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timescale 1ns / 1ps
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
// Company:
// Engineer:
//
// Create Date: 05/09/2021 11:55:16 PM
// Design Name:
// Module Name: lab5_state_machine
// Project Name:
// Target Devices:
// Tool Versions:
// Description:
//
// Dependencies:
//
// Revision:
// Revision 0.01 - File Created
// Additional Comments:
//
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////

module lab5_state_machine(
    input btnU,
    input TimeUp,
    input Anow,
    input Bnow,
    input clk,
    output LoadTime,
    output RunTime,
    output IncA,
    output IncB,
    output ShowScore
);
    wire [3:0] Q;
    wire [3:0] D;

    //assign D[0] = (Q[0] & ~btnU) | (Q[2] & (Anow | Bnow)) | (Q[3] & (Anow | Bnow));
    //assign D[1] = (Q[0] & btnU) | (Q[1] & btnU);
    //assign D[2] = (Q[1] & ~btnU) | (Q[2] & ~TimeUp) | (Q[2] & (~Anow & ~Bnow));
    //assign D[3] = (Q[2] & TimeUp) | (Q[3] & (~Anow & ~Bnow));

    lab5_one_hot_one_hot_encoding (.Q(Q[3:0]), .A(Anow), .B(Bnow), .Up(btnU),
    .Time(TimeUp), .D(D[3:0]));

    FDRE #(.INIT(1'b1) ) Q0 (.C(clk), .CE(1'b1), .D(D[0]), .Q(Q[0]));

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    FDRE #(.INIT(1'b0) ) Q1 (.C(clk), .CE(1'b1), .D(D[1]), .Q(Q[1]));
    FDRE #(.INIT(1'b0) ) Q2 (.C(clk), .CE(1'b1), .D(D[2]), .Q(Q[2]));
    FDRE #(.INIT(1'b0) ) Q3 (.C(clk), .CE(1'b1), .D(D[3]), .Q(Q[3]));

    //FDRE #(.INIT(1'b0) ) Load (.C(clk), .CE(1'b1), .D(Q[1] & ~Q[0] & ~Q[2] &
~Q[3]), .Q(LoadTime));
    //FDRE #(.INIT(1'b0) ) Run (.C(clk), .CE(1'b1), .D(Q[2] & ~Q[0] & ~Q[1] &
~Q[3]), .Q(RunTime));
    //FDRE #(.INIT(1'b0) ) incA (.C(clk), .CE(1'b1), .D((Q[2] & ~Q[3] & Bnow &
~Anow) | (Q[3] & ~Q[2] & Anow)), .Q(IncA));
    //FDRE #(.INIT(1'b0) ) incB (.C(clk), .CE(1'b1), .D((Q[2] & ~Q[3] & Anow &
~Bnow) | (Q[3] & ~Q[2] & Bnow)), .Q(IncB));
    //FDRE #(.INIT(1'b0) ) score (.C(clk), .CE(1'b1), .D(Q[0] & ~Q[1] & ~Q[2] &
~Q[3]), .Q>ShowScore));
    assign LoadTime = Q[1] & ~Q[0] & ~Q[2] & ~Q[3];
    assign RunTime = Q[2] & ~Q[0] & ~Q[1] & ~Q[3];
    assign IncA = (Q[2] & ~Q[3] & Bnow & ~Anow) | (Q[3] & ~Q[2] & Anow);
    assign IncB = (Q[2] & ~Q[3] & Anow & ~Bnow) | (Q[3] & ~Q[2] & Bnow);
    assign ShowScore = Q[0] & ~Q[1] & ~Q[2] & ~Q[3];

endmodule

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