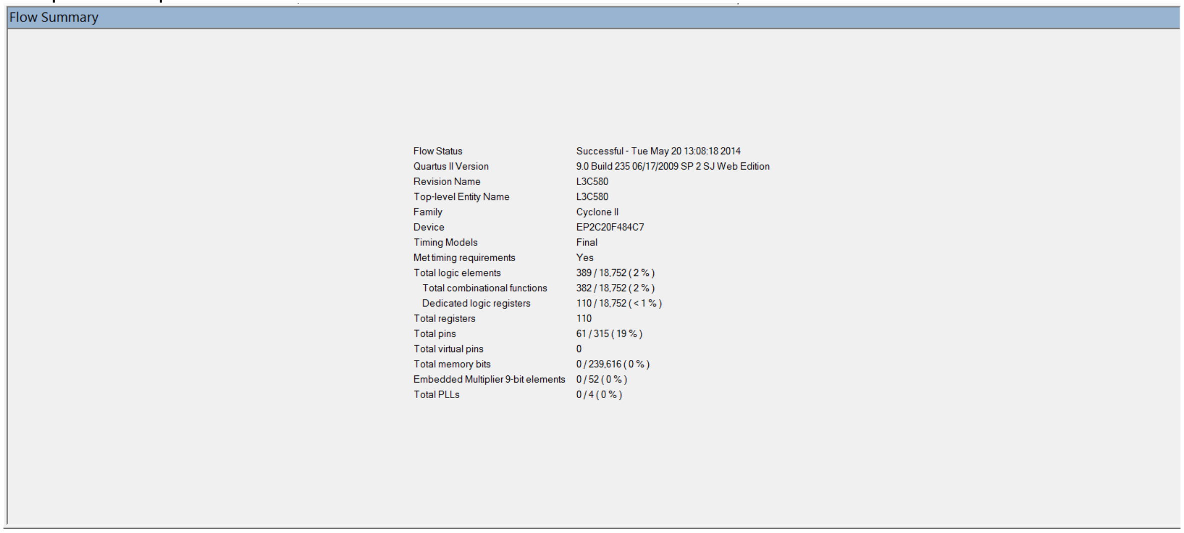
```
always @(negedge key[1]) begin

if (clear == 1) begin
flag = 0;
end
if (VM == 0) begin
VM = 1;
next_state = zero;
end
else if (VM == 1) begin
if (state != seven && err == 0) begin
case(sw[8:0])
none: begin
in = none;
end
nickel: begin
in = nickel;
if (state < seven) begin
if (state == six) begin
counter = counter + 1;
next_state = seven;
end
next_state = state + one;
end
end
dime: begin
in = dime;
if (state < six) begin
next_state = state + two;
end
else begin
next_state = seven;
counter = counter + 1;
end
end
quarter: begin
in = quarter;
if (state < three) begin
next_state = state + five;
end
else begin
next_state = seven;
counter = counter + 1;
end
end
dollar: begin
in = dollar;
next_state = seven;
counter = counter + 1;
end
credit_card: begin
in = credit_card;
next_state = seven;
end
reset: begin
in = reset;
next_state = zero;
end
default: begin
err = 1;
next_state = zero;
end
endcase
end
else if (state == seven && err == 0) begin
case(sw[8:0])
none: begin
in = none;
end
nickel: begin
in = nickel;
next_state = one;
end
dime: begin
```

```
in = dime;
next_state = two;
end
quarter: begin
in = quarter;
next_state = five;
end
dollar: begin
in = dollar;
if (hex1 != `ZERO && hex1 != `ONE && hex1 != `TWO)
begin
err = 1;
next_state = zero;
end
else if (hex1 == `ZERO || hex1 == `ONE || hex1 == `TWO)
begin
next_state = seven;
flag = 1;
err = 0;
end
end
credit_card: begin
in = credit_card;
if (hex1 == `ZERO && hex0 == `ZERO) begin
next_state = zero;
err = 1;
end
else if (hex1 != `ZERO && hex0 != `ZERO) begin
next_state = seven;
flag = 1;
err = 0;
end
end
reset: begin
next_state = zero;
end
default: begin
err = 1;
next_state = zero;
end
endcase
end
else if (err == 1) begin
next_state = zero;
err = 0;
end
end
end
endmodule
```

c) State Diagram



d) Compilation Report



Flow Summary

```
Flow Status                          Successful - Tue May 20 13:08:18 2014
Quartus II Version                   9.0 Build 235 06/17/2009 SP 2 SJ Web Edition
Revision Name                        L3C580
Top-level Entity Name                L3C580
Family                               Cyclone II
Device                               EP2C20F484C7
Timing Models                        Final
Met timing requirements              Yes
Total logic elements                 389 / 18,752 ( 2 % )
   Total combinational functions     382 / 18,752 ( 2 % )
   Dedicated logic registers         110 / 18,752 ( < 1 % )
Total registers                      110
Total pins                           61 / 315 ( 19 % )
Total virtual pins                   0
Total memory bits                    0 / 239,616 ( 0 % )
Embedded Multiplier 9-bit elements   0 / 52 ( 0 % )
Total PLLs                           0 / 4 ( 0 % )
```