

```

module alu #(parameter N=32)
    (input [1:0] ctrl,
     input [N-1:0] a,b,
     output reg [N-1:0] r);

always@(*)
begin
    case(ctrl)
        2'b00: r = a + b;
        2'b01: r = a - b;
        2'b10: r = a & b;
        2'b11: r = a | b;
        default: r = 0;
    endcase
end
endmodule
`include "alu.v"
module alu_fixture;

    reg [1:0] ctrl;
    reg [31:0] a, b;
    wire [31:0] r;

    initial
        $vcdpluson;

    initial
        $monitor ($time, "CTRL = %b A = %h B = %h R = %h", ctrl, a, b, r);

    alu #(.N(32)) alu_instant (.ctrl(ctrl), .a(a), .b(b), .r(r));

    initial
    begin
        ctrl = 2'b00; a = 32'h00000000; b = 32'h00000000;
        #10; a = 32'h00FFF021; b = 32'h000FFFFFFF;
        #10; a = 32'h76767676; b = 32'h23144321;
        #10; a = 32'h06781234; b = 32'h00076998;
        #10; ctrl = 2'b01; a = 32'h00FFF021; b = 32'h000FFFFFFF;
        #10; a = 32'h76767676; b = 32'h23144321;
        #10; a = 32'h06781234; b = 32'h00076998;
        #10; ctrl = 2'b10; a = 32'hFFFFFFFF; b = 32'h0A0AB0B0;
        #10; a = 32'hABCD4545; b = 32'h12383588;
        #10; a = 32'hF0F0FFFF; b = 32'hCFCFCFCF;
        #10; a = 32'h00000002; b = 32'h22233444;
        #10; ctrl = 2'b11; a = 32'hFFFFFFFF; b = 32'h0A0AB0B0;
        #10; a = 32'hABCD4545; b = 32'h12383588;
        #10; a = 32'hF0F0FFFF; b = 32'hCFCFCFCF;
        #10; a = 32'h00000002; b = 32'h22233444;
        #10; $finish;
    end
endmodule

```

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```

0CTRL = 00 A = 00000000 B = 00000000 R = 00000000
10CTRL = 00 A = 00fff021 B = 000fffff R = 010ff020
20CTRL = 00 A = 76767676 B = 23144321 R = 998ab997
30CTRL = 00 A = 06781234 B = 00076998 R = 067f7bcc
40CTRL = 01 A = 00fff021 B = 000fffff R = 00eff022
50CTRL = 01 A = 76767676 B = 23144321 R = 53623355
60CTRL = 01 A = 06781234 B = 00076998 R = 0670a89c

```

hw6

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```
70CTRL = 10 A = ffffffff B = 0a0ab0b0 R = 0a0ab0b0
80CTRL = 10 A = abcd4545 B = 12383588 R = 02080500
90CTRL = 10 A = f0f0ffff B = cfcfcfcf R = c0c0cfcf
100CTRL = 10 A = 00000002 B = 22233444 R = 00000000
110CTRL = 11 A = ffffffff B = 0a0ab0b0 R = ffffffff
120CTRL = 11 A = abcd4545 B = 12383588 R = bbfd75cd
130CTRL = 11 A = f0f0ffff B = cfcfcfcf R = ffffffff
140CTRL = 11 A = 00000002 B = 22233444 R = 22233446
```

\$finish called from file "alu_fixture.v", line 33.

\$finish at simulation time 150

V C S S i m u l a t i o n R e p o r t

Time: 150

CPU Time: 0.300 seconds; Data structure size: 0.0Mb

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