

Computer Systems – Lab 02

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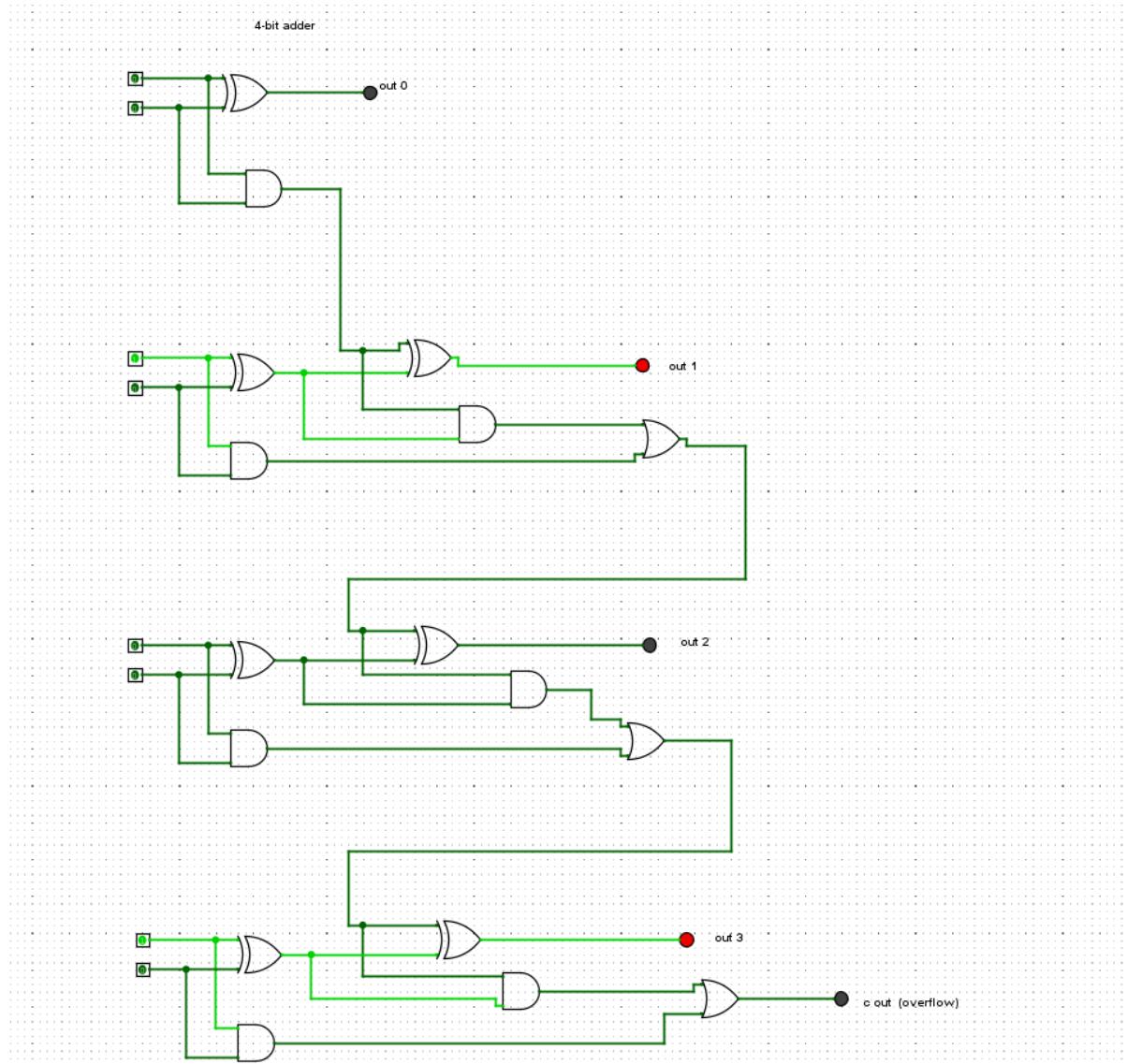


Figure 1- 4-bit adder

Input A	Input B	Output
0101	0000	0101
0101	0001	0100
0101	0010	0111
0101	0011	0110
0101	0100	0011
0101	0101	0010
0101	0110	0000
0101	0111	0001
0101	1000	1101
0101	1001	1100
0101	1010	1111
0101	1011	1110
0101	1100	1011
0101	1101	1010
0101	1110	1000
0101	1111	1001

Table 1

Figure 2- RS flipflop

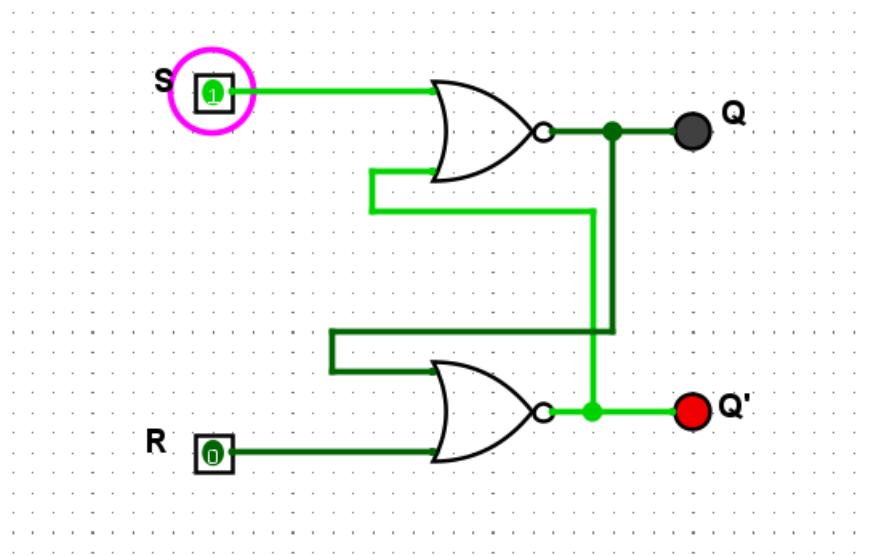


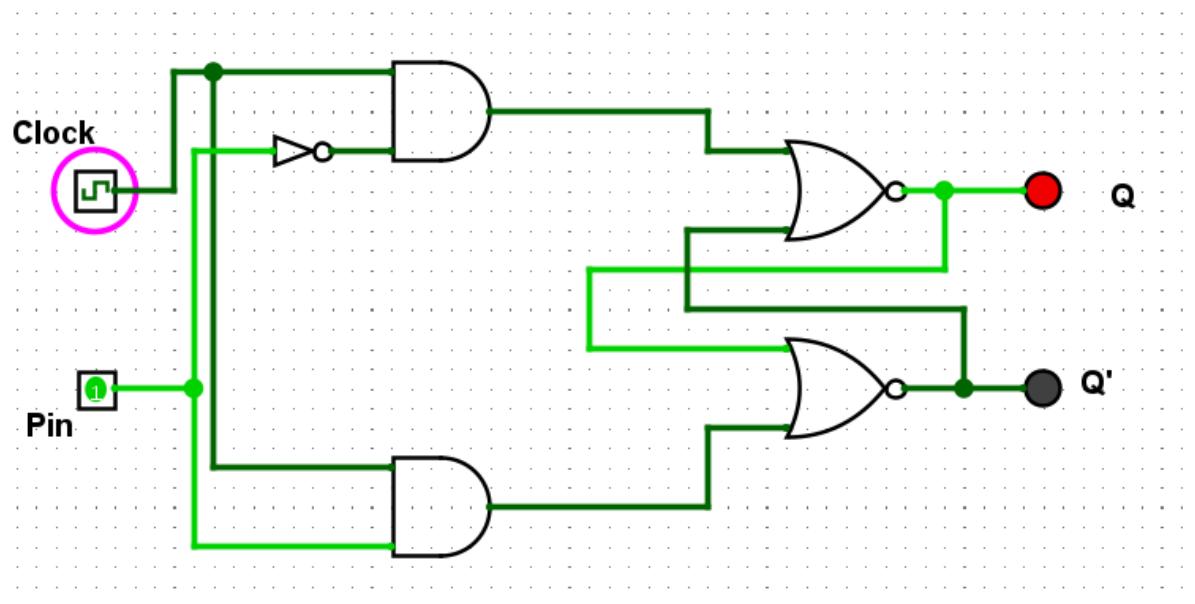
Table 2

Set	Reset	Q	Q'
1	0	indeterminant	indeterminant
1	1	0	0
0	1	1	0
1	1	No change	No change

Ans.11: The circuit remembers when one of the inputs is set to 1. The output will not change unless the set button turned off first. This is useful as the circuit stores the inputs until any manual interaction.

Ans.12: Both the LED lights turn off which means the circuit enters an unstable state since there is no mechanism to control the timing of single reception.

Figure 3- D flipflop



Clock	Pin	Q	Q'
0	0	1	0
0	1	1	0
1	1	1	0
1	0	0	1

Table 3

Ans.15: The D flipflop is similar to an RS flipflop but has one input pin and a clock instead of two pins. This is to overcome the illegal state when two inputs are turned on. The circuit changes its state only during a clock pulse. Thus, the issue of illegal state is solved allowing to store the required value.

Ans.16: A clock is an electrical device in a circuit that coordinates the actions of the circuit by regulating the data flow. This assures the predictability of the output.

Ans.17: The output only changes when the clock pulse is switched on and the input of the pin is set high or low.

Figure 4- JK flipflop

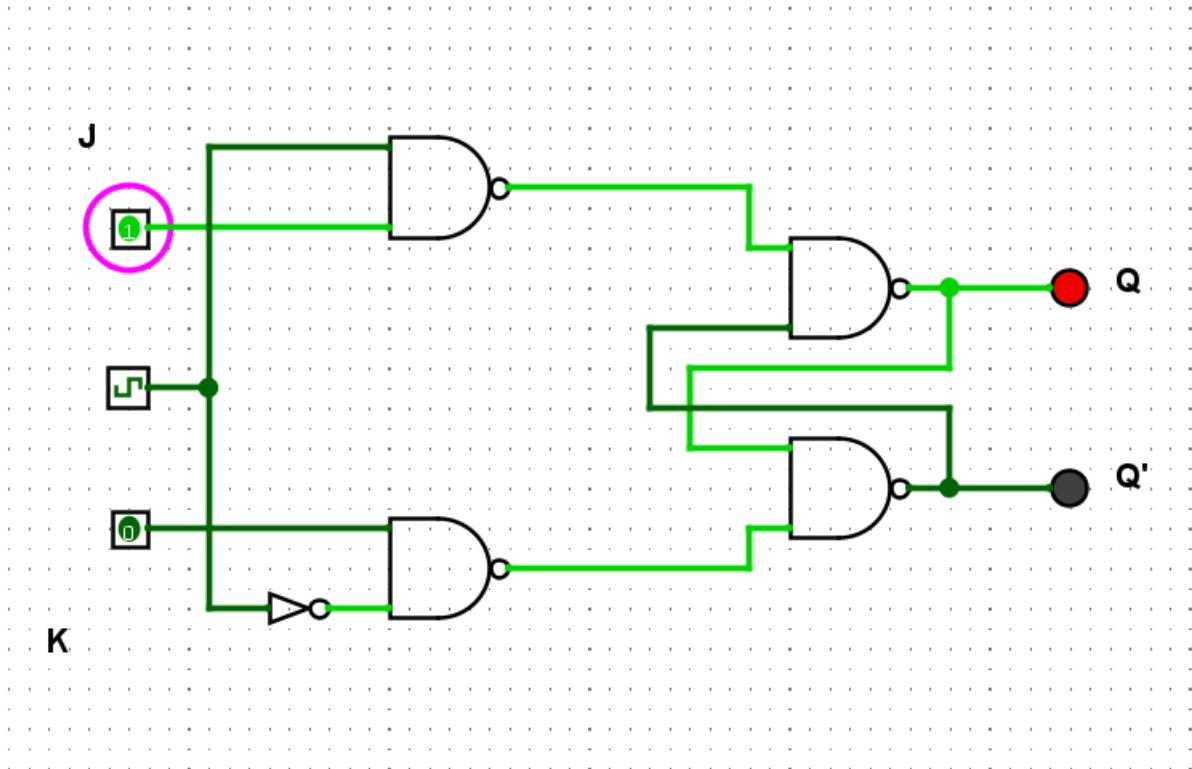


Table 4

J	K	Q (when clocked)	Q'(when clocked)
0	0	No change	No change
1	0	1	0
0	1	0	1
1	1	Toggle	Toggle

Ans.20: A JK flipflop is an RS flipflop with an additional input from a clock. During a clocked pulse, if the inputs of J and K (1 and 0 to 0 and 1) are interchanged, the circuit changes from state reset to set position like it does in D flipflop.

Ans.21: When both J and K switched to 1, both outputs start changing to on and off which leads to toggling. This happens in a T flipflop.