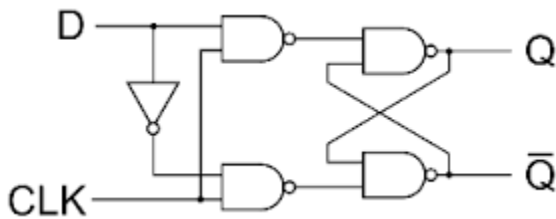


Computer Architecture. Logisim assignment #1.

PART A

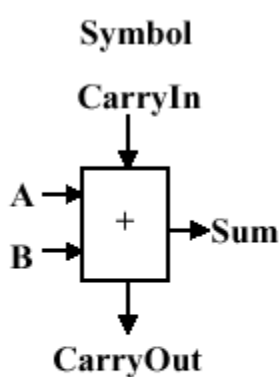


- 1) Build this circuit, making sure that you change the properties of the gates to "2 inputs" and the symbol size to narrow.
- 2) Feed the "D" input from a pin, a constant source of a "0" or a "1", making sure that you change the "three state" property to "NO".
- 3) Feed the CLK input using a push button, as that input always needs a pulse.
- 4) Place l.e.d.s on D, Q and the clock
- 5) Select your entire circuit and copy/paste to get 4 copies horizontally at the top of the canvas.
- 6) Finally, connect all clock lines together. You have made a 4-bit register!

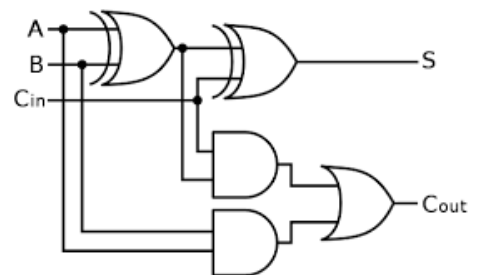
Set the 4 pins to a binary pattern, then pulse the CLK line once. Observe that the pattern appears on the output as the CLK input is pulsed. **Purpose of assignment:** to cement the notion of a collection of flip-flops acts as a register, which is storage for a multi-bit binary value.

PART B

Build a FULL-ADDER as explained in class, and put it onto the same canvas, under the register.



		Definition			
A	B	CarryIn	CarryOut	Sum	
0	0	0	0	0	
0	0	1	0	1	
0	1	0	0	1	
0	1	1	1	0	
1	0	0	0	1	
1	0	1	1	0	
1	1	0	1	0	
1	1	1	1	1	



Connect 3 pins to "A", "B" and "Cin". Connect l.e.d.s to these inputs and also to the Sum or "Σ", and the carry out.

Purpose: familiarity with the way computers perform arithmetic.

$$\begin{aligned}\text{CarryOut} &= (A*B*\text{CarryIn}) + (A*B*\text{CarryIn}) + (A*B*\text{CarryIn}) + (A*B*\text{CarryIn}) \\ &= (B*\text{CarryIn}) + (A*\text{CarryIn}) + (A*B)\end{aligned}$$

$$\text{Sum} = (A*B*\text{CarryIn}) + (A*B*\text{CarryIn}) + (A*B*\text{CarryIn}) + (A*B*\text{CarryIn})$$

DUE MONDAY. HAND IN A ONE PAGE PRINTOUT OF THE LOGISIM CANVAS. GOOD LUCK. PROBLEMS? E-MAIL ME.