```
 1:  library IEEE;
 2:  use IEEE.std_logic_1164.all;
 3:
 4:  entity control_logic is
 5:     port (
 6:        clock: in STD_LOGIC;
 7:        reset: in STD_LOGIC;
 8:        scounter: in STD_LOGIC_VECTOR(2 downto 0) ;
 9:        instruction: in STD_LOGIC_VECTOR(7 downto 0);
10:        r0_bus: out STD_LOGIC;
11:        r1_bus: out STD_LOGIC;
12:        ld_out: out STD_LOGIC;
13:        lsl_r0: out STD_LOGIC;
14:        lsl_r1: out STD_LOGIC;
15:        swap_r0_r1: out STD_LOGIC;
16:        ld_r0: out STD_LOGIC;
17:        ld_r1: out STD_LOGIC;
18:        clr_r0: out STD_LOGIC;
19:        clr_r1: out STD_LOGIC;
20:        clr_temp: out STD_LOGIC;
21:        clr_out: out STD_LOGIC;
22:        ld_temp: out STD_LOGIC;
23:        clr_mbr: out STD_LOGIC;
24:        clr_mar1: out STD_LOGIC;
25:        ld_mar1: out STD_LOGIC;
26:        ld_mbr: out STD_LOGIC;
27:        clr_pc: out STD_LOGIC;
28:        clr_ir: out STD_LOGIC;
29:        ld_pc: out STD_LOGIC;
30:        ld_ir: out STD_LOGIC;
31:        clr_scntr: out STD_LOGIC;
32:        ceb: out STD_LOGIC;
33:        oeb: out STD_LOGIC;
34:        web: out STD_LOGIC;
35:        temp_bus: out STD_LOGIC
36:     );
37:  end control_logic;
38:
39:  architecture control_logic_arch of control_logic is
40:  begin
41:    process(instruction, clock, scounter)
42:                  begin
43:                  if(clock'event and clock = '1') then
44:                              case instruction(7 downto 4) is
45:
46:                                          -- R0 > OUT
47:                                          when "0000" =>          if(scounter="000") then
48:                                                                  r0_bus <= '1';
49:                                                                  ld_out <= '1';
50:                                                                  clr_scntr <= '1';
51:                                                                  end if;
52:
53:                                          -- R1 > OUT
54:                                          when "0001" =>          if(scounter="000") then
55:                                                                  r1_bus <= '1';
56:                                                                  ld_out <= '1';
57:                                                                  clr_scntr <= '1';
58:                                                                  end if;
59:
60:                                          -- RO < LSL R0
```

```
61:                                     when "0010" =>          if(scounter="000") then
62:                                                             lsl_r0 <= '1';
63:                                                             clr_scntr <= '1';
64:                                                             end if;
65:
66:                                     -- R1 < LSL R1
67:                                     when "0011" =>          if(scounter="000") then
68:                                                             lsl_r1 <= '1';
69:                                                             clr_scntr <= '1';
70:                                                             end if;
71:
72:                                     -- R0 > TMP ; R1 > R0 ; TMP > R1
73:                                     when "0100" =>          if(scounter="000") then
74:                                                             swap_r0_r1 <= '1';
75:                                                             r0_bus <= '1';
76:                                                             ld_temp <= '1';
77:                                                             r1_bus <= '1';
78:                                                             ld_r0 <= '1';
79:                                                             temp_bus <= '1';
80:                                                             ld_r1 <= '1';
81:                                                             clr_scntr <= '1';
82:                                                             end if;
83:                                     -- R0 < MEM
84:                                     when "0101" =>          if(scounter="000") then
85:                                                             ld_r0 <= '1';
86:                                                             ceb <= '0';
87:                                                             oeb <= '0';
88:                                                             web <= '1';
89:                                                             end if;
90:
91:                                     -- R1 < MEM
92:                                     when "0110" =>          if(scounter="000") then
93:                                                             ld_r1 <= '1';
94:                                                             ceb <= '0';
95:                                                             oeb <= '0';
96:                                                             web <= '1';
97:                                                             end if;
98:
99:                                     -- MEM < R0
100:                                    when "0111" =>          if(scounter="000") then
101:                                                            r0_bus <= '1';
102:                                                            ceb <= '0';
103:                                                            oeb <= '1';
104:                                                            web <= '0';
105:                                                            end if;
106:
107:                                    -- MEM < R1
108:                                    when "1000" => if(scounter="000") then
109:                                                            r1_bus <= '1';
110:                                                            ceb <= '0';
111:                                                            oeb <= '1';
112:                                                            web <= '0';
113:                                                            end if;
114:
115:                                    when others => null;
116:                            end case;
117:                    end if;
118:                    end process;
119:    end control_logic_arch;
```