

/home/itzzinfinity/Cozy Drive/100daysofRTL/day_012/project_1/project_1.srsrcs/sources_1/new/top_module.v

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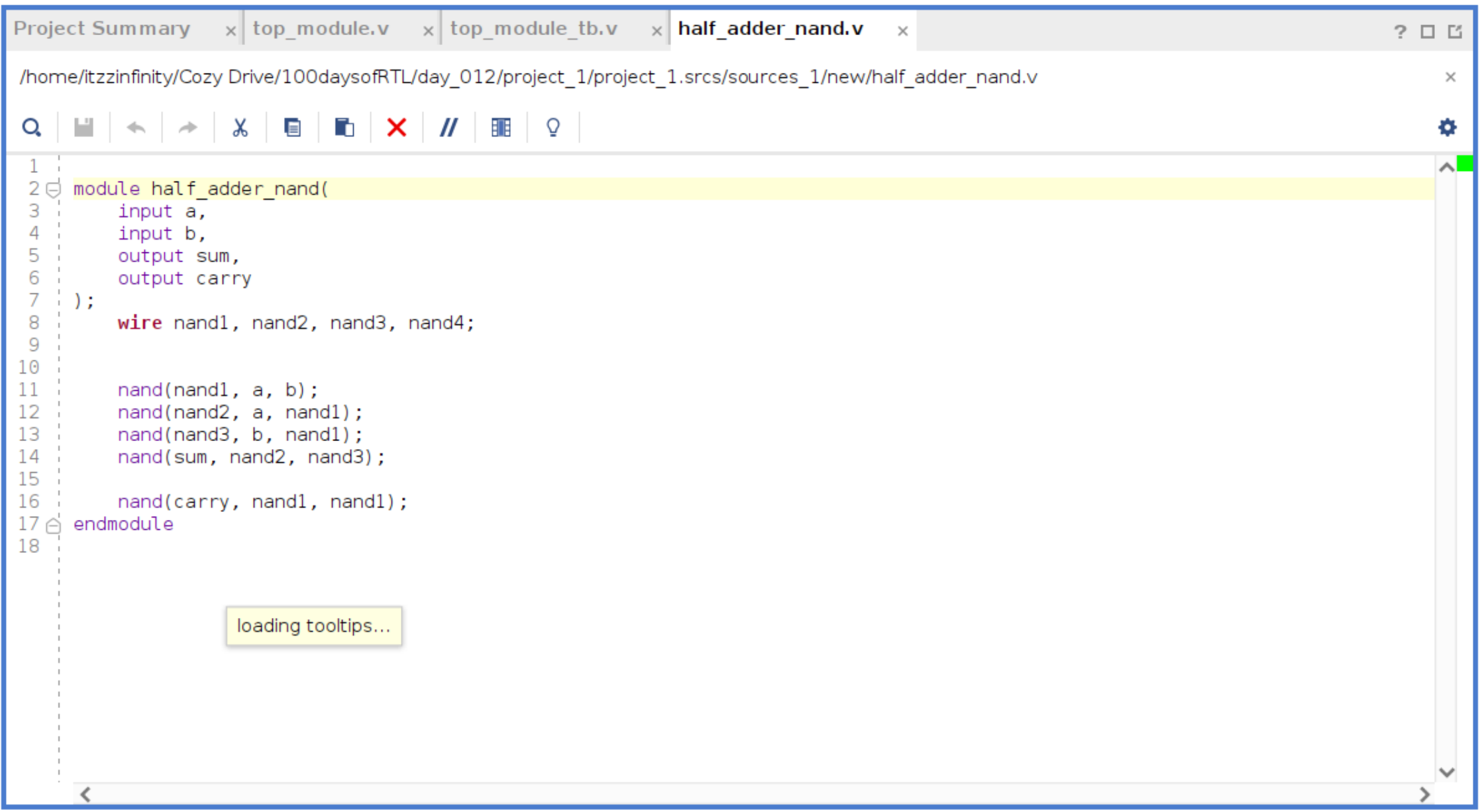


```
1  `timescale 1ns / 1ps
2  //////////////////////////////////////
3  // Engineer: Anjan Prasad
4  // Create Date: 10/03/2024 10:09:17 PM
5  // Module Name: top_module
6  //////////////////////////////////////
7
8
9  module top_module(
10     input a, b, cin, bin,
11     output sum_half, carry_half, sum_full, carry_full,
12     output diff_half, borrow_half, diff_full, borrow_full
13 );
14     half_adder_nand ha_inst (
15         .a(a), .b(b),
16         .sum(sum_half),
17         .carry(carry_half)
18     );
19
20     full_adder_nand fa_inst (
21         .a(a), .b(b), .cin(cin),
22         .sum(sum_full),
23         .carry(carry_full)
24     );
25
26     half_subtractor_nand hs_inst (
27         .a(a), .b(b),
28         .diff(diff_half),
29         .borrow(borrow_half)
30     );
31
32     full_subtractor_nand fs_inst (
33         .a(a), .b(b), .bin(bin),
34         .diff(diff_full),
35         .borrow(borrow_full)
36     );
37 endmodule
38
```

/home/itzinfinity/Cozy Drive/100daysofRTL/day_012/project_1/project_1.srsrcs/sim_1/new/top_module_tb.v



```
1  `timescale 1ns / 1ps
2  //////////////////////////////////////
3  // Engineer: Anjan Prasad
4  // Create Date: 10/03/2024 10:55:23 PM
5  // Module Name: top_module_tb
6  //////////////////////////////////////
7
8  module top_module_tb;
9      reg a, b, cin, bin;
10     wire sum_half, carry_half;
11     wire sum_full, carry_full;
12     wire diff_half, borrow_half;
13     wire diff_full, borrow_full;
14
15     top_module DUT (
16         .a(a), .b(b), .cin(cin), .bin(bin), .sum_half(sum_half), .carry_half(carry_half), .sum_full(sum_full), .carry_full(carry_full), .diff_half(diff_half),
17         .borrow_half(borrow_half), .diff_full(diff_full), .borrow_full(borrow_full)
18     );
19     initial begin
20         $monitor("a=%b, b=%b, cin=%b, bin=%b | sum_half=%b, carry_half=%b, sum_full=%b, carry_full=%b, diff_half=%b, borrow_half=%b, diff_full=%b, borrow_full=%b",
21             a, b, cin, bin, sum_half, carry_half, sum_full, carry_full, diff_half, borrow_half, diff_full, borrow_full);
22         a = 0; b = 0; cin = 0; bin = 0;
23         #10;
24         a = 0; b = 1; cin = 0; bin = 0;
25         #10;
26         a = 1; b = 0; cin = 0; bin = 1;
27         #10;
28         a = 1; b = 1; cin = 1; bin = 1;
29         #10;
30         a = 0; b = 1; cin = 1; bin = 0;
31         #10;
32         a = 1; b = 0; cin = 1; bin = 0;
33         #10;
34         a = 1; b = 1; cin = 1; bin = 1;
35         #10;
36         $finish;
37     end
38
39 endmodule
```



/home/itzzinfinity/Cozy Drive/100daysofRTL/day_011/project_1/project_1.srscs/sources_1/new/full_adder_nand.v



```

1  module full_adder_nand(
2      input a,
3      input b,
4      input cin,
5      output sum,
6      output carry
7  );
8      wire sum1, carry1, carry2;
9
10
11      half_adder_nand ha1(.a(a), .b(b), .sum(sum1), .carry(carry1));
12      half_adder_nand ha2(.a(sum1), .b(cin), .sum(sum), .carry(carry2));
13
14
15      nand(carry, carry1, carry2);
16  endmodule
17

```

/home/itzzinfinity/Cozy Drive/100daysofRTL/day_011/project_1/project_1.srscs/sources_1/new/half_subtractor_nand.



```

1  module half_subtractor_nand(
2      input a,
3      input b,
4      output diff,
5      output borrow
6  );
7      wire nand1, nand2, nand3, nand4;
8
9      nand(nand1, a, b);
10     nand(nand2, a, nand1);
11     nand(nand3, b, nand1);
12     nand(diff, nand2, nand3);
13
14     nand(nand4, a, a);
15     nand(borrow, nand4, b);
16 endmodule
17

```



```

1  module full_subtractor_nand(
2      input a,
3      input b,
4      input bin,
5      output diff,
6      output borrow
7  );
8      wire diff1, borrow1, borrow2;
9
10
11      half_subtractor_nand hs1(.a(a), .b(b), .diff(diff1), .borrow(borrow1));
12      half_subtractor_nand hs2(.a(diff1), .b(bin), .diff(diff), .borrow(borrow2));
13
14
15      nand(borrow, borrow1, borrow2);
16  endmodule
17
    
```