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1  module display (clk, z, HEX0, HEX1, HEX2, HEX3, HEX4, HEX5);
2
3      output logic [6:0] HEX0, HEX1, HEX2, HEX3, HEX4, HEX5;
4      input logic [4:0] z;
5      input logic clk;
6
7      logic [6:0] E, M, P, t, y, F, U, L, one, two, three, four, five, six, seven, eight, nine,
      zero, n;
8
9      assign E = 7'b0000110;
10     assign M = 7'b0010101;
11     assign P = 7'b0001100;
12     assign t = 7'b0000111;
13     assign y = 7'b0010001;
14     assign F = 7'b0001110;
15     assign U = 7'b1000001;
16     assign L = 7'b1000111;
17     assign one = ~7'b0000110;
18     assign two = ~7'b1011011;
19     assign three = ~7'b1001111;
20     assign four = ~7'b1100110;
21     assign five = ~7'b1101101;
22     assign six = ~7'b1111101;
23     assign seven = ~7'b0000111;
24     assign eight = ~7'b1111111;
25     assign nine = ~7'b1101111;
26     assign zero = ~7'b0111111;
27     assign n = 7'b1111111;
28
29     always_comb begin
30         case (z)
31             5'b00000: begin
32                 HEX5 = E; HEX4 = M; HEX3 = P; HEX2 = t; HEX1 = y; HEX0 = zero;
33             end
34             5'b00001: begin
35                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = zero; HEX0 = one;
36             end
37             5'b00010: begin
38                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = zero; HEX0 = two;
39             end
40             5'b00011: begin
41                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = zero; HEX0 = three;
42             end
43             5'b00100: begin
44                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = zero; HEX0 = four;
45             end
46             5'b00101: begin
47                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = zero; HEX0 = five;
48             end
49             5'b00110: begin
50                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = zero; HEX0 = six;
51             end
52             5'b00111: begin
53                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = zero; HEX0 = seven;
54             end
55             5'b01000: begin
56                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = zero; HEX0 = eight;
57             end
58             5'b01001: begin
59                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = zero; HEX0 = nine;
60             end
61             5'b01010: begin
62                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = one; HEX0 = zero;
63             end
64             5'b01011: begin
65                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = one; HEX0 = one;
66             end
67             5'b01100: begin
68                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = one; HEX0 = two;
69             end
70             5'b01101: begin
71                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = one; HEX0 = three;
72             end
73             5'b01110: begin
74                 HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = one; HEX0 = four;

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75     end
76     5'b01111: begin
77         HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = one; HEX0 = five;
78     end
79     5'b10000: begin
80         HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = one; HEX0 = six;
81     end
82     5'b10001: begin
83         HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = one; HEX0 = seven;
84     end
85     5'b10010: begin
86         HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = one; HEX0 = eight;
87     end
88     5'b10011: begin
89         HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = one; HEX0 = nine;
90     end
91     5'b10100: begin
92         HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = two; HEX0 = zero;
93     end
94     5'b10101: begin
95         HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = two; HEX0 = one;
96     end
97     5'b10110: begin
98         HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = two; HEX0 = two;
99     end
100    5'b10111: begin
101        HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = two; HEX0 = three;
102    end
103    5'b11000: begin
104        HEX5 = n; HEX4 = n; HEX3 = n; HEX2 = n; HEX1 = two; HEX0 = four;
105    end
106    5'b11001: begin
107        HEX5 = F; HEX4 = U; HEX3 = L; HEX2 = L; HEX1 = two; HEX0 = five;
108    end
109    default: begin
110        HEX5 = F; HEX4 = U; HEX3 = L; HEX2 = L; HEX1 = two; HEX0 = five;
111    end
112 endcase
113 end
114
115 endmodule
116
117 module display_testbench();
118
119     logic [6:0] HEX0, HEX1, HEX2, HEX3, HEX4, HEX5;
120     logic [4:0] z;
121     logic clk;
122
123     display dut (.clk, .z, .HEX0, .HEX1, .HEX2, .HEX3, .HEX4, .HEX5);
124
125     parameter CLOCK_PERIOD = 100;
126     initial clk = 1;
127     always begin
128         #(CLOCK_PERIOD / 2);
129         clk = ~clk;
130     end
131
132     initial begin
133         @(posedge clk);
134         @(posedge clk);
135         @(posedge clk);
136         @(posedge clk);
137         z = 5'b00000; @(posedge clk);
138         @(posedge clk);
139         z = 5'b00001; @(posedge clk);
140         @(posedge clk);
141         z = 5'b00010; @(posedge clk);
142         @(posedge clk);
143         z = 5'b00011; @(posedge clk);
144         @(posedge clk);
145         z = 5'b00100; @(posedge clk);
146         z = 5'b00101; @(posedge clk);
147         z = 5'b00110; @(posedge clk);
148         z = 5'b00111; @(posedge clk);
149         z = 5'b01000; @(posedge clk);

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150         z = 5'b01001; @(posedge clk);
151         z = 5'b01010; @(posedge clk);
152         z = 5'b01011; @(posedge clk);
153         z = 5'b01100; @(posedge clk);
154         z = 5'b01101; @(posedge clk);
155         z = 5'b01110; @(posedge clk);
156         z = 5'b01111; @(posedge clk);
157         z = 5'b10000; @(posedge clk);
158         z = 5'b10001; @(posedge clk);
159         z = 5'b10010; @(posedge clk);
160         z = 5'b10011; @(posedge clk);
161         z = 5'b10100; @(posedge clk);
162         z = 5'b10101; @(posedge clk);
163         z = 5'b10110; @(posedge clk);
164         z = 5'b10111; @(posedge clk);
165         z = 5'b11000; @(posedge clk);
166         z = 5'b11001; @(posedge clk);
167         z = 5'b11010; @(posedge clk);
168         z = 5'b11011; @(posedge clk);
169         z = 5'b11100; @(posedge clk);
170         z = 5'b11101; @(posedge clk);
171         z = 5'b11110; @(posedge clk);
172         z = 5'b11111; @(posedge clk);
173     $stop;
174 end
175
176 endmodule
177
```