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1  -----
2  -- This component synchronizes input signals produced from outside the
3  -- board with the clock signal on the board. This is done to avoid
4  -- metastability. Also this component makes sure that these signals will
5  -- only be asserted for one clock cycle each, even if the input signals
6  -- are asserted from outside the board for several clock cycles.
7  -----
8
9  library ieee;
10 use ieee.std_logic_1164.all;
11
12 entity input_synchronizer is
13     port(clock      : in  std_logic;
14           buy_btn    : in  std_logic;
15           buy_out    : out std_logic;
16           coin1_btn  : in  std_logic;
17           coin1_out  : out std_logic;
18           coin2_btn  : in  std_logic;
19           coin2_out  : out std_logic;
20           coin5_btn  : in  std_logic;
21           coin5_out  : out std_logic;
22           cola_sw    : in  std_logic;
23           cola_out   : out std_logic;
24           hash_sw    : in  std_logic;
25           hash_out   : out std_logic;
26           aqua_sw    : in  std_logic;
27           aqua_out   : out std_logic;
28           Reset      : in  std_logic);
29 end input_synchronizer;
30
31 architecture Structure of input_synchronizer is
32     signal buy_btn_synk, buy_btn_synk_new    : std_logic;
33     signal coin1_btn_synk, coin1_btn_synk_new : std_logic;
34     signal coin2_btn_synk, coin2_btn_synk_new : std_logic;
35     signal coin5_btn_synk, coin5_btn_synk_new : std_logic;
36     signal cola_sw_synk, cola_sw_synk_new    : std_logic;
37     signal hash_sw_synk, hash_sw_synk_new    : std_logic;
38     signal aqua_sw_synk, aqua_sw_synk_new    : std_logic;
39
40 begin
41
42     -----
43     -- the seven processes below asserts the signal_out only when
44     -- the synkd version of the input signal is '1' and the synk_new
45     -- version of the input signal is '0'. This makes signal_out
46     -- last for exactly one clock cycle.
47     -----
48
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49  -- buy button
50  process(buy_btn_synk)
51  begin
52      buy_out <= '0';
53      if buy_btn_synk = '1' AND buy_btn_synk_new = '0' then
54          buy_out <= '1';
55      end if;
56  end process;
57
58  -- coin1 button
59  process(coin1_btn_synk)
60  begin
61      coin1_out <= '0';
62      if coin1_btn_synk = '1' AND coin1_btn_synk_new = '0' then
63          coin1_out <= '1';
64      end if;
65  end process;
66
67  -- coin2 button
68  process(coin2_btn_synk)
69  begin
70      coin2_out <= '0';
71      if (coin2_btn_synk = '1' AND coin2_btn_synk_new = '0') then
72          coin2_out <= '1';
73      end if;
74  end process;
75
76  -- coin5 button
77  process(coin5_btn_synk)
78  begin
79      coin5_out <= '0';
80      if coin5_btn_synk = '1' AND coin5_btn_synk_new = '0' then
81          coin5_out <= '1';
82      end if;
83  end process;
84
85  -- cola switch
86  process(cola_sw_synk)
87  begin
88      cola_out <= '0';
89      if cola_sw_synk = '1' AND cola_sw_synk_new = '0' then
90          cola_out <= '1';
91      end if;
92  end process;
93
94  -- hash switch
95  process(hash_sw_synk)
96  begin
```

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97     hash_out <= '0';
98     if hash_sw_synk = '1' AND hash_sw_synk_new = '0' then
99         hash_out <= '1';
100     end if;
101 end process;
102
103 -- aqua switch
104 process(aqua_sw_synk)
105 begin
106     aqua_out <= '0';
107     if aqua_sw_synk = '1' AND aqua_sw_synk_new = '0' then
108         aqua_out <= '1';
109     end if;
110 end process;
111
112 -----
113 -- This process keeps updating registers
114 -- on every rising clock edge
115 -----
116 process(clock)
117 begin
118     if rising_edge(clock) then
119         -- buy button
120         buy_btn_synk      <= buy_btn;
121         buy_btn_synk_new <= buy_btn_synk;
122
123         -- coin1 button
124         coin1_btn_synk    <= coin1_btn;
125         coin1_btn_synk_new <= coin1_btn_synk;
126
127         -- coin2 button
128         coin2_btn_synk    <= coin2_btn;
129         coin2_btn_synk_new <= coin2_btn_synk;
130
131         -- coin5 button
132         coin5_btn_synk    <= coin5_btn;
133         coin5_btn_synk_new <= coin5_btn_synk;
134
135         -- cola switch
136         cola_sw_synk     <= cola_sw;
137         cola_sw_synk_new <= cola_sw_synk;
138
139         -- hash switch
140         hash_sw_synk     <= hash_sw;
141         hash_sw_synk_new <= hash_sw_synk;
142
143         -- aqua switch
144         aqua_sw_synk     <= aqua_sw;
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145         aqua_sw_synk_new <= aqua_sw_synk;  
146     end if;  
147 end process;  
148  
149 end Structure;
```