

Multiplexer (A)

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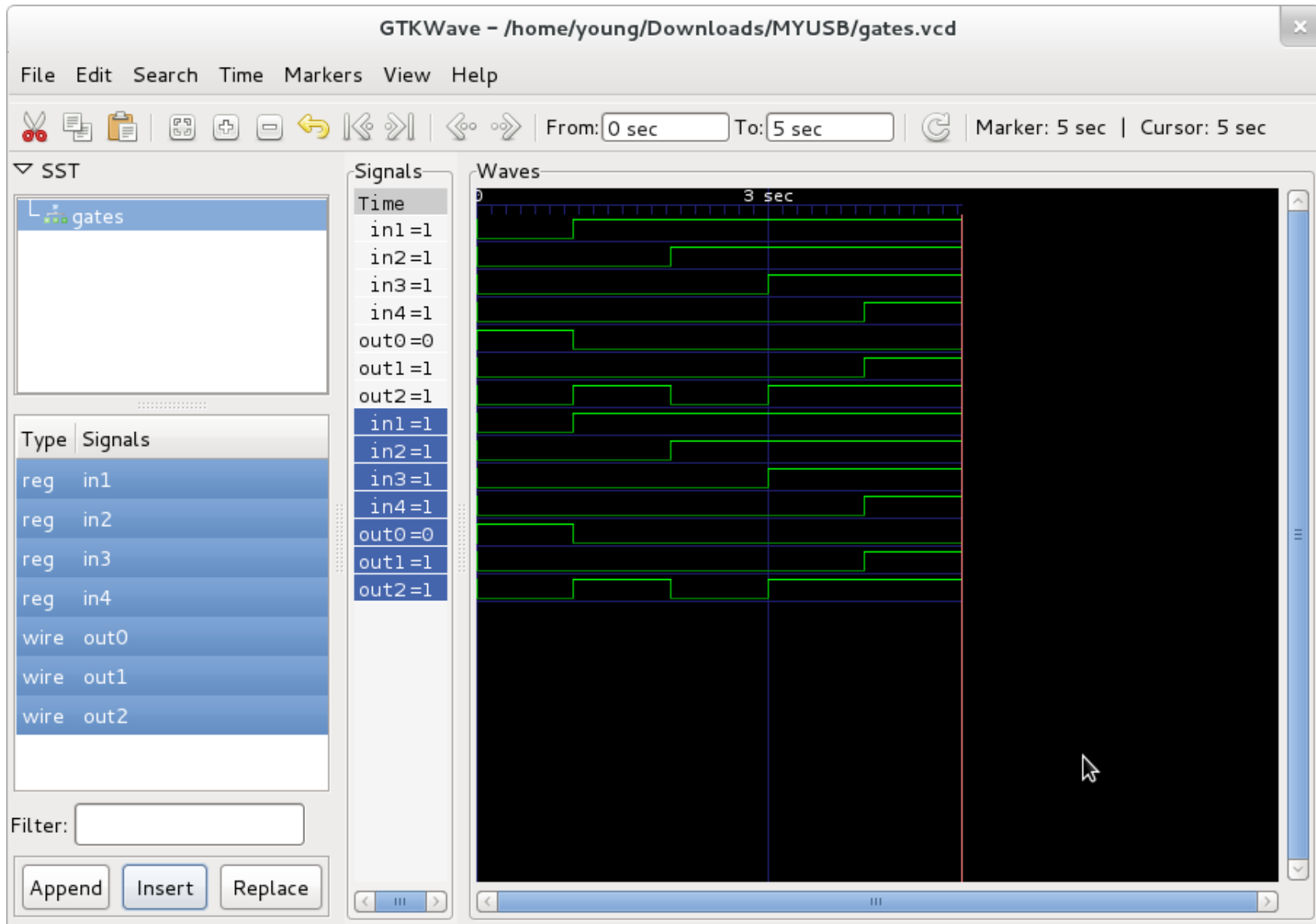
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Simple Gates

```
module gates();  
    wire out0;  
    wire out1;  
    wire out2;  
  
    reg in1, in2, in3, in4;  
  
    not U1 (out0, in1);  
    and U2 (out1, in1, in2, in3, in4);  
    xor U3 (out2, in1, in2, in3);  
  
    initial begin  
        $dumpfile("gates.vcd");  
        $dumpvars(0, gates);  
  
        $monitor(  
            "in1=%b in2=%b in3=%b in4=%b out0=%b out1=%b out2=%b",  
            in1,in2,in3,in4, out0,out1,out2);  
  
        in1 = 0;  
        in2 = 0;  
        in3 = 0;  
        in4 = 0;  
  
        #1 in1 = 1;  
        #1 in2 = 1;  
        #1 in3 = 1;  
        #1 in4 = 1;  
        #1  
  
        $finish;  
    end  
  
endmodule
```

from www.asic-world.com

Simple Gates



Multiplexer

```
module mux_from_gates ();
  reg c0,c1,c2,c3, A,B;
  wire Y;

  //Invert the sel signals
  not (a_inv, A);
  not (b_inv, B);

  // 3-input AND gate
  and (y0, c0, a_inv, b_inv); // 00
  and (y1, c1, a_inv, B);    // 01
  and (y2, c2, A,    b_inv); // 10
  and (y3, c3, A,    B);     // 11

  // 4-input OR gate
  or (Y, y0, y1, y2, y3);

  initial begin
    $dumpfile("mux.vcd");
    $dumpvars(0,mux_from_gates);

    $monitor (
      "c0 = %b c1 = %b c2 = %b c3 = %b A = %b B = %b Y = %b",
      c0, c1, c2, c3, A, B, Y);

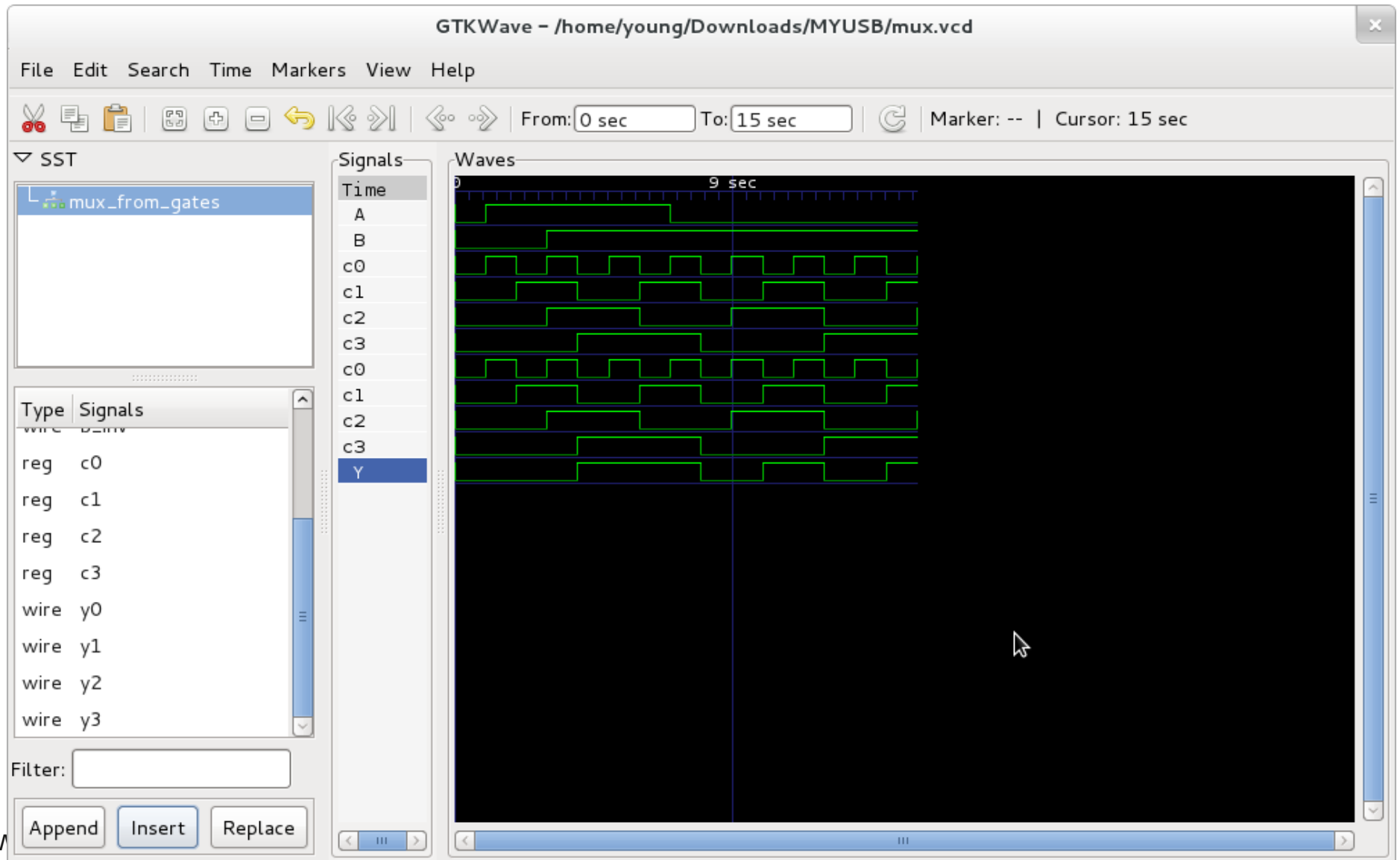
    c0 = 0;
    c1 = 0;
    c2 = 0;
    c3 = 0;
    A = 0;
    B = 0;

    #1 A = 1;
    #2 B = 1;
    #4 A = 0;
    #8 $finish;
  end

  always #1 c0 = ~c0;
  always #2 c1 = ~c1;
  always #3 c2 = ~c2;
  always #4 c3 = ~c3;
endmodule
```

from www.asic-world.com

Multiplexer



Multiplexer

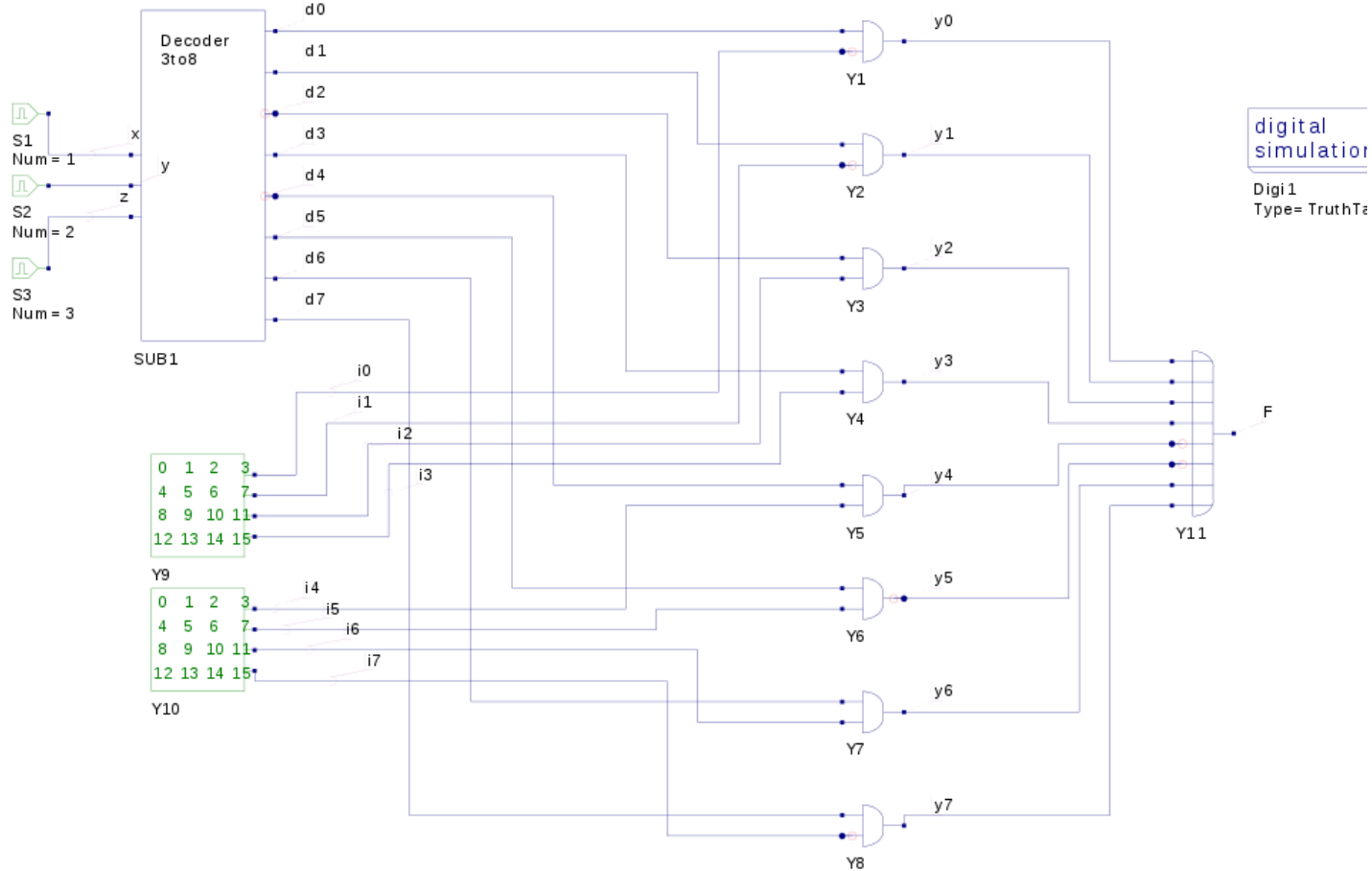
```
module mux(sel, D0, D1, D2, D3, Y)
  input [1:0] sel;
  input D0, D1, D2, D3;
  output Y;
  reg Y;

  always @(sel or D0 or D1 or D2 or D3)
    case (sel)
      2'b00 : Y = D0;
      2'b01 : Y = D1;
      2'b10 : Y = D2;
      2'b11 : Y = D3;
      default: Y = D0;
    endcase

endmodule
```

from www.asic-world.com

Multiplexer Schematic



Multiplexer Schematic

References

- [1] <http://en.wikipedia.org/>
- [2] www.asic-world.com