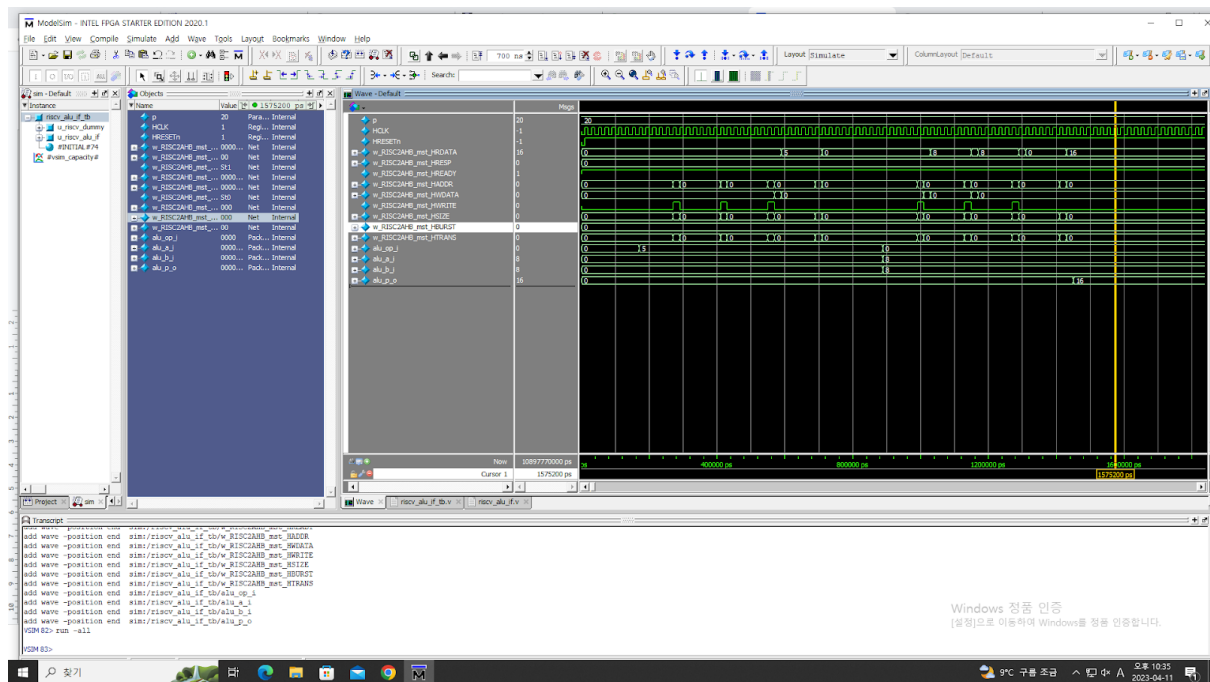**HW#05: AMBA Bus**

SATYAM (2023-81784)

Problem 1 (10p): ALU IP

Files -
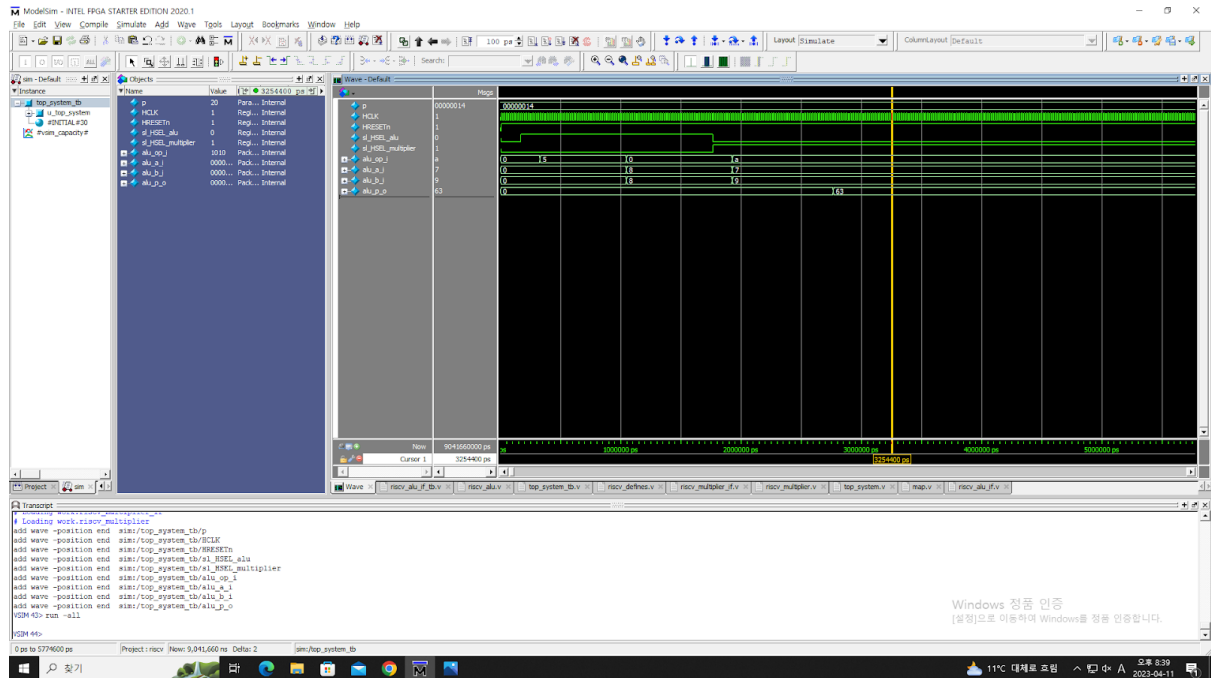
1. Code/ex1_alu_custom_ip/riscv_alu_if.v

Waveform -

Problem 2 (15p): Multi-AHB-Slave system

Files -

1. Code/ex2_multi_slave/riscv_alu_if.v

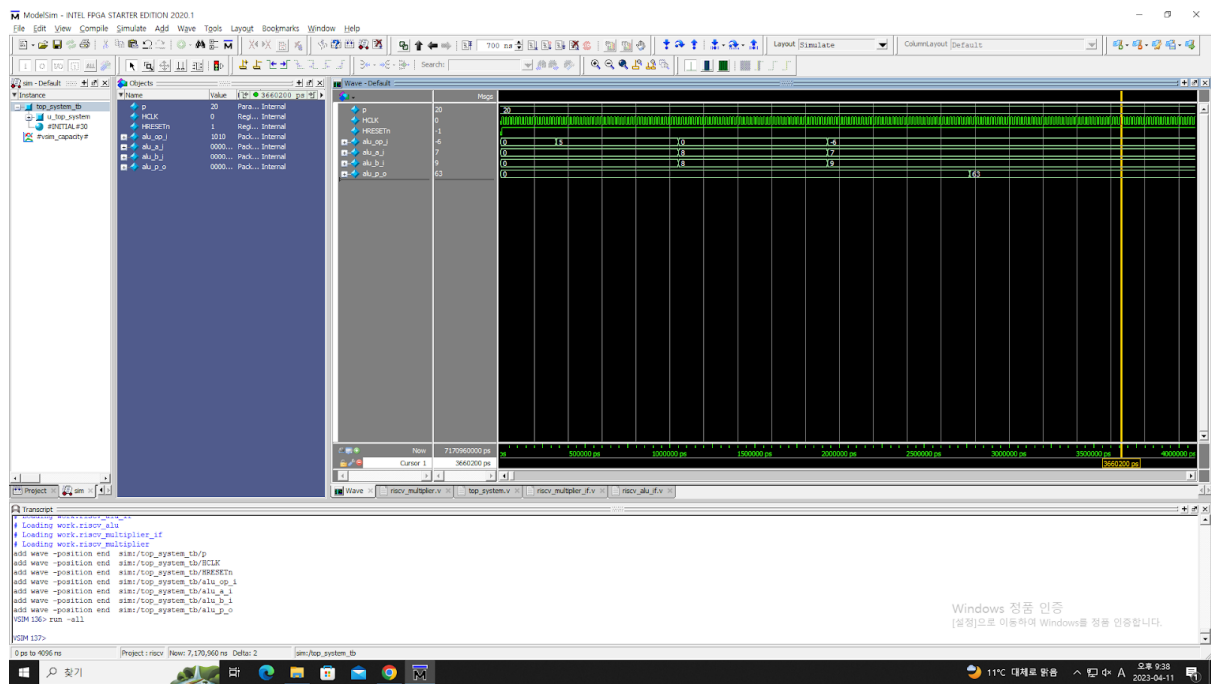2. Code/ex2_multi_slave/riscv_multiplier_if.v

Waveform -

Problem 3 (5p): AHB Decoder

Files -

1. Code/ex3_ahb_decoder/riscv_alu_if.v

2. Code/ex3_ahb_decoder/riscv_multiplier_if.v

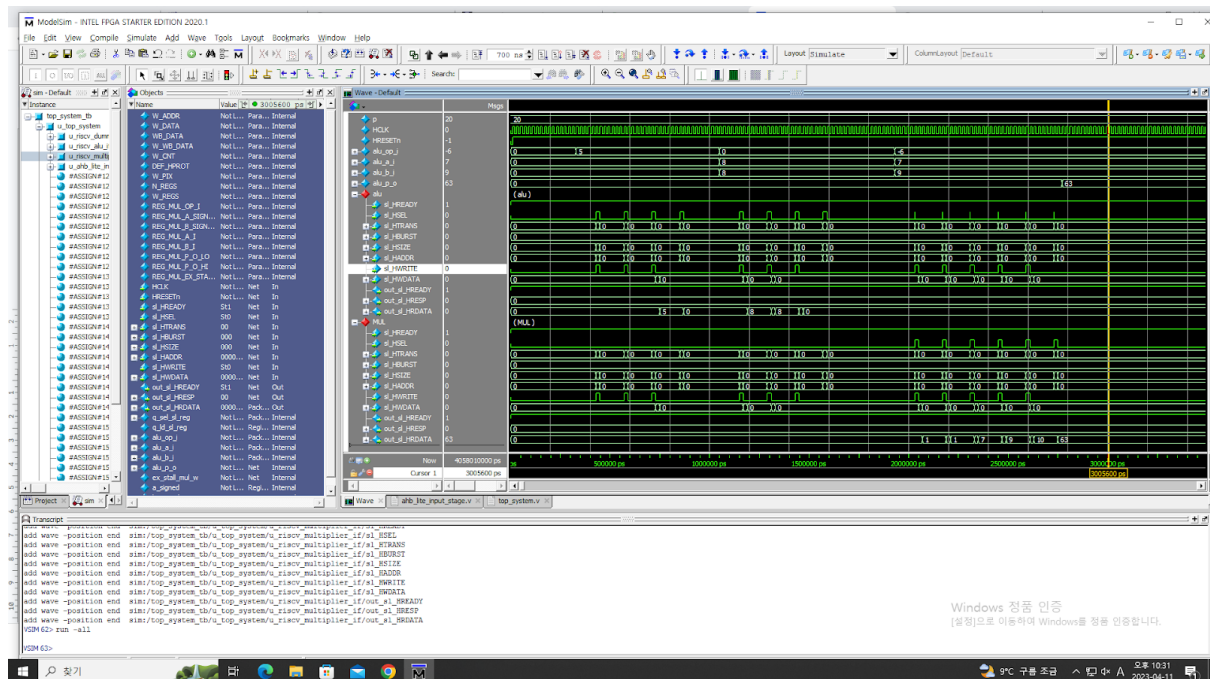3. Code/ex3_ahb_decoder/top_system.v

Waveform -

Problem 4 (10p): AHB Bus Interconnection

Files -

1. Code/ex4_ahb_interconnection/top_system.v

Waveform -

Problem 5 (3p) (Optional): Bonus

1.

1. q_sel_sl_reg: As the number of offset bytes is 4 for each word line, therefore we can ignore the last 2 LSBs. And we will use one more bit to get the information for a particular slave. So to get the address, we will need the number of registers (in binary) and ignore 2 LSBs. And we get the whole address from "sl_HADDR."

2. q_lg_sl_reg: we use "sl_HWRITE" as the input to get the data to read/write the data coming from the AHB Master.

2.   The address we use is 32-bit long. And as we saw in the previous question, we use 2 bits after 2 LSBs to define the address of a particular word line in a specific slave. And the bits after the base address are used to determine the operation need to be performed from the slave.

And in the file "map.v" everything is defined so we can understand what every bit means and what the master tells the slave to perform.