Computer-Aided Design for VLSI Design
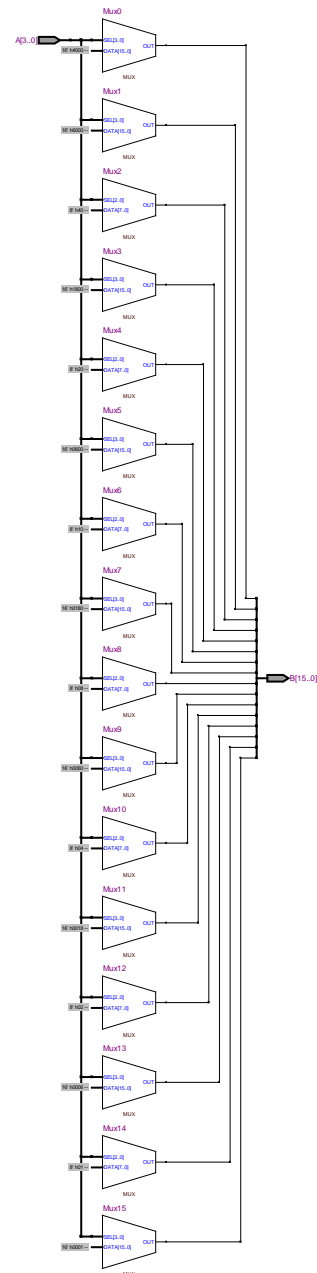
Homework1（Student ID: 61247046S｜Name: 鄭琮達）

1. Provide a simple explanation of your code.

    In my code, First I **include std_logic_1164 package** for using the std_logic, and I use **with A select B** method to implement my circuit. Below is my code and RTL Viewer.
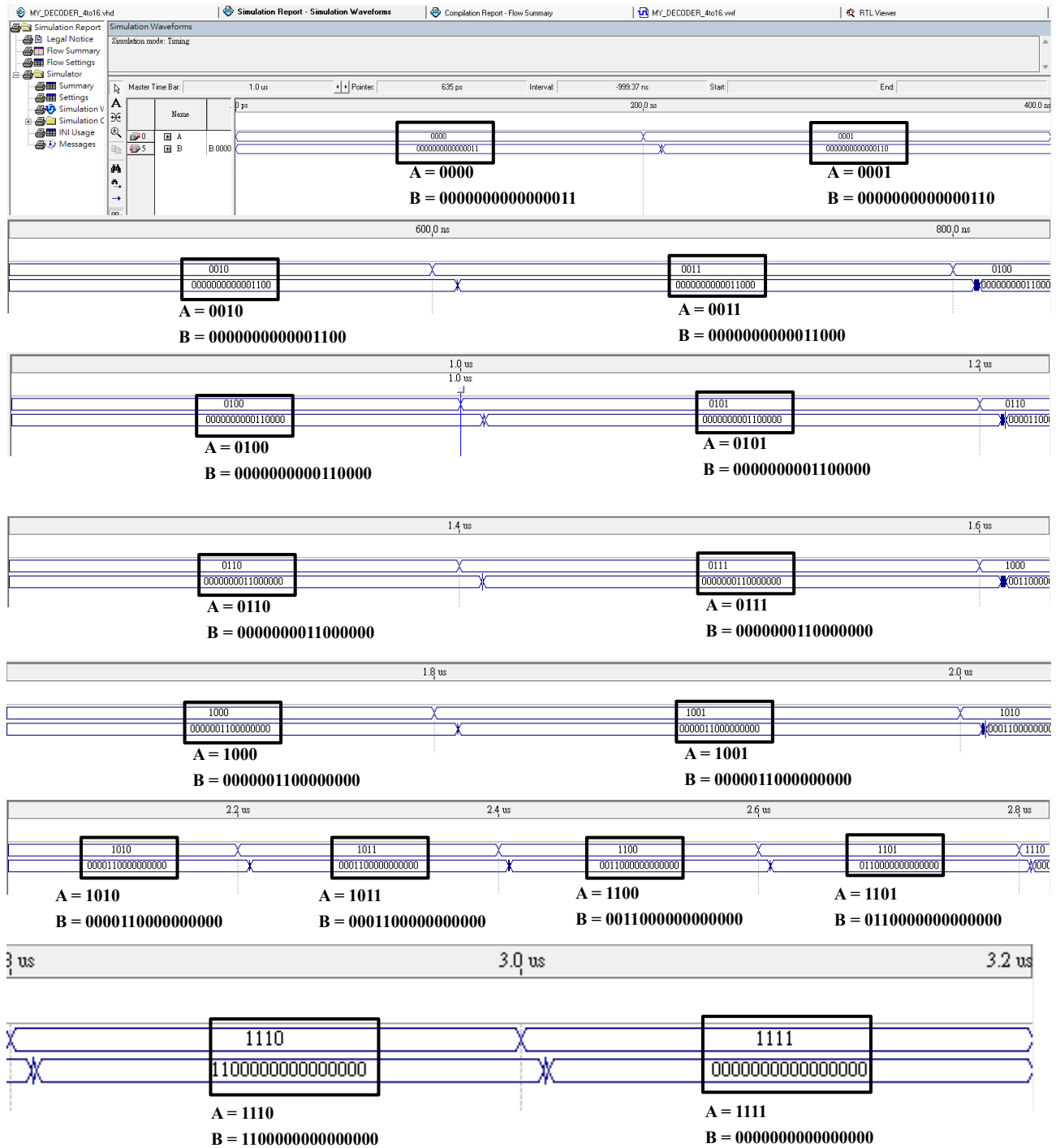
```vhdl
library ieee;
use ieee.std_logic_1164.all;


entity MY_DECODER_4to16 is
port(
            A : in std_logic_vector(3 downto 0);
            B : out std_logic_vector(15 downto 0)
            );
end MY_DECODER_4to16;


architecture DATAFLOW of MY_DECODER_4to16 is
begin
    with A select
        B <= "0000000000000011" when "0000",
             "0000000000000110" when "0001",
             "0000000000001100" when "0010",
             "0000000000011000" when "0011",
             "0000000000110000" when "0100",
             "0000000001100000" when "0101",
             "0000000011000000" when "0110",
             "0000000110000000" when "0111",
             "0000001100000000" when "1000",
             "0000011000000000" when "1001",
             "0000110000000000" when "1010",
             "0001100000000000" when "1011",
             "0011000000000000" when "1100",
             "0110000000000000" when "1101",
             "1100000000000000" when "1110",
             "0000000000000000" when "1111";
end DATAFLOW;
```

2. Waveform diagram here (Simulation Results)

MY_DECODER_4to16.vhd | Simulation Report - Simulation Waveforms | Compilation Report - Flow Summary | MY_DECODER_4to16.vwf | RTL Viewer

Simulation Report
- Legal Notice
- Flow Summary
- Flow Settings
- Simulator
  - Summary
  - Settings
  - Simulation V
  - Simulation C
  - INI Usage
  - Messages

Simulation Waveforms
Simulation mode: Timing

A = 0000
B = 0000000000000011

A = 0001
B = 0000000000000110

A = 0010
B = 0000000000001100

A = 0011
B = 0000000000011000

A = 0100
B = 0000000000110000

A = 0101
B = 0000000001100000

A = 0110
B = 0000000011000000

A = 0111
B = 0000000110000000

A = 1000
B = 0000001100000000

A = 1001
B = 0000011000000000

A = 1010
B = 0000110000000000

A = 1011
B = 0001100000000000

A = 1100
B = 0011000000000000

A = 1101
B = 0110000000000000

A = 1110
B = 1100000000000000

A = 1111
B = 0000000000000000

3. Reflections and discussions

From this assignment, I learned how to write code and interpret waveform diagrams.

Regarding waveform output, noise and delay are considered normal behavior.