COS10004 - Computer System
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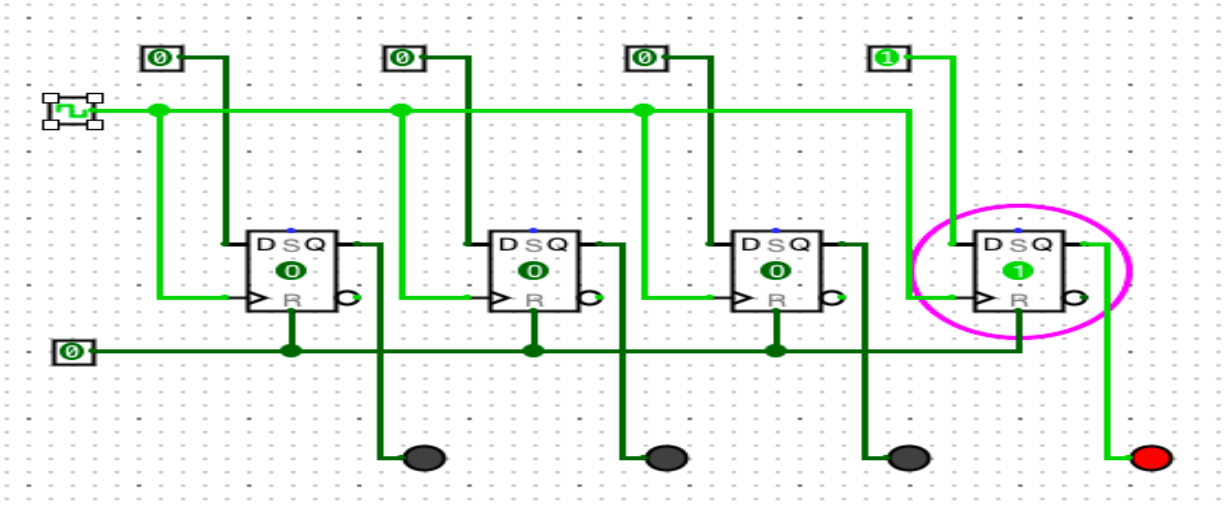
LAB 3

4-Bit Register



Ox	Input Binary	Output Binary
0	0000	0000
1	0001	0001
2	0010	0010
3	0011	0011
5	0101	0101
A	1010	1010
B	1011	1011
C	1100	1100
D	1101	1101
E	1110	1110
F	1111	1111

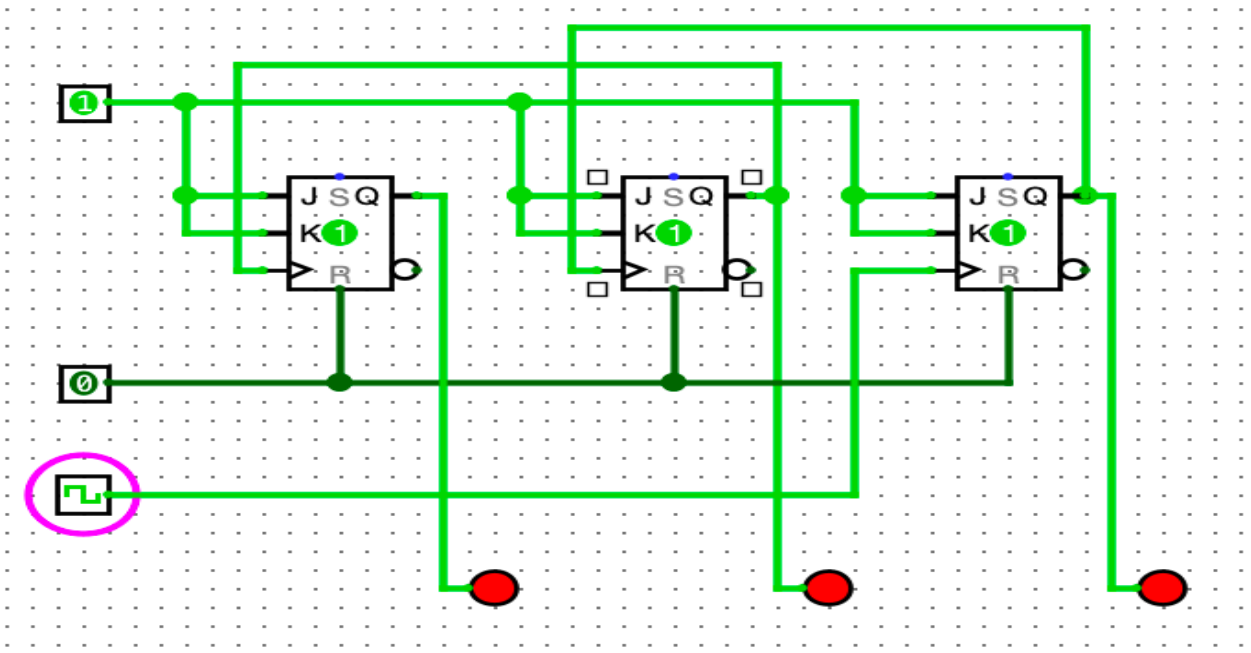
7.1 Name one crucial role (hardware) counters play in modern computing architectures?

- A computer has many needs for counters designed and built into modern processors such to keep count of events or clock pulses etc

7.2 Describe in a few sentences how a ripple counter works. How does the “ripple” occur?

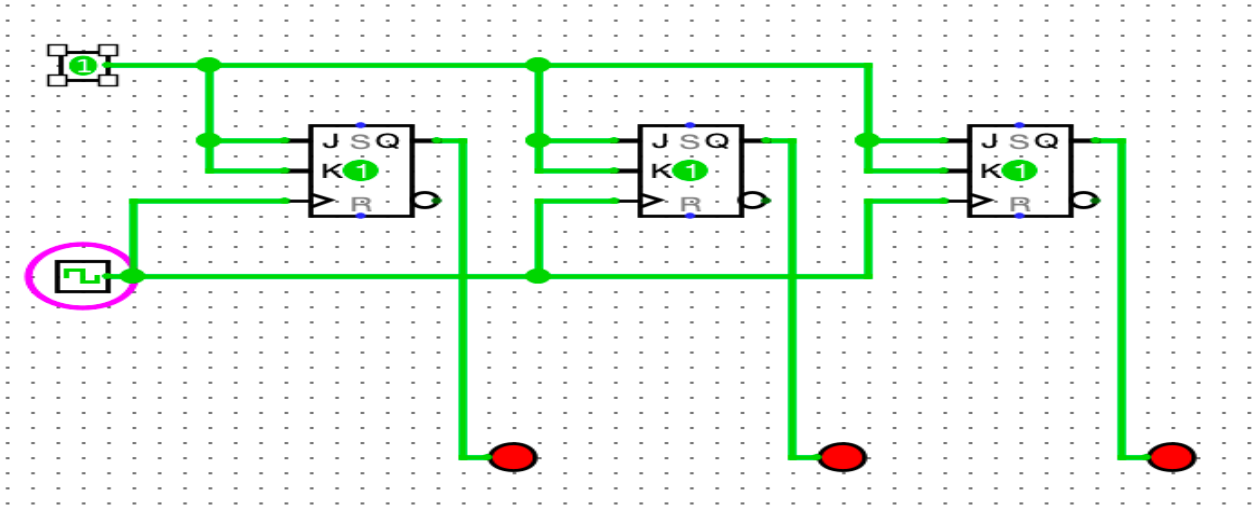
- A ripple counter is an asynchronous counter where only the first flip-flop is clocked by an external clock. The output of the preceding flip clocks all subsequent flip-flops-flop.

JK Ripple Encounter

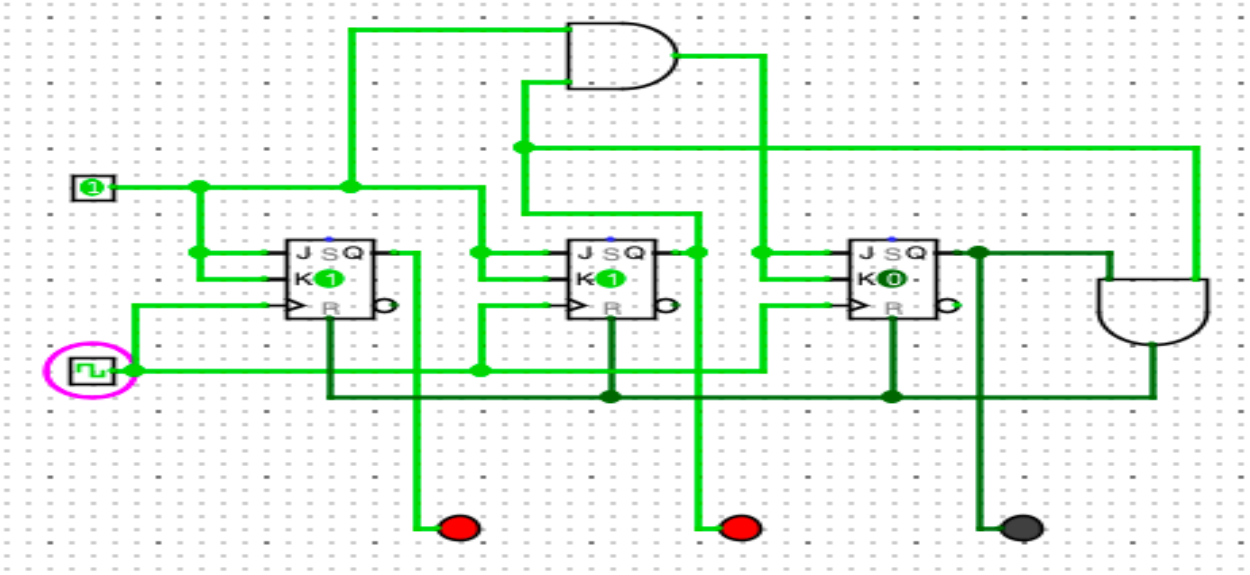


- The counting down counter appears to be the same as the counting up counter since they share the same connection. However, the attribute of the flip flop for the counting-up counter is the falling edge, whereas the rising edge for the counting-down counter.

JK Counter with a common clock



Mode 6 Counter



17.2 Why is handling such things important?

- Handling momentary illegal states in digital circuits is important for ensuring correct operation, maintaining data integrity, promoting stability and reliability, ensuring compatibility with other components, and following good design practices. By addressing these states, we can prevent errors, glitches, and unpredictable behaviour in the circuit while maintaining data integrity and promoting a stable and reliable operation.

Mode 6 Counter with HEX Digit Display