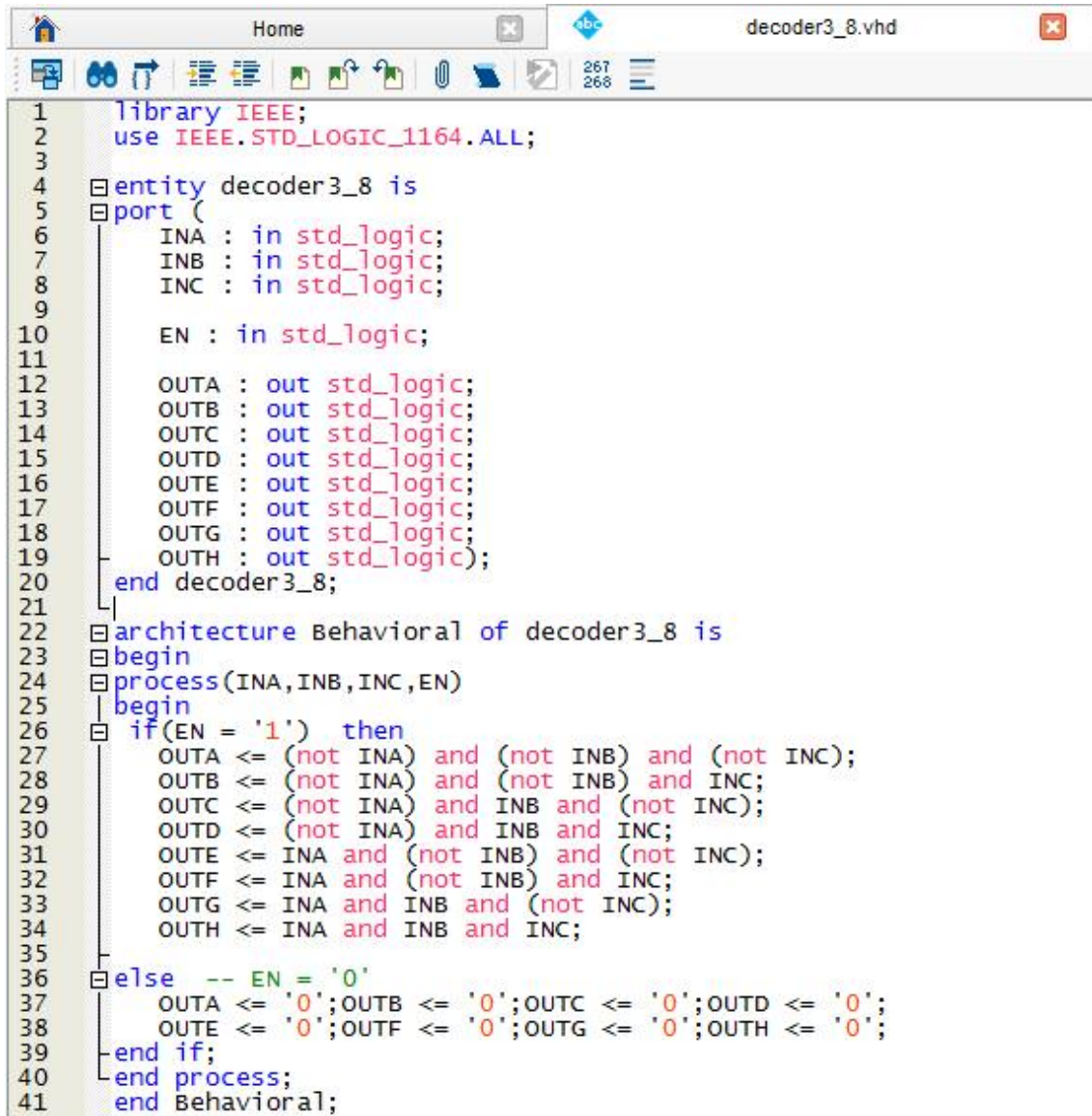


- VHDL code



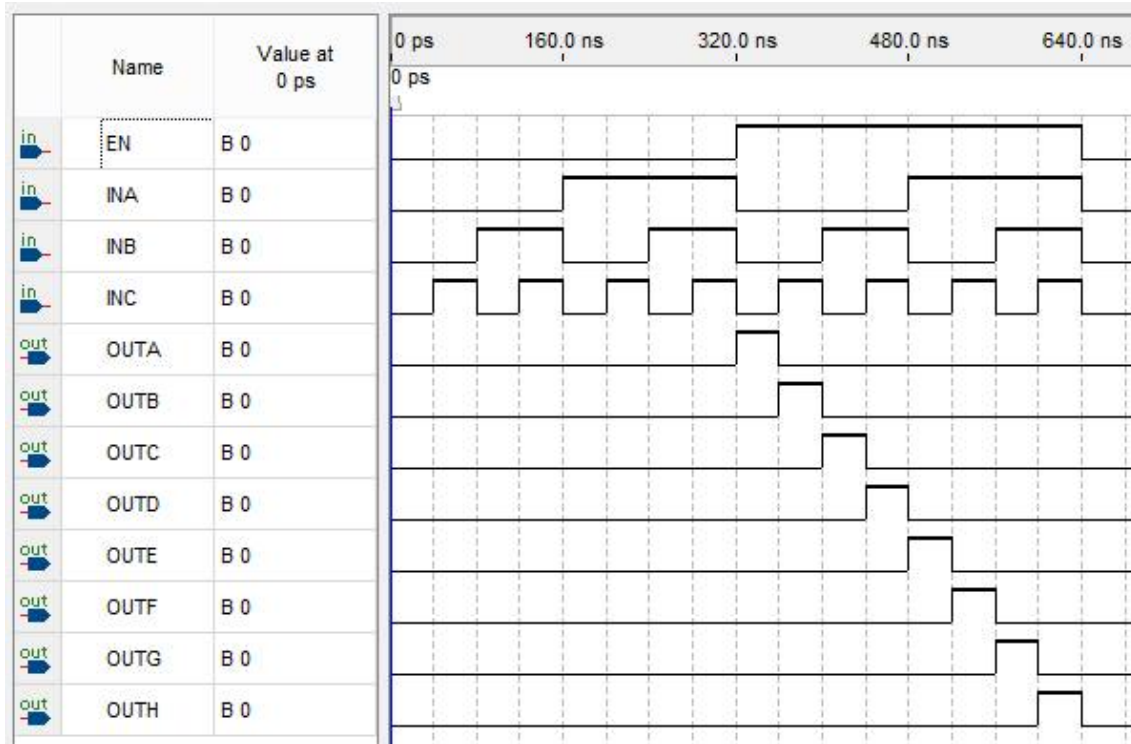
```

1  library IEEE;
2  use IEEE.STD_LOGIC_1164.ALL;
3
4  entity decoder3_8 is
5  port (
6      INA : in std_logic;
7      INB : in std_logic;
8      INC : in std_logic;
9
10     EN : in std_logic;
11
12     OUTA : out std_logic;
13     OUTB : out std_logic;
14     OUTC : out std_logic;
15     OUTD : out std_logic;
16     OUTE : out std_logic;
17     OUTF : out std_logic;
18     OUTG : out std_logic;
19     OUTH : out std_logic);
20 end decoder3_8;
21
22 architecture Behavioral of decoder3_8 is
23 begin
24     process(INA,INB,INC,EN)
25     begin
26         if(EN = '1') then
27             OUTA <= (not INA) and (not INB) and (not INC);
28             OUTB <= (not INA) and (not INB) and INC;
29             OUTC <= (not INA) and INB and (not INC);
30             OUTD <= (not INA) and INB and INC;
31             OUTE <= INA and (not INB) and (not INC);
32             OUTF <= INA and (not INB) and INC;
33             OUTG <= INA and INB and (not INC);
34             OUTH <= INA and INB and INC;
35         else -- EN = '0'
36             OUTA <= '0'; OUTB <= '0'; OUTC <= '0'; OUTD <= '0';
37             OUTE <= '0'; OUTF <= '0'; OUTG <= '0'; OUTH <= '0';
38         end if;
39     end process;
40 end Behavioral;
41

```

- INA, INB, INC for input
- EN for input (enable signal)
- OUTA, OUTB, OUTC, OUTD, OUTE, OUTF, OUTG, OUTH for output

- Screenshot of the waveform for test



- Explanation
- Truth Table for decoder 3 to 8

INA	INB	INC	EN	OUTA	OUTB	OUTC	OUTD	OUTE	OUTF	OUTG	OUTH
0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	0
0	1	1	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	0	0	0	0	0	0
0	0	1	1	0	1	0	0	0	0	0	0
0	1	0	1	0	0	1	0	0	0	0	0
0	1	1	1	0	0	0	1	0	0	0	0
1	0	0	1	0	0	0	0	1	0	0	0
1	0	1	1	0	0	0	0	0	1	0	0
1	1	0	1	0	0	0	0	0	0	1	0
1	1	1	1	0	0	0	0	0	0	0	1

decoder is a combinational logic circuit that converts a binary integer value to an associated pattern of output bits. 3 to 8 decoder has 3 inputs( INA, INB, INC ), 8 possible input binary numbers that match with OUTA, OUTB, OUTC, OUTD, OUTE, OUTF, OUTG, OUTH. 'EN' is enable signal. when 'EN' is 0, decoder dose not work.