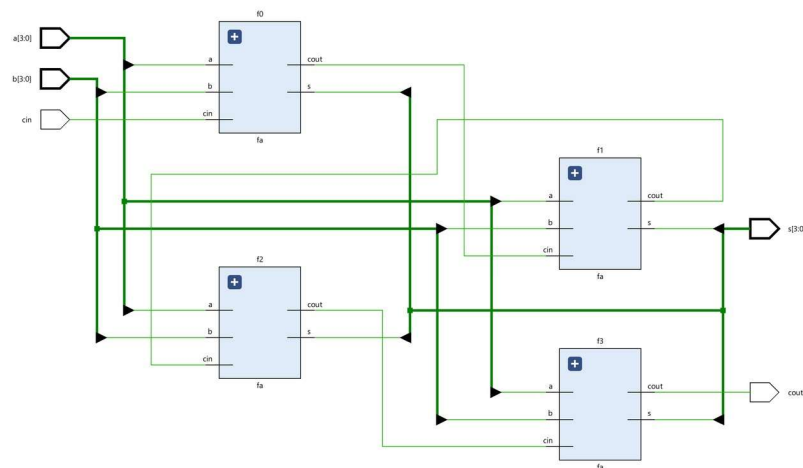


Assignment 17: Design 4-bit Ripple Carry Adder with the help of 1-bit adder

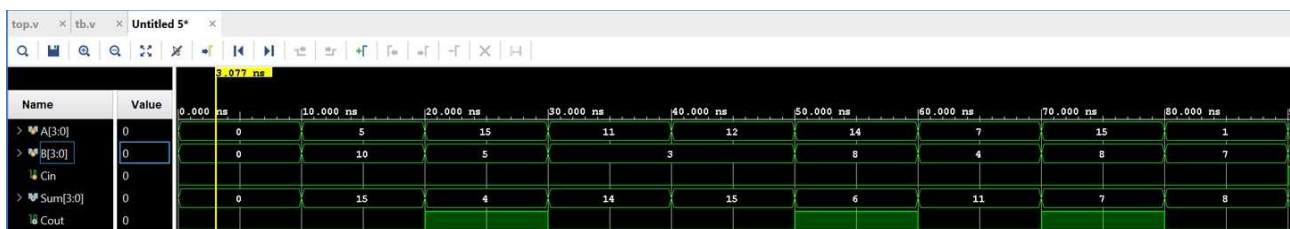
Code

```
1 module ha
2 (
3     input a,b,
4     output s,c
5 );
6
7 assign s = a ^ b;
8 assign c = a & b;
9
10 endmodule
11 //////////////////////////////////////
12 module fa
13 (
14     input a,b,cin,
15     output s,cout
16 );
17
18 wire t1,t2,t3;
19
20 ha h1 (.a(a), .b(b), .s(t2), .c(t1));
21 ha h2 (.a(t2), .b(cin), .s(s), .c(t3));
22
23
24
25 assign cout = t1 | t3;
26
27 endmodule
28 //////////////////////////////////////
29 module top
30 (
31     input [3:0] a,b,
32     input cin,
33     output cout,
34     output [3:0] s
35 );
36
37 wire t0,t1,t2;
38
39 fa f0 (.a(a[0]), .b(b[0]), .cin(cin), .s(s[0]), .cout(t0));
40 fa f1 (.a(a[1]), .b(b[1]), .cin(t0), .s(s[1]), .cout(t1));
41 fa f2 (.a(a[2]), .b(b[2]), .cin(t1), .s(s[2]), .cout(t2));
42 fa f3 (.a(a[3]), .b(b[3]), .cin(t2), .s(s[3]), .cout(cout));
43
44 endmodule
```

Structural Schematic



Simulation



.As it can be seen the circuit functions as a 1-bit carry adder