

Simulation Results

The test cases for the comparator were hard coded.

Numbers for the divider tests were read in from a text file in the pattern:

Dividend

Divisor

And then passed to the divider component.

4 bit comparator input:

```
DINL_stimulus : process is
begin
    DINL_tb <= "00000";
    wait for 10 ns; DINL_tb <= "00110";
    wait for 10 ns; DINL_tb <= "01010";
    wait for 10 ns; DINL_tb <= "11110";
    wait for 10 ns; DINL_tb <= "01000";
    wait;
end process;

DINR_stimulus : process is
begin
    DINR_tb <= "0001";
    wait for 10 ns; DINR_tb <= "0000";
    wait for 10 ns; DINR_tb <= "0010";
    wait for 10 ns; DINR_tb <= "0111";
    wait for 10 ns; DINR_tb <= "1000";
    wait;
end process;
end architecture behave;
```

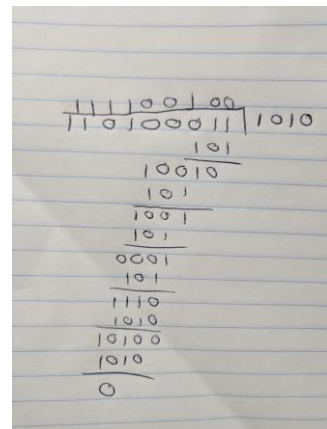


Figure 1 Binary Long Division by Hand

Waveform output:

/comparator_tb/DINL_tb	00000	00000	00110	01010	11110	01000
/comparator_tb/DINR_tb	0001	0001	0000	0010	0111	1000
/comparator_tb/DOUT_tb	0000	0000	0101	1000	0111	0000
/comparator_tb/isGreaterEq_tb	0					

16 bit divider simulation input:

12
4
16
2
1000
0
12
7
25000
250
12
9
3200
52
58346
127
12345
123
9876
102

Output:

$12 / 4 = 3 \text{ -- } 0$
 $16 / 2 = 8 \text{ -- } 0$
 $1000 / 0 = 1000 \text{ -- } 0 \text{ OVERFLOW}$
 $12 / 7 = 1 \text{ -- } 5$
 $25000 / 250 = 100 \text{ -- } 0$
 $12 / 9 = 1 \text{ -- } 3$
 $3200 / 52 = 61 \text{ -- } 28$
 $58346 / 127 = 459 \text{ -- } 53$
 $12345 / 123 = 100 \text{ -- } 45$
 $9876 / 102 = 96 \text{ -- } 84$

Waveform output:

	Msgs					
/divider_tb/start_tb	0					
/divider_tb/dividend_tb	0000000000001100	0000000000001100	0000000000001000	0000001111101000		
/divider_tb/divisor_tb	00000100	00000100	00000010	00000000		
/divider_tb/quotient_tb	0000000000000011	0000000000000011	0000000000001000	0000001111101000		
/divider_tb/remainder_tb	00000000	00000000	00000000	00000000		
/divider_tb/overflow_tb	0					

0000000000001100	0110000110101000	0000000000001100		
00000111	11111010	00001001		
0000000000000001	000000001100100	0000000000000001		
00000101	00000000	00000011		

32 bit divider simulation input:

1000000
2500
4598093
12300
1000009
4598
3200000
24501
3490000
9
123456
9876
4543245
6475
63665742
567
27538530
9852
6575097
45

Output:

$1000000 / 2500 = 400 \text{ -- } 0$
 $4598093 / 12300 = 373 \text{ -- } 10193$
 $1000009 / 4598 = 217 \text{ -- } 2243$
 $3200000 / 24501 = 130 \text{ -- } 14870$
 $3490000 / 9 = 387777 \text{ -- } 7$
 $123456 / 9876 = 12 \text{ -- } 4944$
 $4543245 / 6475 = 701 \text{ -- } 4270$
 $63665742 / 567 = 112285 \text{ -- } 147$
 $27538530 / 9852 = 2795 \text{ -- } 2190$
 $6575097 / 45 = 146113 \text{ -- } 12$

Waveform output:

