smolao / **Digital-electronics-1**

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Ondřej Smola splnil … 19 hours ago **History**

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README.md

Ondřej Smola, 217628 - gates (úkol č.1)

1st part - Link to my GitHub repository

My GitHub repository

2nd part De Morgan's laws verification and simulation

De Morgan's laws equations

$$f(c,b,a) = \overline{b}a + \overline{c}\overline{b}$$

$$f(c,b,a)_{NAND} = \overline{\overline{b}a\overline{b}\overline{c}}$$

$$f(c,b,a)_{NOR} = \overline{b+\overline{a}} + \overline{b+c}$$

Table of functions values of set variables

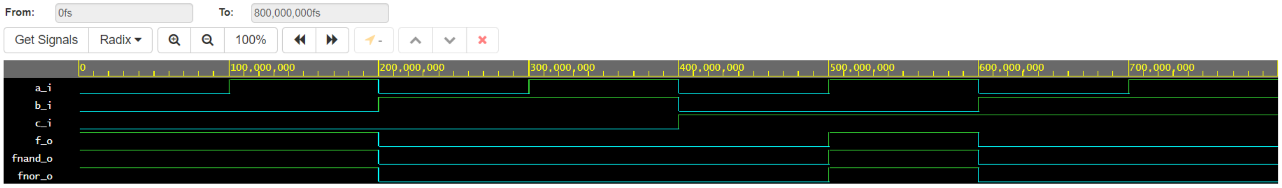
c	b	a	f(c,b,a)
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0

Source code from design.vhd of Architecture

```vhdl
------------------------------------------------------------------------
-- Architecture body for basic gates
------------------------------------------------------------------------
architecture dataflow of gates is
begin
    f_o  <= ((not b_i) and a_i) or ((not c_i) and (not b_i));
    fnand_o <= not(not((not b_i) and a_i) and not((not c_i) and (not b_i)));
    f_nor <= not(b_i or (not a_i)) or not(c_i or b_i);

end architecture dataflow;
```

Screenshot of simulated waweforms of f, fnand and fnor, to see if they match



Note: To revert to EPWave opening in a new browser window, set that option on your user page.

Link to my EDA playground of De Morgan's laws

De Morgan's Laws EDA Playground

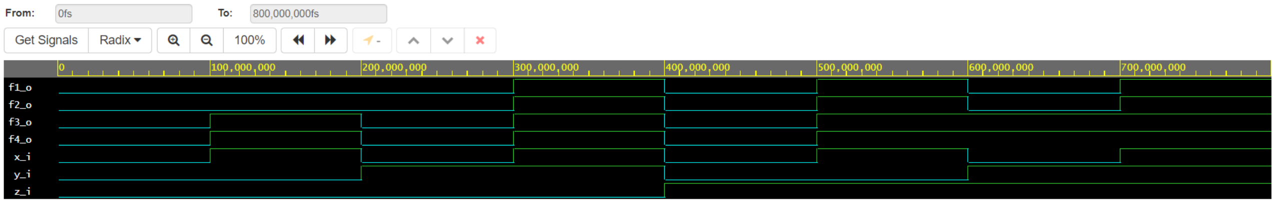
3rd part verification of Distributive laws

Source code from design.vhd of Architecture

```
------------------------------------------------------------------------
-- Architecture body for basic gates
------------------------------------------------------------------------
--Distributive laws equations and its functions
architecture dataflow of gates is
begin
    f1_o <= (x_i and y_i) or (x_i and z_i);
    f2_o <= x_i and (y_i or z_i);
    f3_o <= (x_i or y_i) and (x_i or z_i);
    f4_o <= x_i or (y_i and z_i);

end architecture dataflow;
```

Screenshot of simulated time waweforms to see if f1=f2 and f3=f4, it does



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Link to my EDA Playground of Distributed laws

Distributed laws EDA Playground