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1  ----------------------------------------------------------------------------
2  -- Top component of the vending machine for the course:
3  -- 02139 Digital electronics 2 at the Technical University of Denmark
4  --
5  -- This component declares and instantiates all the components of the
6  -- vending machine.
7  ----------------------------------------------------------------------------
8
9  library ieee;
10 use ieee.std_logic_1164.all;
11 use ieee.numeric_std.all;
12
13 entity vending_machine is
14     port(clk_50    : in  std_logic;
15          clk_man   : in  std_logic;
16          sel_man   : in  std_logic;
17          reset     : in  std_logic;
18          coin1_btn : in  std_logic;
19          coin2_btn : in  std_logic;
20          coin5_btn : in  std_logic;
21          buy_btn   : in  std_logic;
22          cola_sw   : in  std_logic;
23          hash_sw   : in  std_logic;
24          aqua_sw   : in  std_logic;
25          an        : out std_logic_vector(3 downto 0);
26          led       : out std_logic_vector(1 to 8));
27 end vending_machine;
28
29 architecture struct of vending_machine is
30     signal clk                                  : std_logic;
31     signal clk_3                                : std_logic;
32     signal buy                                  : std_logic;
33     signal coin1, coin2, coin5                  : std_logic;
34     signal price_cola, price_hash, price_aqua : std_logic;
35     signal alarm, cola, aqua, hash              : std_logic;
36     signal sum, price                           : unsigned(5 downto 0);
37
38     -------------------------
39     -- Component declarations
40     -------------------------
41     component clock_manager is
42         port(clk_50  : in  std_logic;
43              clk_man : in  std_logic;
44              sel_man : in  std_logic;
45              clk     : out std_logic;
46              clk_3   : out std_logic);
47     end component;
48
```

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49      component display_driver is
50          port(price : in  unsigned(5 downto 0);
51               sum   : in  unsigned(5 downto 0);
52               an    : out std_logic_vector(3 downto 0);
53               reset : in  std_logic;
54               clock : in  std_logic;
55               clk_3 : in  std_logic;
56               alarm : in  std_logic;
57               cola  : in  std_logic;
58               hash  : in  std_logic;
59               aqua  : in  std_logic;
60               led   : out std_logic_vector(1 to 8));
61      end component;
62
63      component input_synchronizer is
64          port(clock     : in  std_logic;
65               buy_btn   : in  std_logic;
66               buy_out   : out std_logic;
67               coin1_btn : in  std_logic;
68               coin1_out : out std_logic;
69               coin2_btn : in  std_logic;
70               coin2_out : out std_logic;
71               coin5_btn : in  std_logic;
72               coin5_out : out std_logic;
73               cola_sw   : in  std_logic;
74               cola_out  : out std_logic;
75               hash_sw   : in  std_logic;
76               hash_out  : out std_logic;
77               aqua_sw   : in  std_logic;
78               aqua_out  : out std_logic;
79               Reset     : in  std_logic);
80
81      end component;
82
83      component processing_unit is
84          port(clock      : in  std_logic;
85               buy        : in  std_logic;
86               coin1      : in  std_logic;
87               coin2      : in  std_logic;
88               coin5      : in  std_logic;
89               price_cola : in  std_logic;
90               price_hash : in  std_logic;
91               price_aqua : in  std_logic;
92               Reset      : in  std_logic;
93               sum_out    : out unsigned(5 downto 0);
94               price_out  : out unsigned(5 downto 0);
95               alarm_out  : out std_logic;
96               cola_out   : out std_logic;
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97              hash_out   : out std_logic;
98              aqua_out   : out std_logic);
99      end component;
100
101 ---------------------
102 -- signal assignments
103 ---------------------
104
105 begin
106     clock_manager1 : clock_manager
107         port map(clk_50  => clk_50,
108                  clk_man => clk_man,
109                  sel_man => sel_man,
110                  clk     => clk,
111                  clk_3   => clk_3);
112
113     display_driver1 : display_driver
114         port map(sum   => sum,
115                  price => price,
116                  an    => an,
117                  reset => reset,
118                  clock => clk,
119                  clk_3 => clk_3,
120                  alarm => alarm,
121                  cola  => cola,
122                  hash  => hash,
123                  aqua  => aqua,
124                  led   => led);
125
126     input_synchronizer1 : input_synchronizer
127         port map(clock     => clk,
128                  buy_btn   => buy_btn,
129                  buy_out   => buy,
130                  coin1_btn => coin1_btn,
131                  coin1_out => coin1,
132                  coin2_btn => coin2_btn,
133                  coin2_out => coin2,
134                  coin5_btn => coin5_btn,
135                  coin5_out => coin5,
136                  cola_sw   => cola_sw,
137                  cola_out  => price_cola,
138                  hash_sw   => hash_sw,
139                  hash_out  => price_hash,
140                  aqua_sw   => aqua_sw,
141                  aqua_out  => price_aqua,
142                  Reset     => reset);
143
144     processing_unit1 : processing_unit
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```
145         port map(clock      => clk,
146                  buy        => buy,
147                  coin1      => coin1,
148                  coin2      => coin2,
149                  coin5      => coin5,
150                  price_cola => price_cola,
151                  price_hash => price_hash,
152                  price_aqua => price_aqua,
153                  Reset      => reset,
154                  sum_out    => sum,
155                  price_out  => price,
156                  alarm_out  => alarm,
157                  cola_out   => cola,
158                  hash_out   => hash,
159                  aqua_out   => aqua);
160
161 end struct;
162
```