

INTRODUCTION:

The 8-bit ALU (Arithmetic Logic Unit) is a crucial component in computer processors that manages fundamental arithmetic and logical operations. Operating with two operands, each of 8 bits in length, the 8-bit ALU performs addition and subtraction operations. In the addition process, the relevant bits of both operands are combined with the carry value, while subtraction involves comparing operands and subtracting with the carry value. The 8-bit ALU, especially utilized in retro computer systems and microcontrollers, efficiently executes basic calculations with advantages of low cost and power consumption.

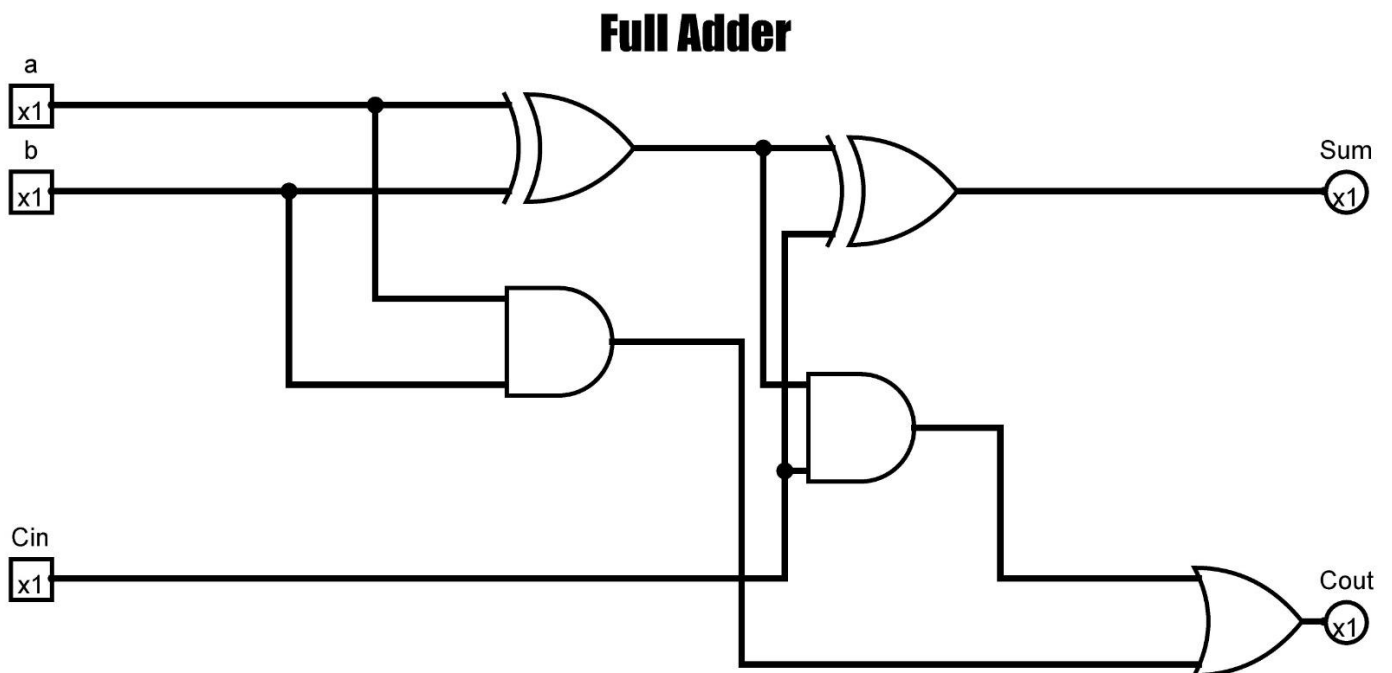


Figure 1:Full adder circuit in logism

1 Bit ALU

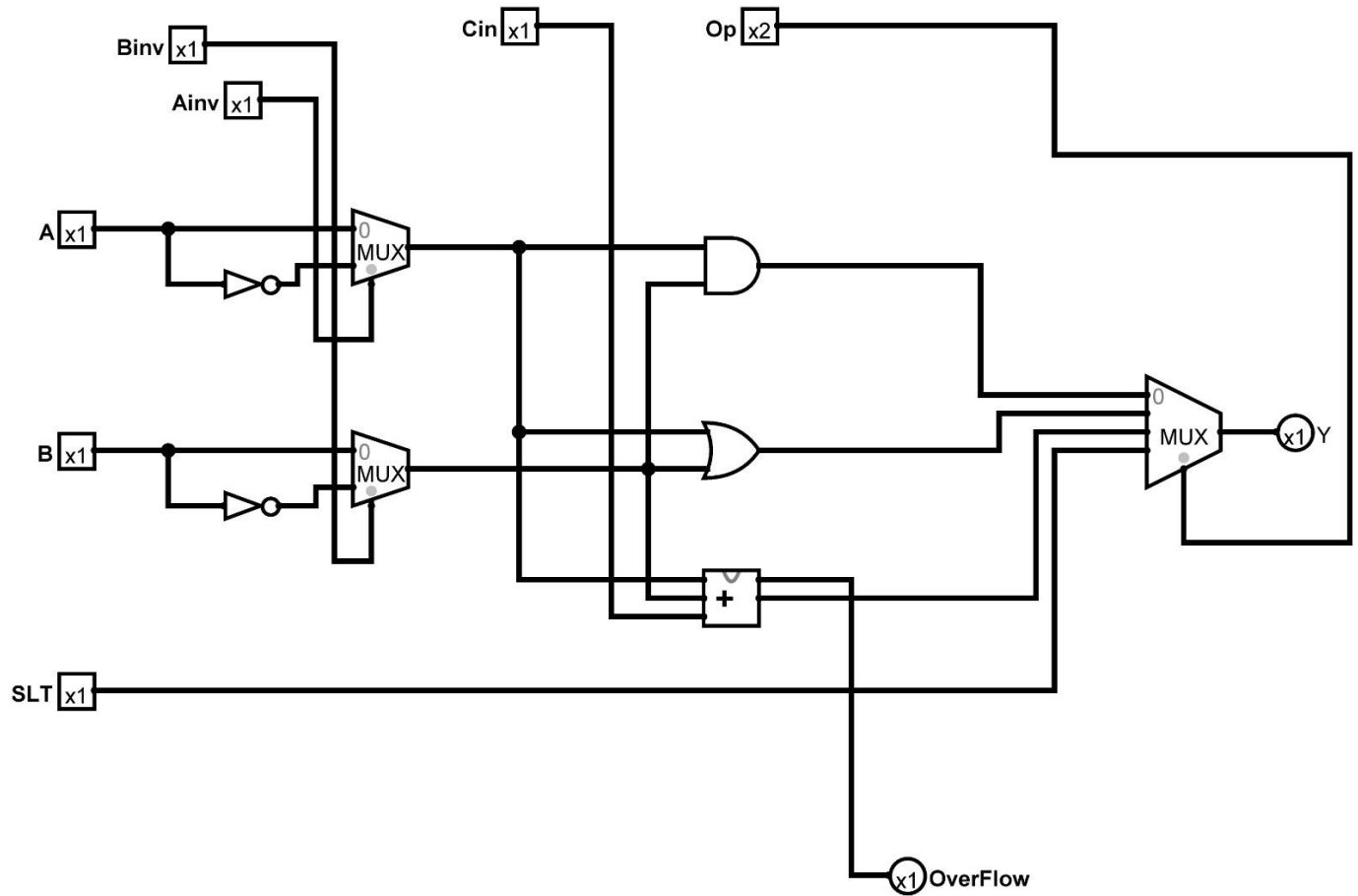


Figure 2: 1 bit arithmetic and logic unit in logism.

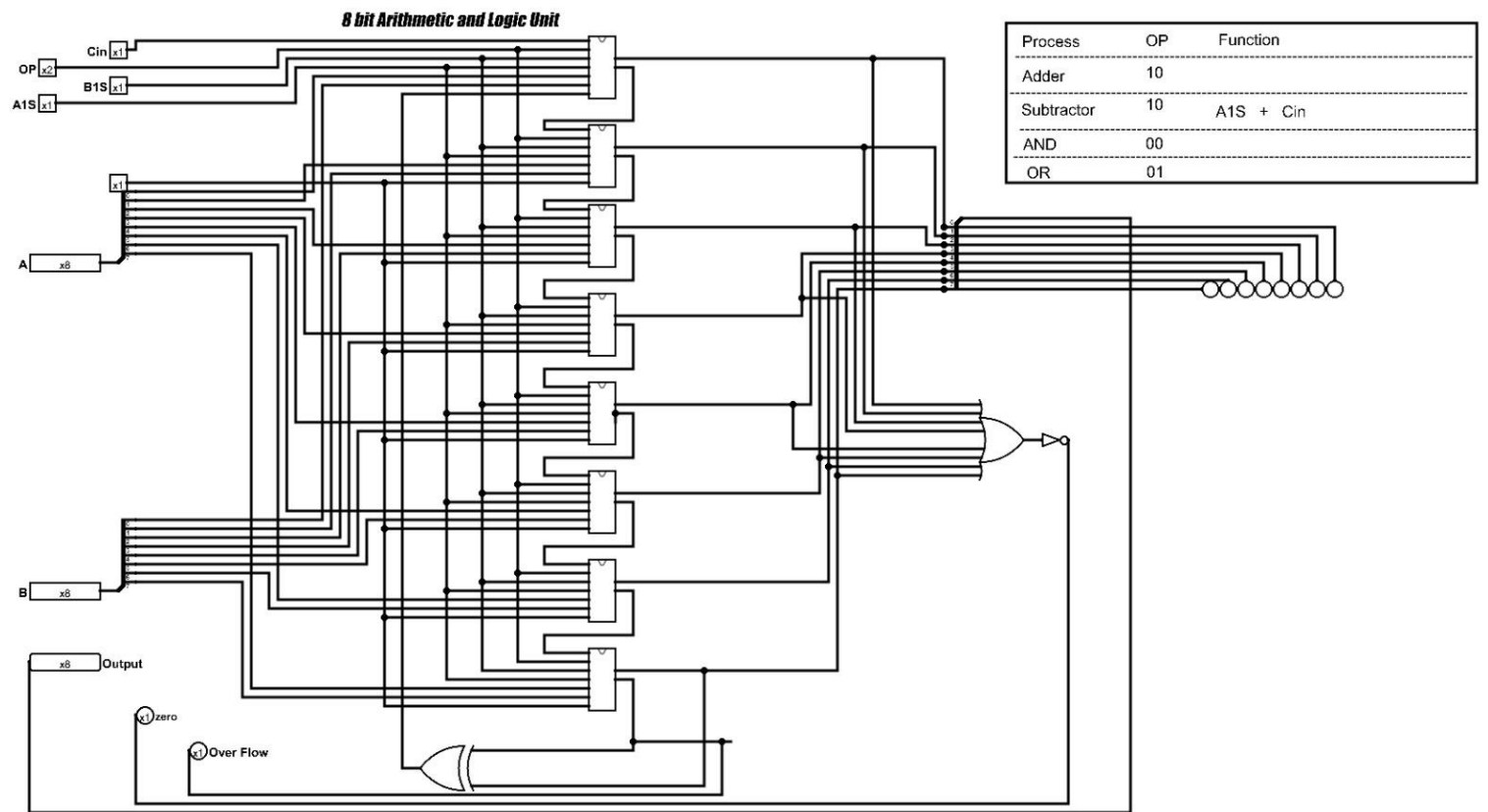


Figure 3: 8 bit arithmetic and logic unit in logism.

8-bit ALU SUM TRUTH TABLE:

A	B	Cin	SUM	Cout
00101101	01011100	0	10001001	0
11010011	01011100	0	00101111	1
10101010	11110000	0	10011010	1
01101001	00100101	0	10001110	0
11111111	00000000	0	11111111	0
01010101	10101010	0	11111111	0
10001000	01000100	0	11001100	0
00111100	11110011	0	00101111	1
11001100	00101010	0	11110110	0
00000001	11111110	0	11111111	0
11110000	00001111	0	11111111	0
10101010	01010101	0	11111111	0
11000011	10101010	0	01101101	1
01011010	01101011	0	11000101	0
11111111	11111111	0	11111110	1
00110011	11001100	0	11111111	0
10101100	01010010	0	11111110	0
01110010	10000110	0	11111000	0
11010110	01100110	0	00111100	1
00100111	10101001	0	11010000	0
01010101	01010101	0	10101010	0
11110011	00101001	0	00011100	1
00000000	11111111	0	11111111	0
11001010	10110101	0	01111111	1
10011101	00101010	0	11000111	0
01010101	10010001	0	11100110	0
11100011	11011111	0	11000010	1
10100101	01011010	0	11111111	0
01100101	10101010	0	00001111	1
10011100	01001010	0	11100110	0

8 bit ALU SUBTRACTION TRUTH TABLE:

A	B	BORROW	SUB
00101101	10011010	1	101101101
11010011	01011100	1	001110111
10101010	11110000	1	101000110
01101001	00100101	1	001000100
11111111	00000000	1	011111111
01010101	10101010	1	101010101
10001000	01000100	1	001000100
00111100	11110011	1	110110111
11001100	00101010	1	010100010
00000001	11111110	1	111111101
11110000	00001111	1	011100001
10101010	01010101	1	001010101
11000011	10101010	1	000011001
01011010	01101011	1	100010001
11111111	11111111	1	000000000
00110011	11001100	1	110011001
10101100	01010010	1	001011010
01110010	10000110	1	100010100
11010110	01100110	1	001110000
00100111	10101001	1	010000010
01010101	01010101	1	000000000
01010101	00101001	1	000101100
00000000	11111111	1	111111111
11001010	10110101	1	000010101
10011101	00101010	1	001110011
01010101	10010001	1	100111100
11100011	11011111	1	000000100
10100101	01011010	1	001001011
01100101	10101010	1	101000101
10011100	01001010	1	001010010

**If the most significant bit is 1, it is a negative number.