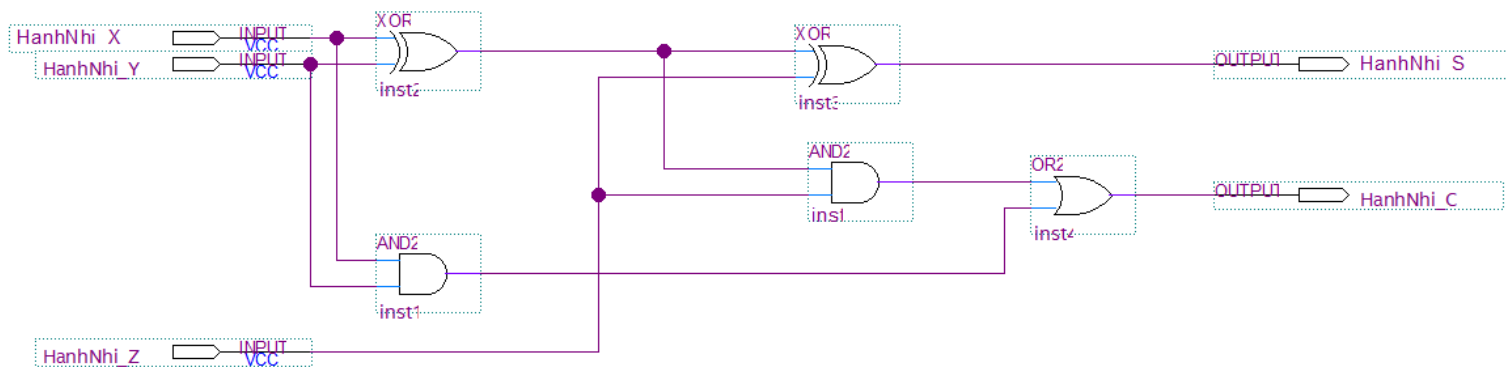


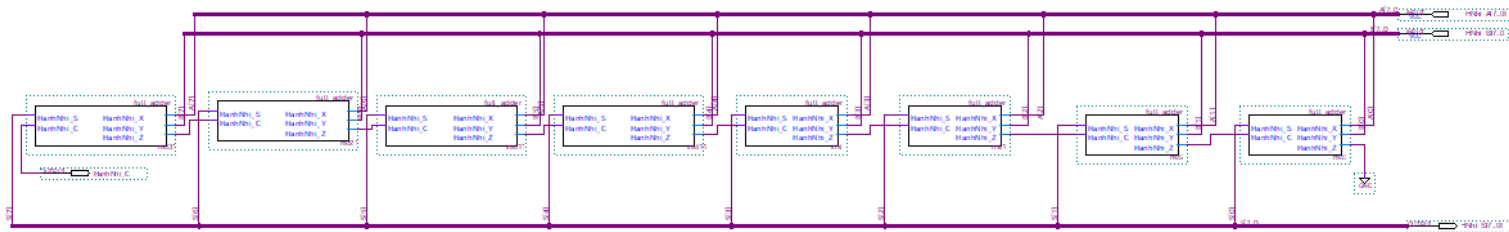
Assignment 1

1. Design the ALU that can perform 8-bit addition operation to implement the Add instruction.

- full adder



- 8 bits adder



2. Design a new instruction named GT (greater than). This instruction performs an 8-bit greater-than comparison. Add a new function in the ALU to implement the new instruction.

- a) Truth table:

A	B	PEQ	GT	EQ
0	0	0	0	0
0	0	1	0	1
0	1	0	0	0
0	1	1	0	0
1	0	0	0	0
1	0	1	1	0

1	1	0	0	0
1	1	1	0	1

b) K - Map:

GT		PEQ	
		0	1
AB	00		
	01		
	11		
	10		1

- $GT = AB'PEQ$

EQ		PEQ	
		0	1
AB	00		1
	01		
	11		1
	10		

- $EQ = A'B'PEQ + ABPEQ$

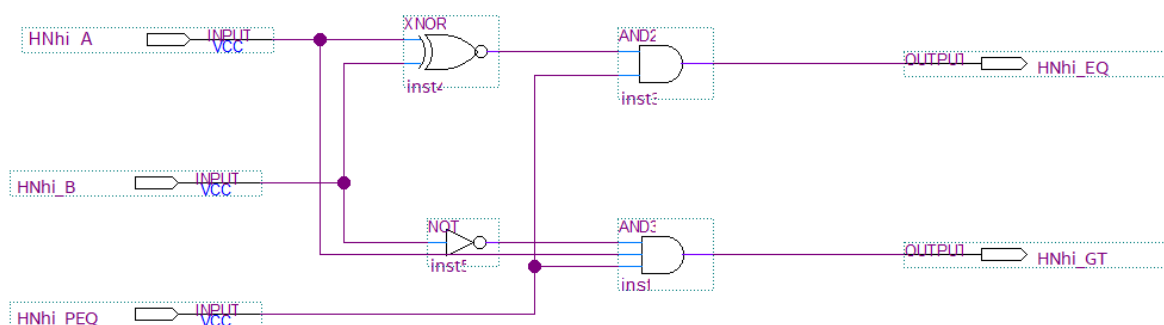
$$= PEQ(A'B' + AB)$$

$$= PEQ (A \oplus B)'$$

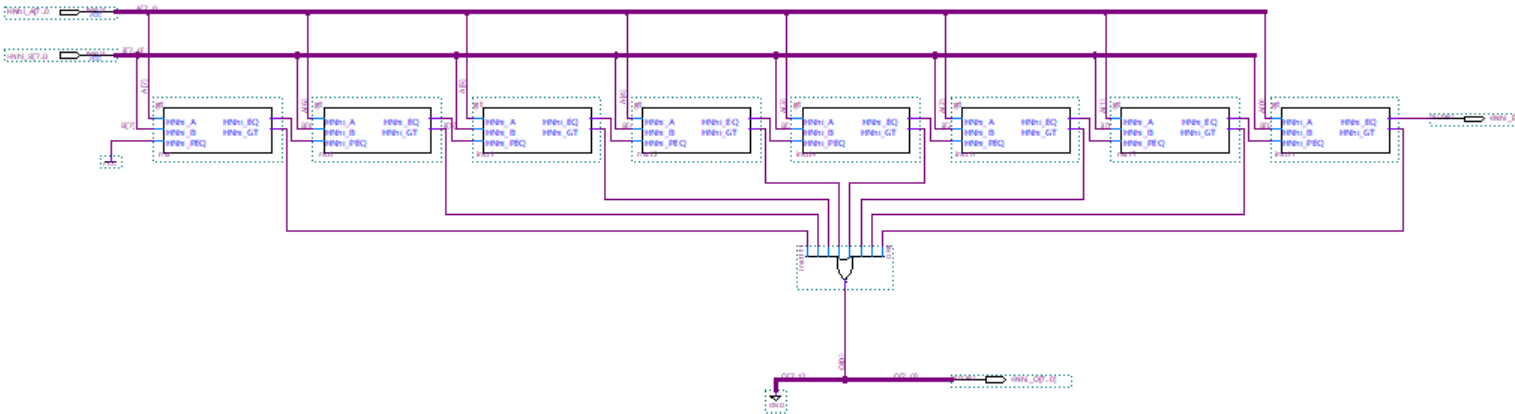
$$= PEQ (A \text{ XNOR } B)$$

c) Design a logic diagram:

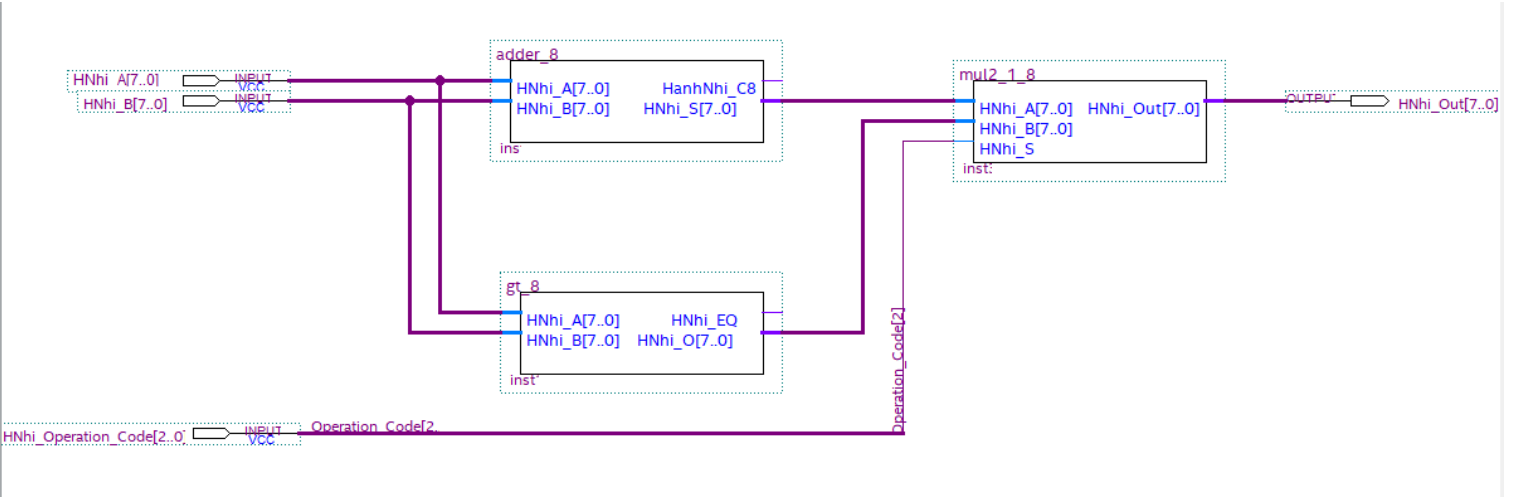
- greater:



- 8 bits greater:



- Add a new function in the ALU to implement the new instruction:



d) Simulate the circuit and check the result:

Name	Value at 0 ps	0 ps	20,0 ns	40,0 ns	60,0 ns	80,0 ns	100,0 ns	120,0 ns	140,0 ns	160,0 ns	180,0 ns	200,0 ns
> HNh_A	U 3	3	5	7	3	119	17		0			
> HNh_B	U 1	1	2	3	4	48	20	21	0			
> HNh_Operation_Code	U 1		1		5	1			0			
> HNh_Out	U 4	4	7	10	0	1	37	21	0			