

Screenshot of Output

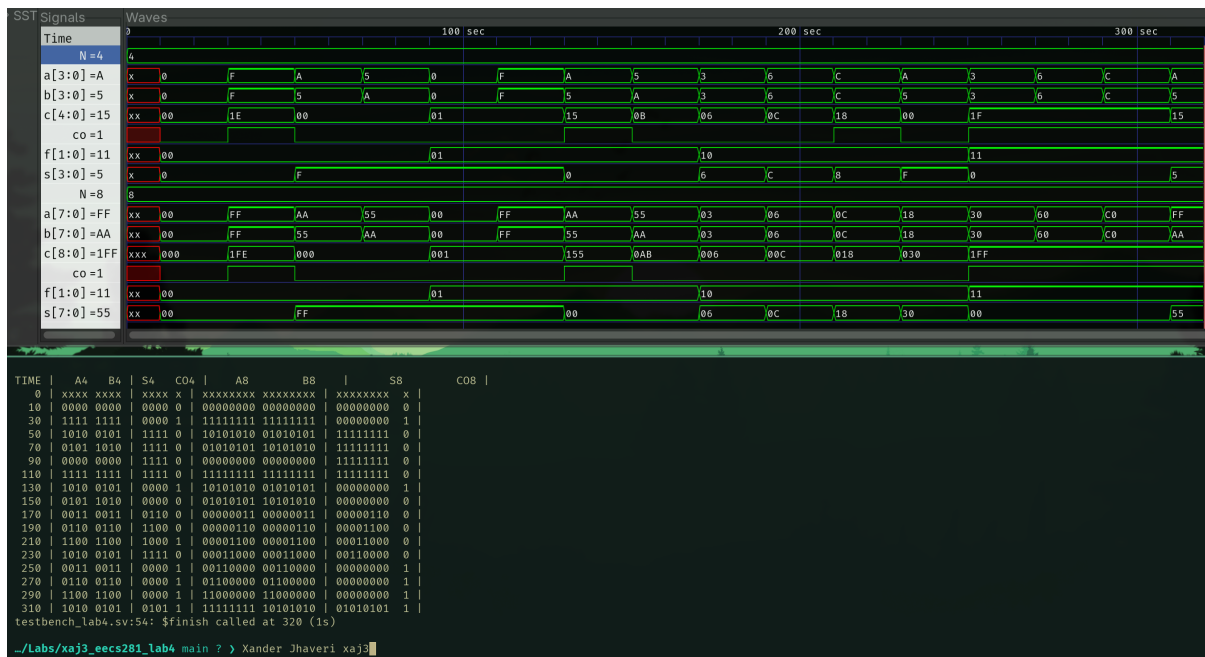


Figure 1: Screenshot of Waveform and Console Output

rc_adder_slice.sv

```
module rc_adder_slice (
    input logic a,
    input logic b,
    input logic c_in,
    output logic s,
    output logic c_out
);
    assign s = a ^ b ^ c_in;
    assign c_out = a & b | b & c_in | a & c_in;
endmodule
```

alu_slice.sv

```
module alu_slice (
    input logic a,
    input logic b,
    input logic c_in,
    input logic [1:0] f,
    output logic s,
    output logic c_out
);
```

```
logic b_inv, c;

assign b_inv = b ^ f[0];
assign c      = c_in & f[1];
rc_adder_slice U1 (
    .a(a),
    .b(b_inv),
    .c_in(c),
    .s(s),
    .c_out(c_out)
);
endmodule
```

gen_alu.sv

```
module gen_alu #(
    parameter N = 8
) (
    input  logic [N-1:0] a,
    input  logic [ 1:0] f,
    output logic [N-1:0] s,
    output logic        co
);

logic [N:0] c;

assign c[0] = f[0];
assign co  = c[N];

alu_slice U[N-1:0] (
    .a(a),
    .b(b),
    .c_in(c[N-1:0]),
    .f(f),
    .s(s),
    .c_out(c[N:1])
);
endmodule
```

testbench_lab4.sv

```
module testbench_lab4 ();
    logic [3:0] a4, b4, s4;
    logic [7:0] a8, b8, s8;
    logic [1:0] f;
    logic co4, co8;

    logic      clk;
    logic [25:0] tvs [15:0];
    int        i = 0;
```

```
gen_alu #(
    .N(4)
) UUT4 (
    .a (a4),
    .b (b4),
    .f (f),
    .s (s4),
    .co(co4)
);

gen_alu #(
    .N(8)
) UUT8 (
    .a (a8),
    .b (b8),
    .f (f),
    .s (s8),
    .co(co8)
);

initial begin
    clk = 1'b0;
    forever #10 clk = ~clk;
end

always @(posedge clk) begin
    f = tvs[i][25:24];
    a4 = tvs[i][23:20];
    b4 = tvs[i][19:16];
    a8 = tvs[i][15:8];
    b8 = tvs[i][7:0];
    i++;
end

initial begin
    $dumpfile("dump.vcd");
    $dumpvars(0, testbench_lab4);

    $readmemb("test_vectors.txt", tvs);
    $display("TIME |   A4   B4 | S4   C04 |   A8       B8       |   S8       C08 | ");
    $monitor(" %3d | %4b %4b | %4b %b | %8b %8b | %8b %b |", $time, a4, b4, s4, co4, a8, b8,
        ↪ s8,
            co8);
    #320 $finish();
end
endmodule
```