

Lab10.v

```

You, 2 days ago | 1 author (You)
`timescale 1ns / 1ps
|
| You, 2 days ago * Something for lab 10, the sim wont work for som...
module ieee_754_mult( A, B, P );
You, 2 days ago | 1 author (You)

    input [ 31:0 ] A, B;
    output reg [ 31:0 ] P;

    reg [ 23:0 ] A_Mantissa;
    reg [ 23:0 ] B_Mantissa;
    reg [ 7:0 ] A_Exponent;
    reg [ 7:0 ] B_Exponent;
    reg [ 7:0 ] A_sign;
    reg [ 7:0 ] B_sign;
    reg [ 47:0 ] Temp_Mantissa;
    reg [ 22:0 ] Mantissa;
    reg [ 8:0 ] Temp_Exponent;
    reg [ 8:0 ] Exponent;
    reg Sign;

    always @( A, B ) begin

        A_Mantissa = { 1'b1, A[ 22:0 ] };
        B_Mantissa = { 1'b1, B[ 22:0 ] };
        A_Exponent = A[ 30:23 ];
        B_Exponent = B[ 30:23 ];
        A_sign = A[ 31 ];
        B_sign = B[ 31 ];
        Mantissa = Temp_Mantissa[ 45:23 ];
        Exponent = Temp_Exponent[ 7:0 ];

    end

    always @( A, B ) begin

        Temp_Exponent = ( A_Exponent + B_Exponent < 'd127 ) ? 8'd0 : A_Exponent + B_Exponent - 'd127;
        Temp_Mantissa = A_Mantissa * B_Mantissa;

        if ( Temp_Mantissa[ 47 ] ) begin

            Temp_Mantissa = Temp_Mantissa << 1; // Mantissa = Temp_Mantissa[46:24]
            Exponent = Exponent + 1;

        end

        if ( Exponent[ 8 ] ) begin

            Exponent[ 7:0 ] = 8'hff;

        end

        Sign = A_sign ^ B_sign;

        P = { Sign, Exponent[ 7:0 ], Mantissa };

    end

endmodule

```

Lab10_tb.v

```

You, 1 second ago | 1 author (You)
`timescale 1ns / 1ps

You, 1 second ago | 1 author (You)
module Lab10_tb();
|
|   You, 2 days ago * Something for lab 10, the sim wont work for som...
    reg [31:0] A, B;
    reg overflow, underflow, exception;
    wire [31:0] product;
    real value, A_dec, B_dec;

    ieee_754_mult F_Mult ( .A( A ), .B( B ), .P( product ) );

    initial begin

        A = 32'b00111111101000000000000000000000; // 1.25
        B = 32'b01000000010000000000000000000000; // 2.5

        #50
        value = ( ( -1 ) ** ( product[31] ) ) * ( 2 ** ( product[30:23] - 127 ) ) * ( $itor( { 1'b1,product[22:0] } ) / ( 2 ** 23 ) );
        $monitor( "Expected Value : %f product : %f", 1.25 * 32.5, value );

        #20

        A = 32'b01000000010010001111010111000011; // 3.14
        B = 32'b01000000010010001111010111000011; // 3.14

        #50
        value = ( ( -1 ) ** ( product[31] ) ) * ( 2 ** ( product[ 30:23 ] - 127 ) ) * ( $itor( { 1'b1, product[22:0] } ) / ( 2 ** 23 ) );
        $monitor( "Expected Value : %f product : %f", 3.14 * 3.14, value );

        #50

        A = 32'b01000001110000000000000000000000; // 24
        B = 32'b01000010000000000000000000000000; // 32

        #50
        value = ( ( -1 ) ** ( product[31] ) ) * ( 2 ** ( product[30:23] - 127 ) ) * ( $itor( { 1'b1,product[22:0] } ) / ( 2 ** 23 ) );
        $monitor( "Expected Value : %f product : %f", 24 * 32, value );

        #50

        A = 32'b01000000101110011001100110011010; // 5.8
        B = 32'b01000010000000000000000000000000; // 4.2

        #50
        value = ( ( -1 ) ** ( product[31] ) ) * ( 2 ** ( product[30:23] - 127 ) ) * ( $itor( { 1'b1,product[22:0] } ) / ( 2 ** 23 ) );
        $monitor( "Expected Value : %f product : %f", 5.8 * 32, value );

        $finish;

    end

endmodule

```

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TCL Console

Expected Value : 3.1250 product : 3.1250

Expected Value : 9.8596 product : 9.8596

Expected Value : 768.0000 product : 768.0000

Expected Value : 24.3600 product : 24.3600