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1  /*-----*/
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3  Class: EE417 Summer 2024
4  Lesson 09 HW Question 3
5  Group: Ron Kalin/ Lamin Jammeh
6  Project Description: TestBench for Interpolator Filter
7  -----*/
8  module Linear_Interpolator_tb ();
9
10 //define the registers and wire for the signals to monitor
11 reg      clock, reset;
12 reg [7:0] Data_in;
13 wire [7:0] Data_out;
14
15 //define the internal probes in the testbench for buffer1 and buffer2
16 wire      filter; // New wire for observing filter
17 wire [7:0] buffer1; // New wire for observing buffer1
18 wire [7:0] buffer2; // New wire for observing buffer2
19
20 //Instantiate the unit under test UUT
21 Linear_Interpolator #(8)  UUT (
22     .Data_out(Data_out),
23     .Data_in(Data_in),
24     .clock(clock),
25     .reset(reset)
26 );
27
28 // Assign buffer1 and buffer2 in the testbench to buffer1 and buffer2 in the Unit under test
29 assign filter = UUT.filter;
30 assign buffer1 = UUT.buffer1;
31 assign buffer2 = UUT.buffer2;
32
33 //instantiate the clock cycle
34 initial
35     begin
36         clock = 0;
37         forever #5 clock = ~clock;
38     end
39
40 initial
41     begin
42         //Initialize all the inputs
43         reset = 1;
44         Data_in = 8'b0;
45         #20 reset = 0;
46
47         //multiple Data_in samples and observe the buffer and Data_out
48         Data_in = 8'b10101010;
49         #20 Data_in = 8'b01101001;
50         #20 Data_in = 8'b00110011;
51         #20 Data_in = 8'b11101001;
52
53         //take everything back Data_out back to zero by setting reset to high
54         #20 reset = 1;
55         #20 reset = 0;
56
57         // Final test case to ensure the interpolator works correctly after reset
58         Data_in = 8'b00001001;
59         #20 Data_in = 8'b01101011;
60         #20 Data_in = 8'b11101011;
61         #20 Data_in = 8'b11101111;
62
63         // stop the simulation
64         #20;
65         $stop;
66     end
67
68 // Display the results
69 always @(posedge clock)

```

```
70     begin
71         $display("@ Time = %t  Data_in = %d  Filter = %d  Buffer1 = %d  Buffer2 = %d
72         Data_out = %d", $time, Data_in, filter, buffer1, buffer2, Data_out);
73     end
74 endmodule
```