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1  ----------------------------------------------------------------------------------
2  -- Company: GRUPO 9 - ED I
3  -- Engineers: Collante Gerardo; Ferraris Domingo
4  --
5  -- Create Date:    19:23:48 05/20/2017
6  -- Module Name:    ALUv2 - Behavioral
7  -- Target Devices: Spartan 3E
8  -- Description:
9  ----------------------------------------------------------------------------------
10
11 library IEEE;
12 use IEEE.STD_LOGIC_1164.ALL;
13 use IEEE.STD_LOGIC_ARITH.ALL;
14 use IEEE.STD_LOGIC_UNSIGNED.ALL;
15
16 entity ALU4Bit is
17     Port ( A : in  STD_LOGIC_VECTOR (3 DOWNTO 0);
18            B : in  STD_LOGIC_VECTOR (3 DOWNTO 0);
19            OP : in  STD_LOGIC_VECTOR (3 DOWNTO 0); --SumRestNandXor (SRNX)
20            RTA : out  STD_LOGIC_VECTOR (6 DOWNTO 0);
21            CN : out STD_LOGIC_VECTOR (1 DOWNTO 0);
22            ZERO : out STD_LOGIC
23            );
24 end ALU4Bit;
25
26 architecture Behavioral of ALU4Bit is
27    signal aux_res : STD_LOGIC_VECTOR (4 DOWNTO 0) := "00000";
28    signal aux_sum : STD_LOGIC_VECTOR (4 DOWNTO 0) := "00000";
29    signal aux_rta : STD_LOGIC_VECTOR (3 DOWNTO 0) := "0000";
30       signal aux_display : STD_LOGIC_VECTOR (6 DOWNTO 0) := "0000000";
31 begin
32
33 --SUMA
34    aux_sum <= ('0'&A) + ('0'&B);
35
36 --RESTA
37    aux_res <= '0'&(A-B) when A > B else
38               '1'&(B-A) when A < B else
39               "00000";
40 --XOR
41 --NAND
42
43 with OP select
44    aux_rta <= aux_sum(3) & aux_sum(2) & aux_sum(1) & aux_sum(0) when "1000",
45               aux_res(3) & aux_res(2) & aux_res(1) & aux_res(0) when "0100",
46               A xor B when "0010",
47               A nand B when "0001",
48               "0000" when others;
49 --INDICADORES CNZ
50 with OP select
51    CN <= aux_sum(4) & '0' when "1000",
52          '0' & aux_res(4) when  "0100",
53          "00" when others;
54 with aux_rta select
55    ZERO <= '1' when "0000",
56             '0' when others;
57 --DECODER
58
59 -- segment encoinputg
60 --      0
61 --     ---
```

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62          --  5 |   | 1
63          --      ---   <- 6
64          --  4 |   | 2
65          --      ---
66          --       3
67
68          with aux_rta select
69             aux_display <= "1111001" when "0001",   --1
70                            "0100100" when "0010",   --2
71                            "0110000" when "0011",   --3
72                            "0011001" when "0100",   --4
73                            "0010010" when "0101",   --5
74                            "0000010" when "0110",   --6
75                            "1111000" when "0111",   --7
76                            "0000000" when "1000",   --8
77                            "0010000" when "1001",   --9
78                            "0001000" when "1010",   --A
79                            "0000011" when "1011",   --b
80                            "1000110" when "1100",   --C
81                            "0100001" when "1101",   --d
82                            "0000110" when "1110",   --E
83                            "0001110" when "1111",   --F
84                            "1000000" when others;   --0
85          RTA <= not aux_display;
86
87          end Behavioral;
88
```