

Register (2A)

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Toggling Input

Shift Register

Feedback Flip Flop

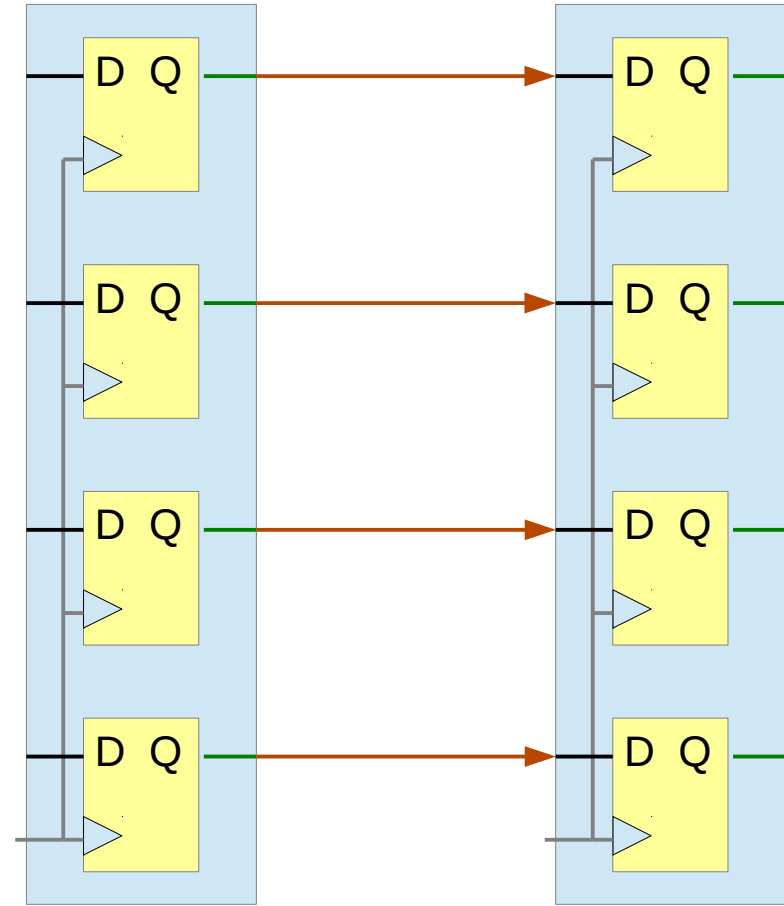
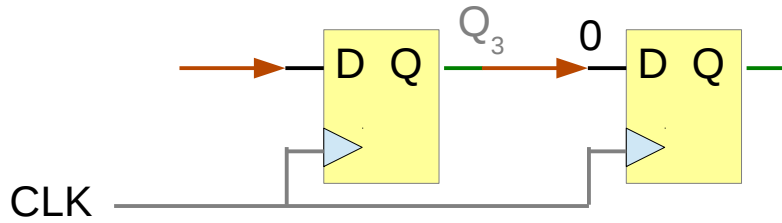
- JK Flip Flop
- T Flip Flop
- Toggling D Flip Flop

Pipeline Stage Register

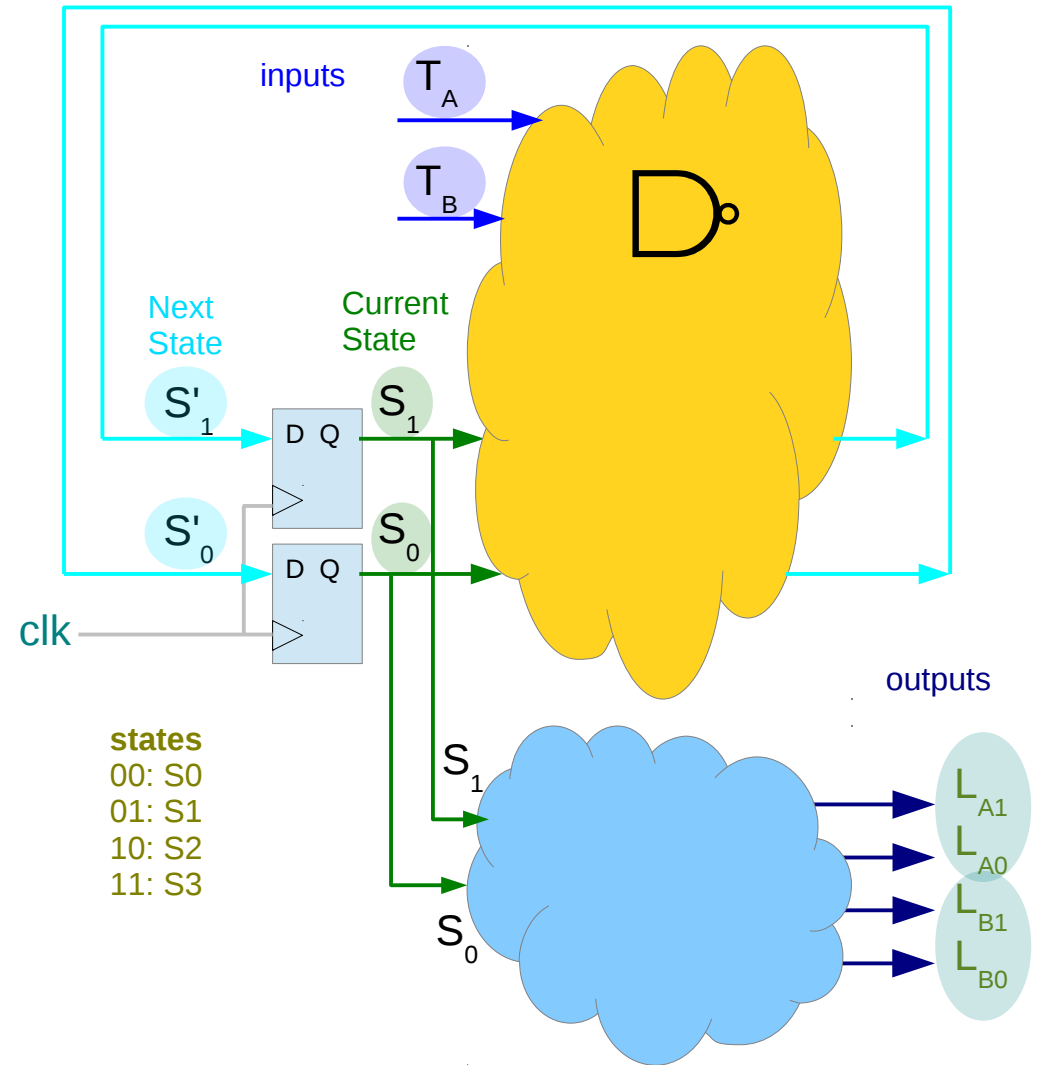
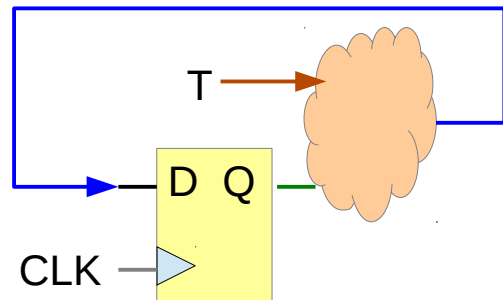
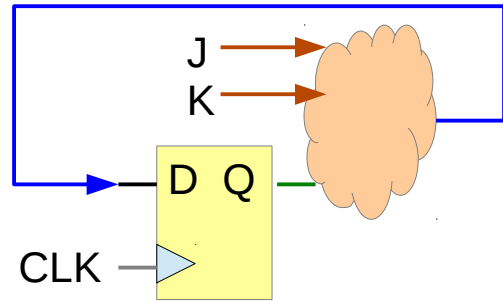
Feedback Register

- FSM State Register
- Counter Register
-

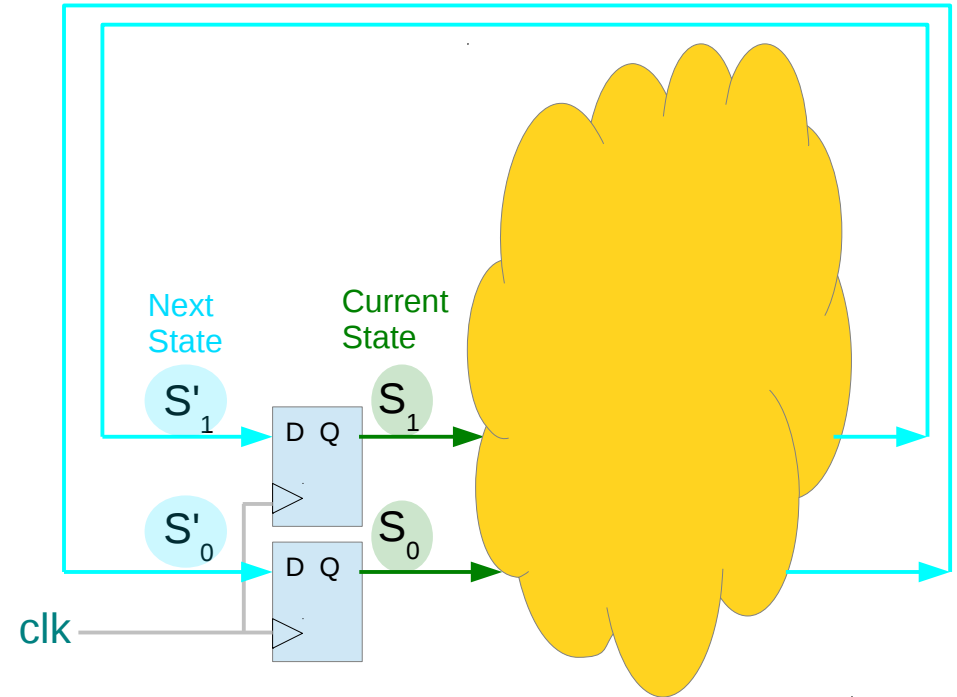
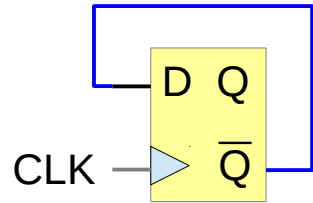
Shift Register v.s. Pipeline Stage Register



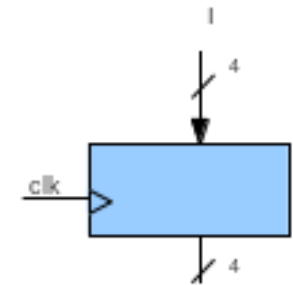
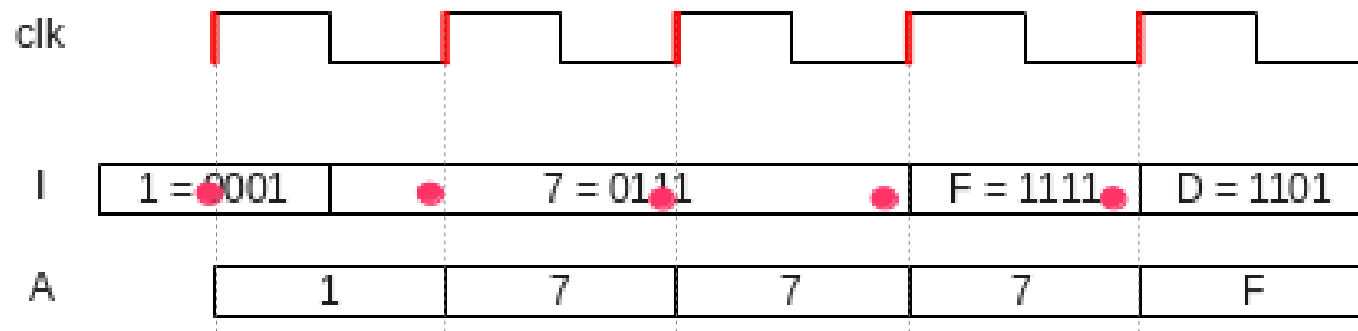
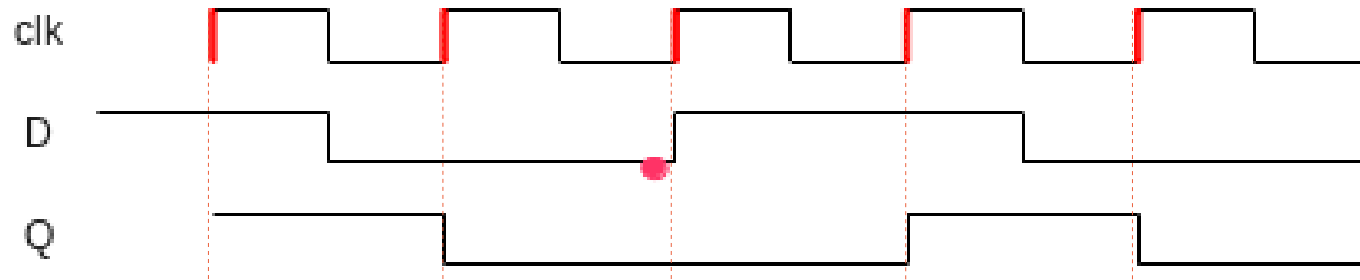
JKFF & TFF v.s. FSM



Toggleing DFF v.s. Counter

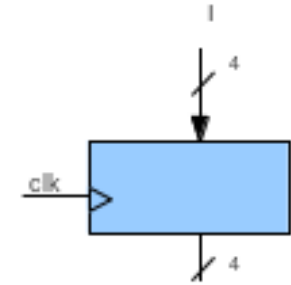
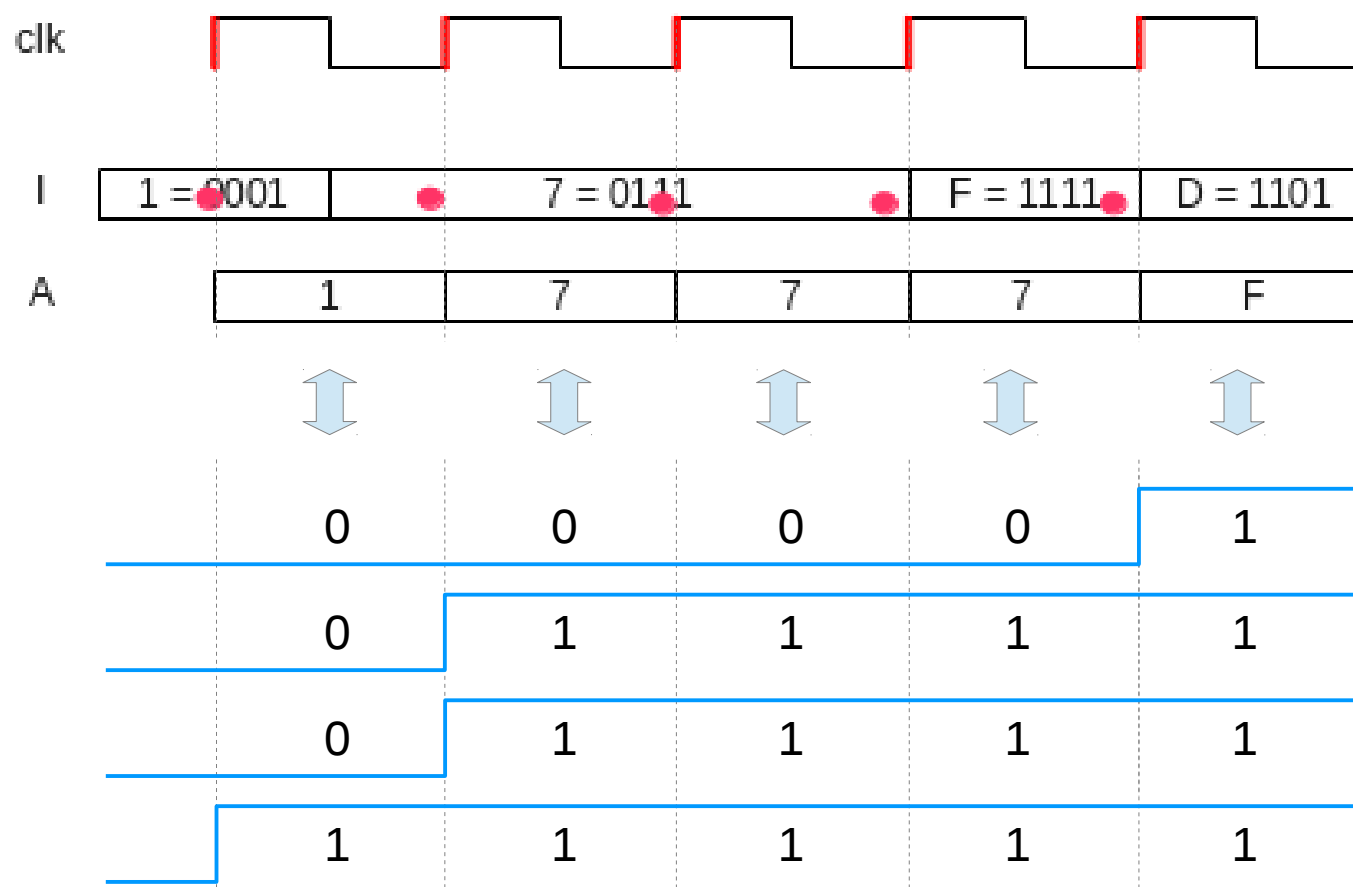


FF and Register Timing



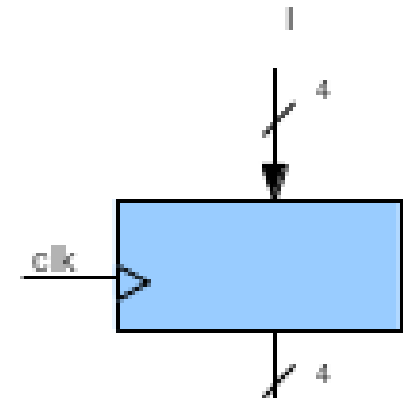
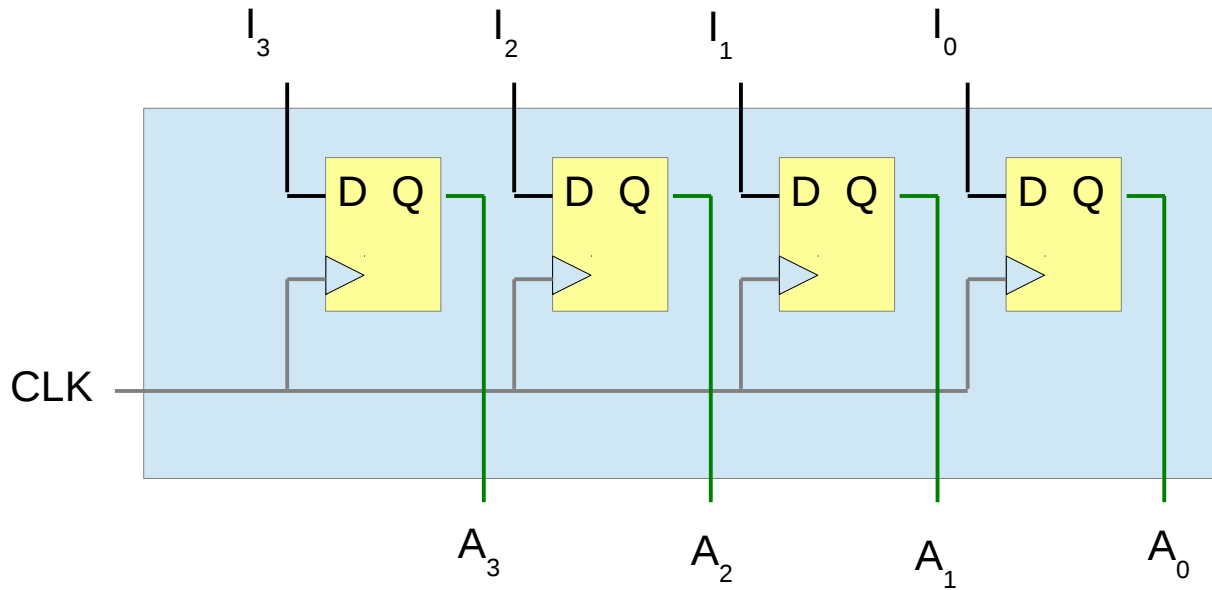
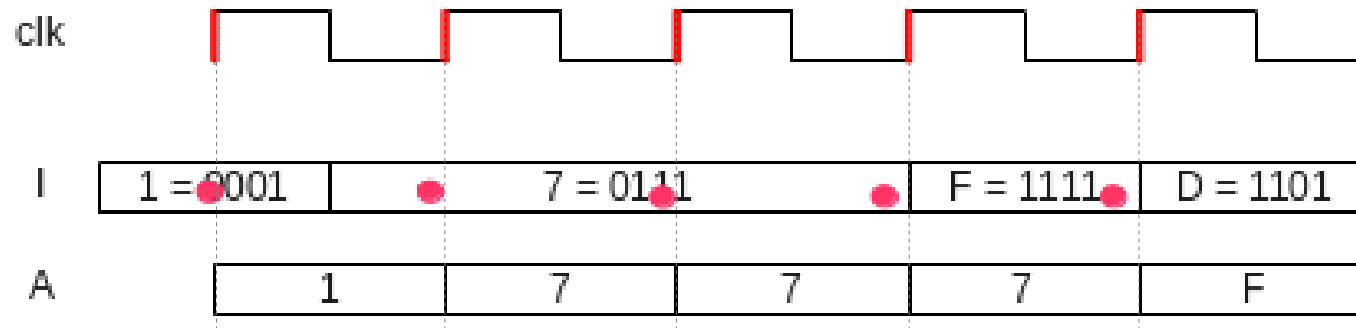
Decimal

Bus Notation



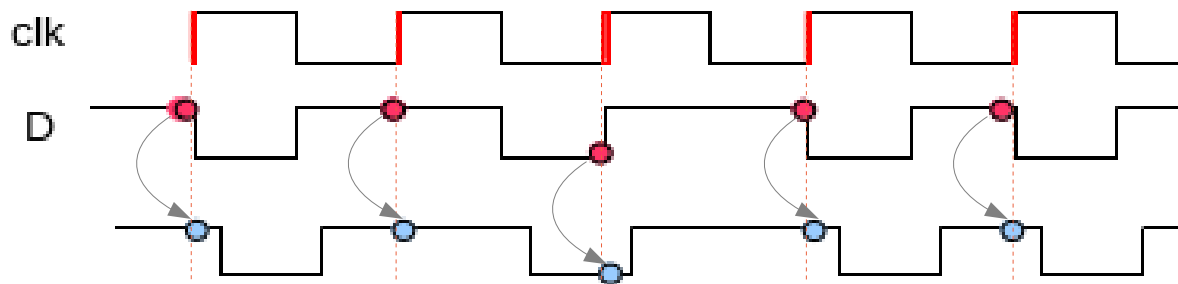
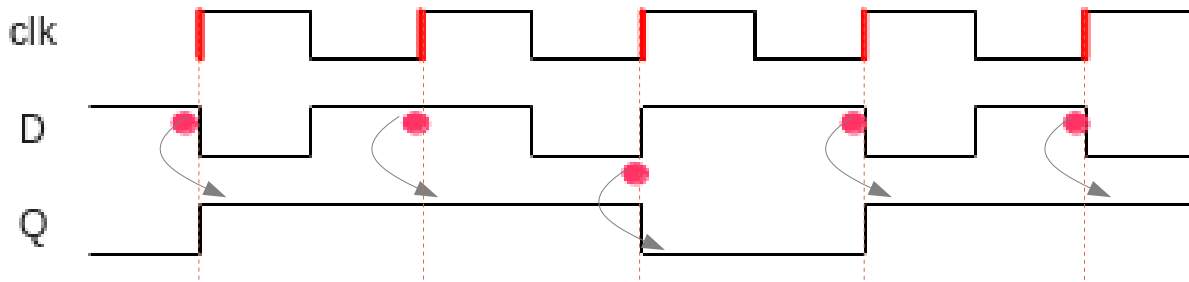
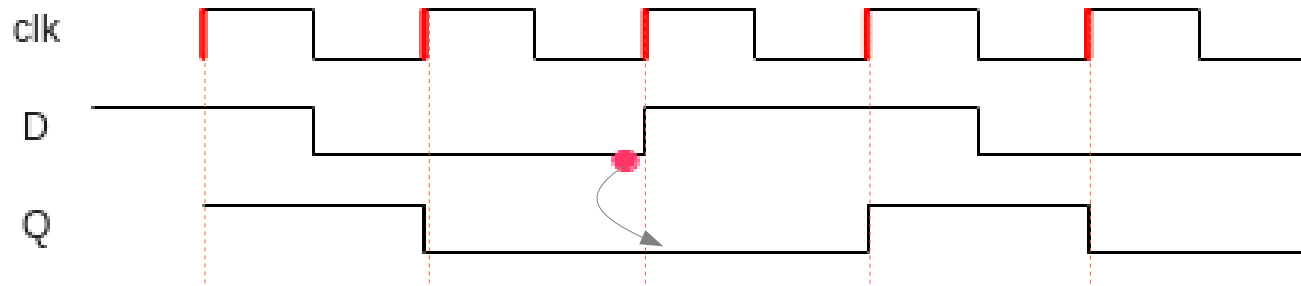
Decimal

Register



Decimal

FF Timing

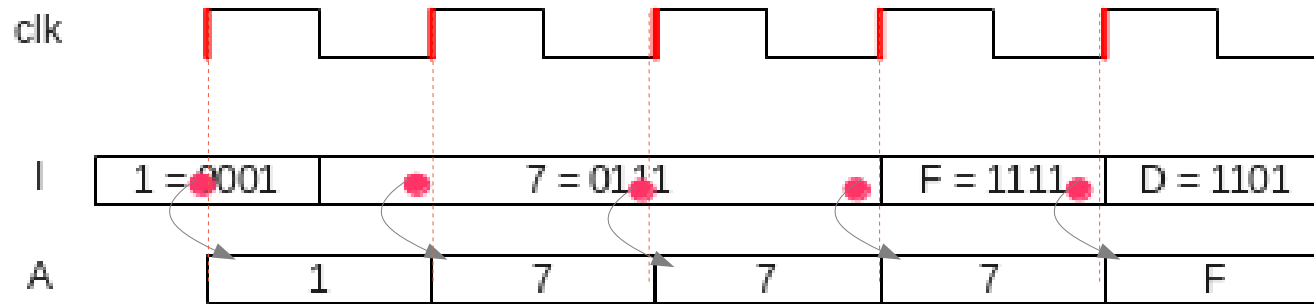


input signal with a delay ignored (ideal case)

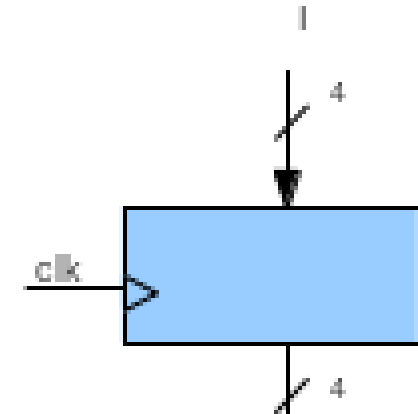
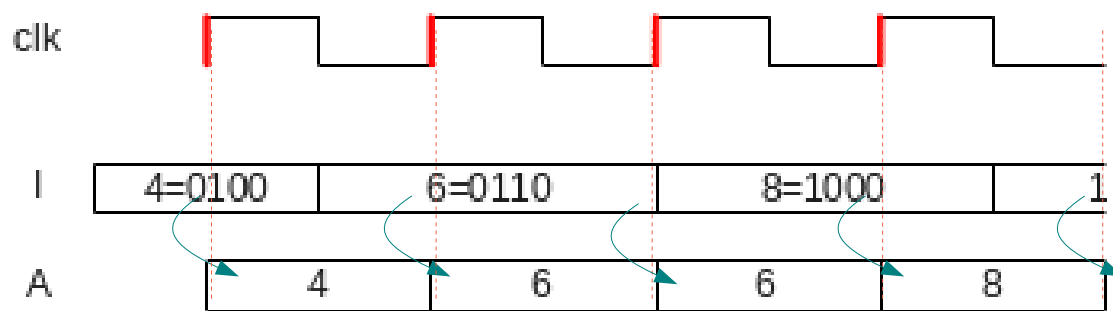
input signal with a delay explicitly shown

Register Timing

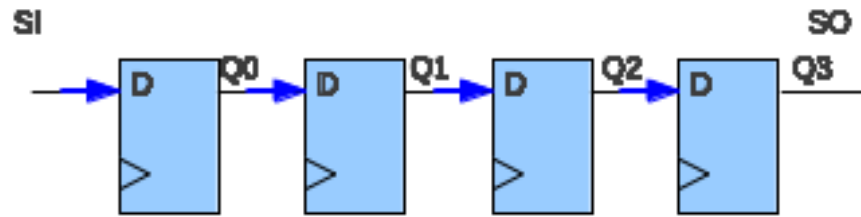
input signal with a delay explicitly shown



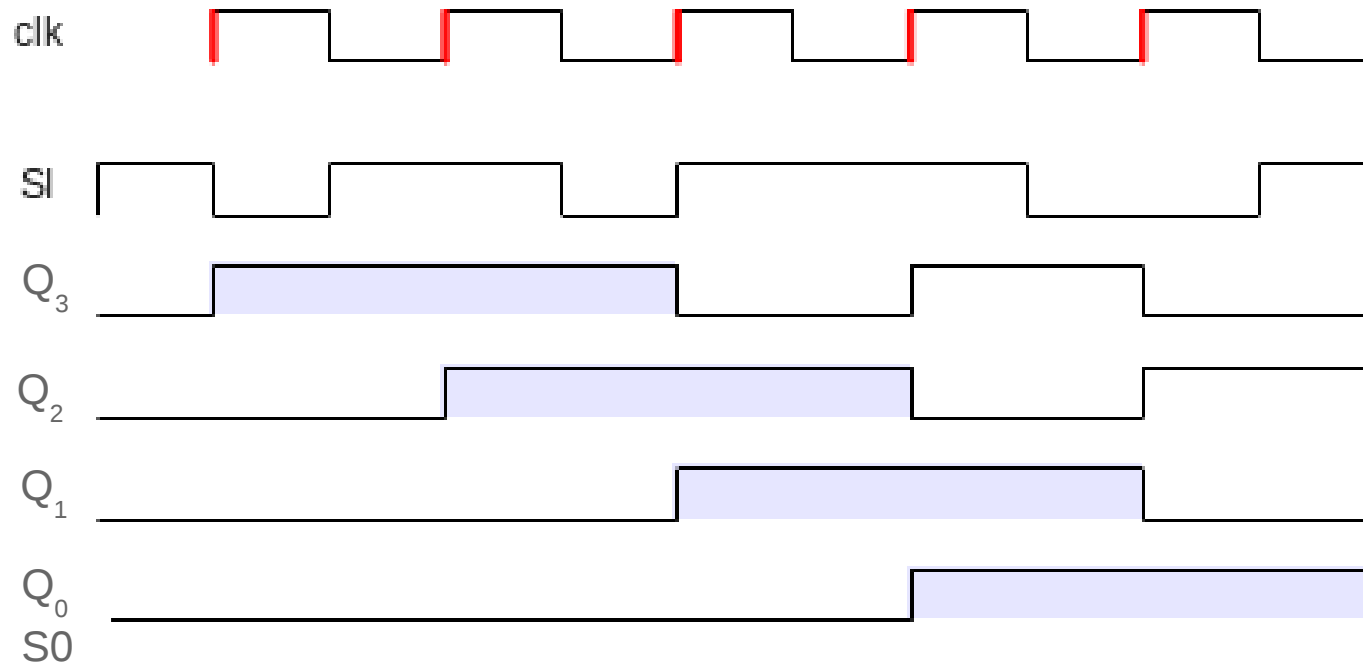
input signal with a delay explicitly shown



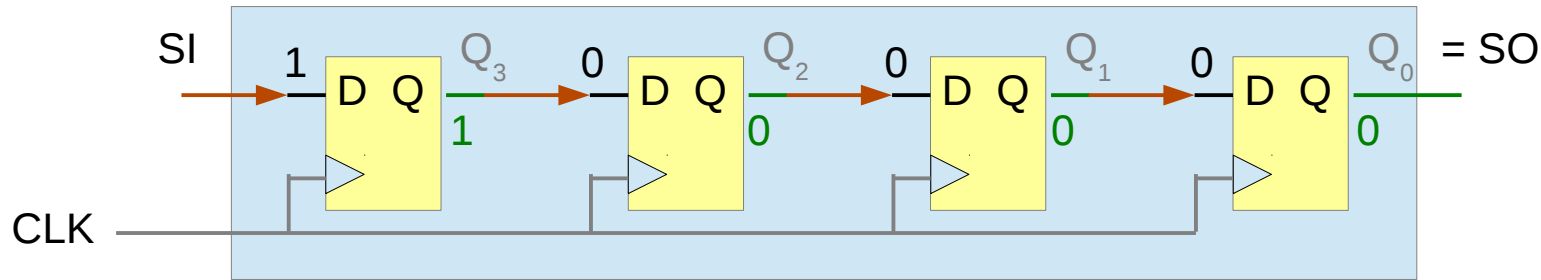
Shift Register Timing



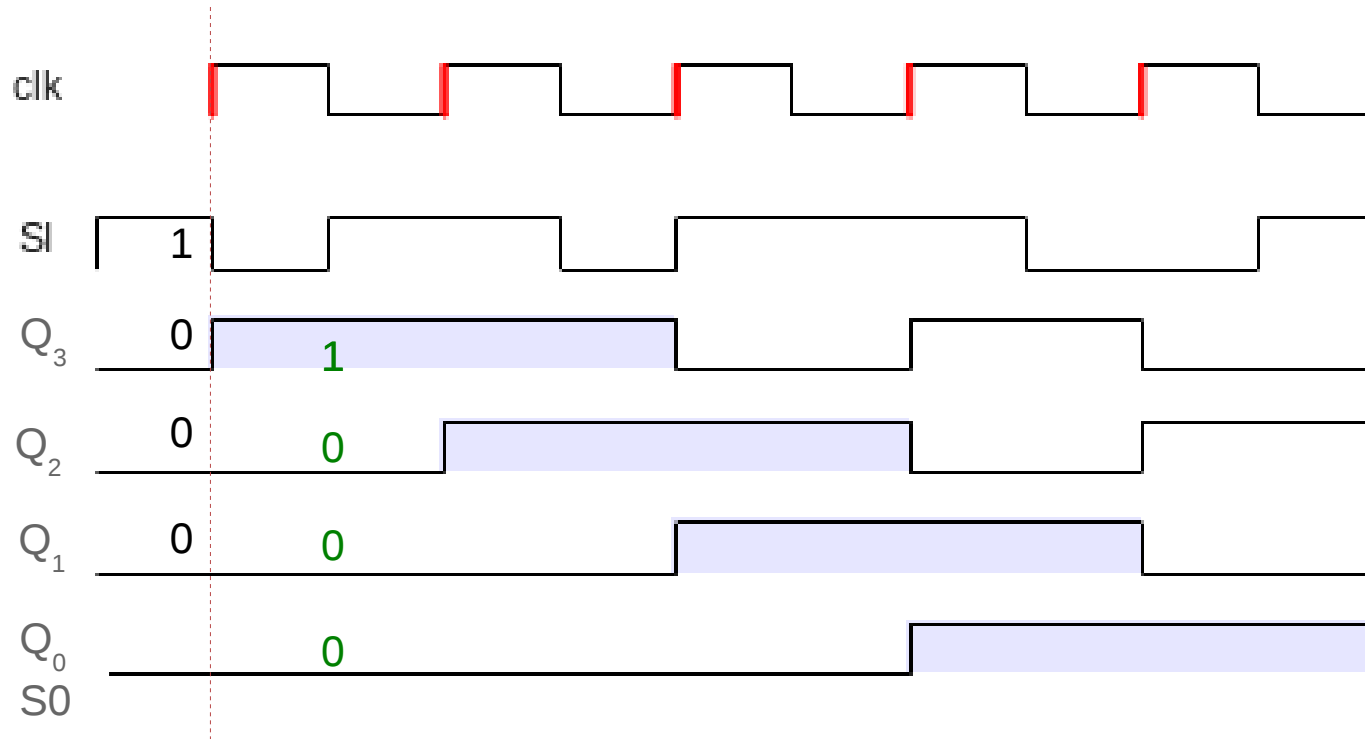
Connected in serial,
but parallel assignments



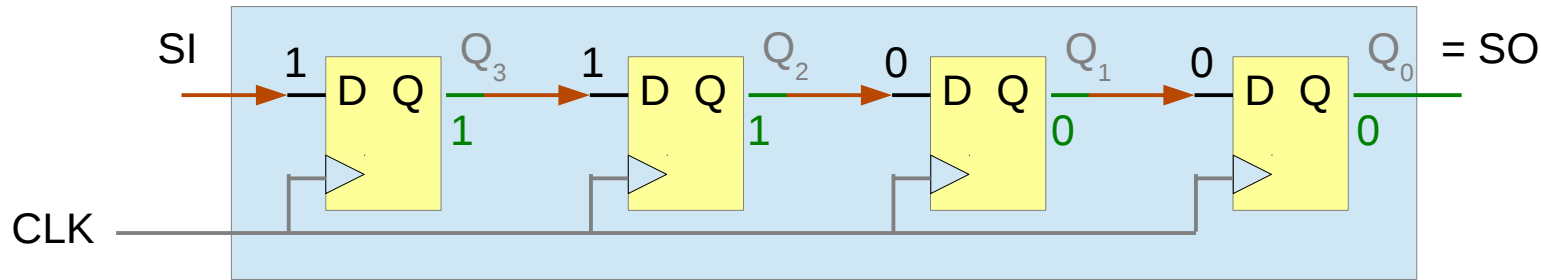
Shift Register Timing - Cycle 1



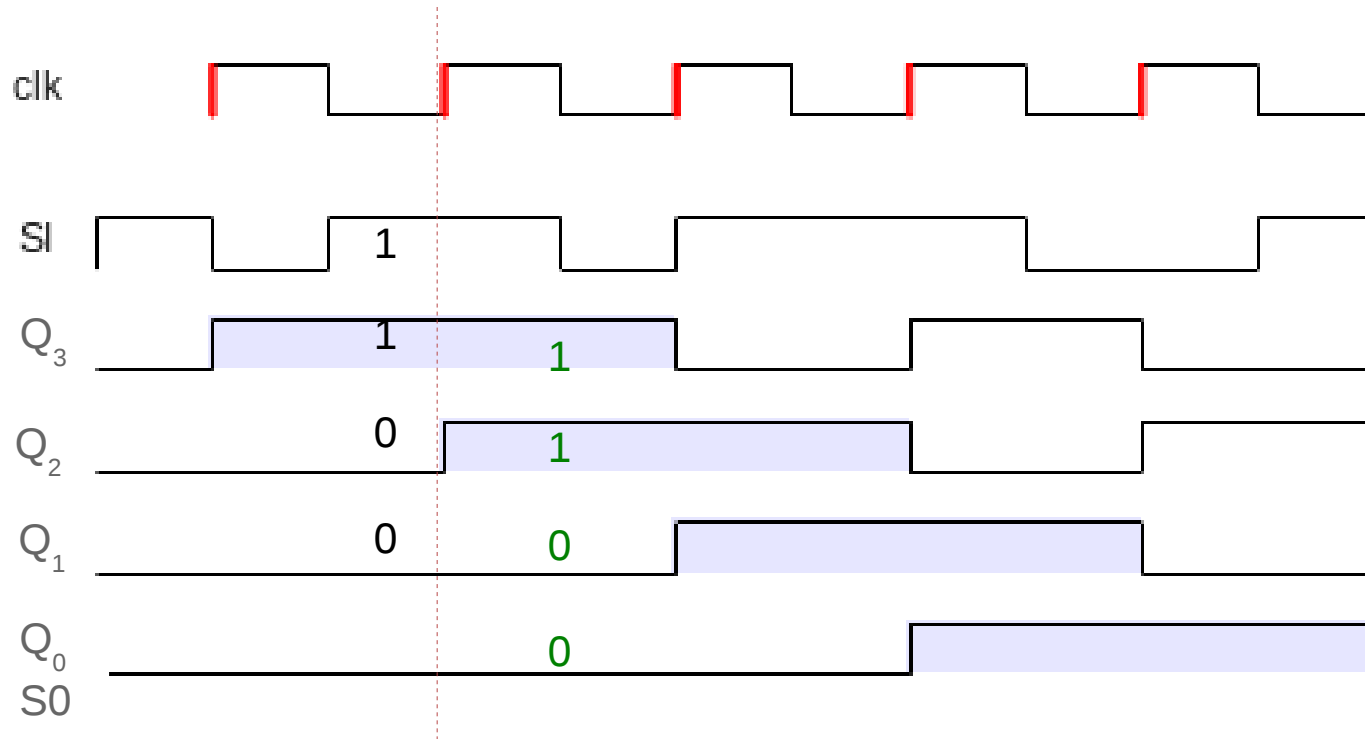
Connected in serial,
but parallel assignments



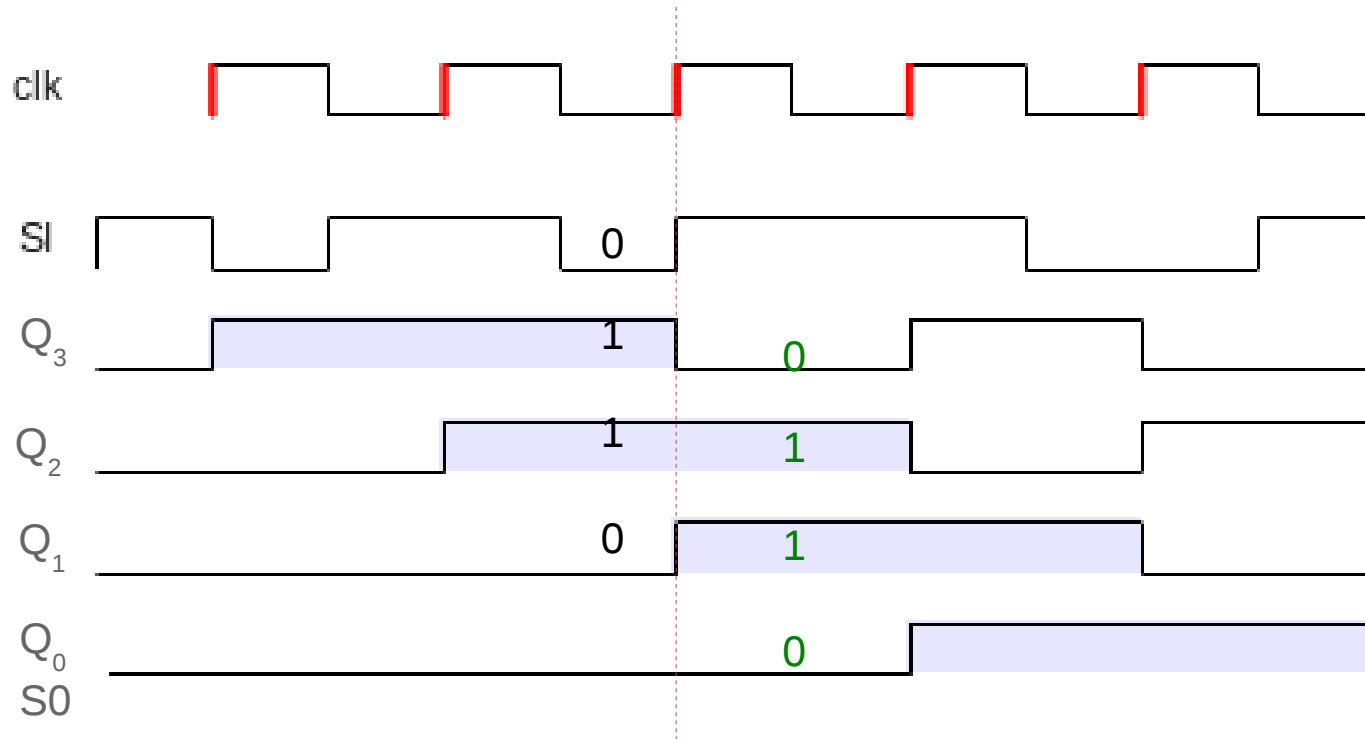
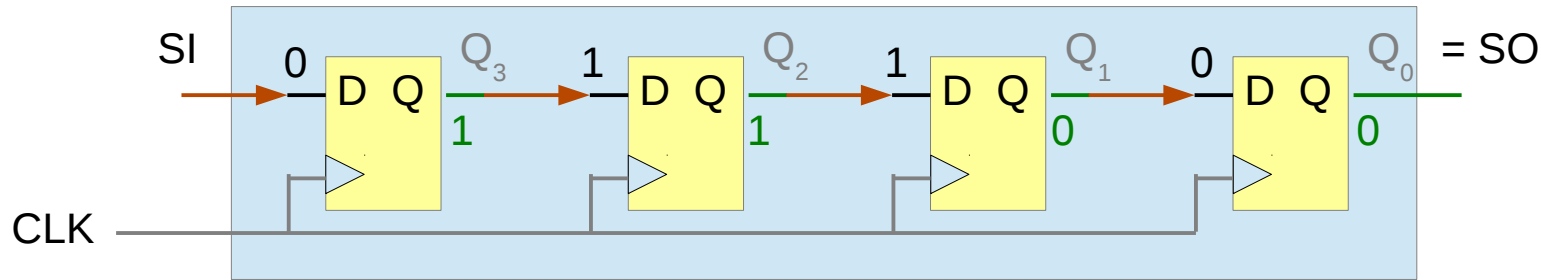
Shift Register Timing - Cycle 2



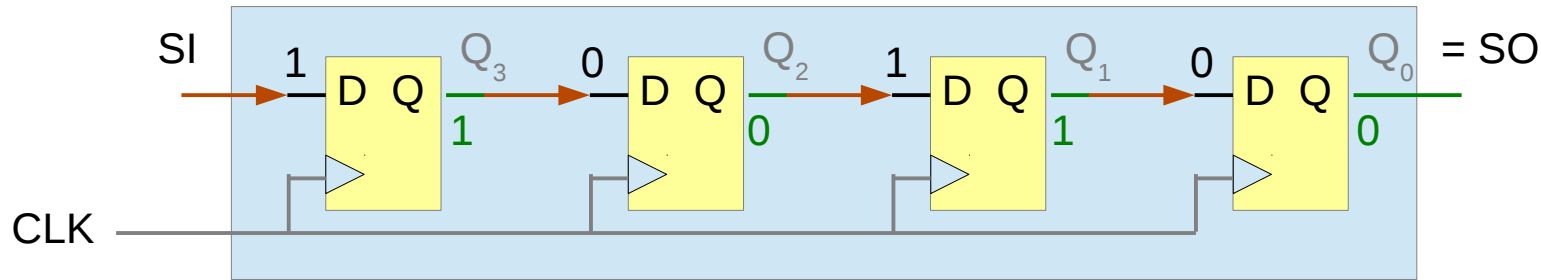
Connected in serial,
but parallel assignments



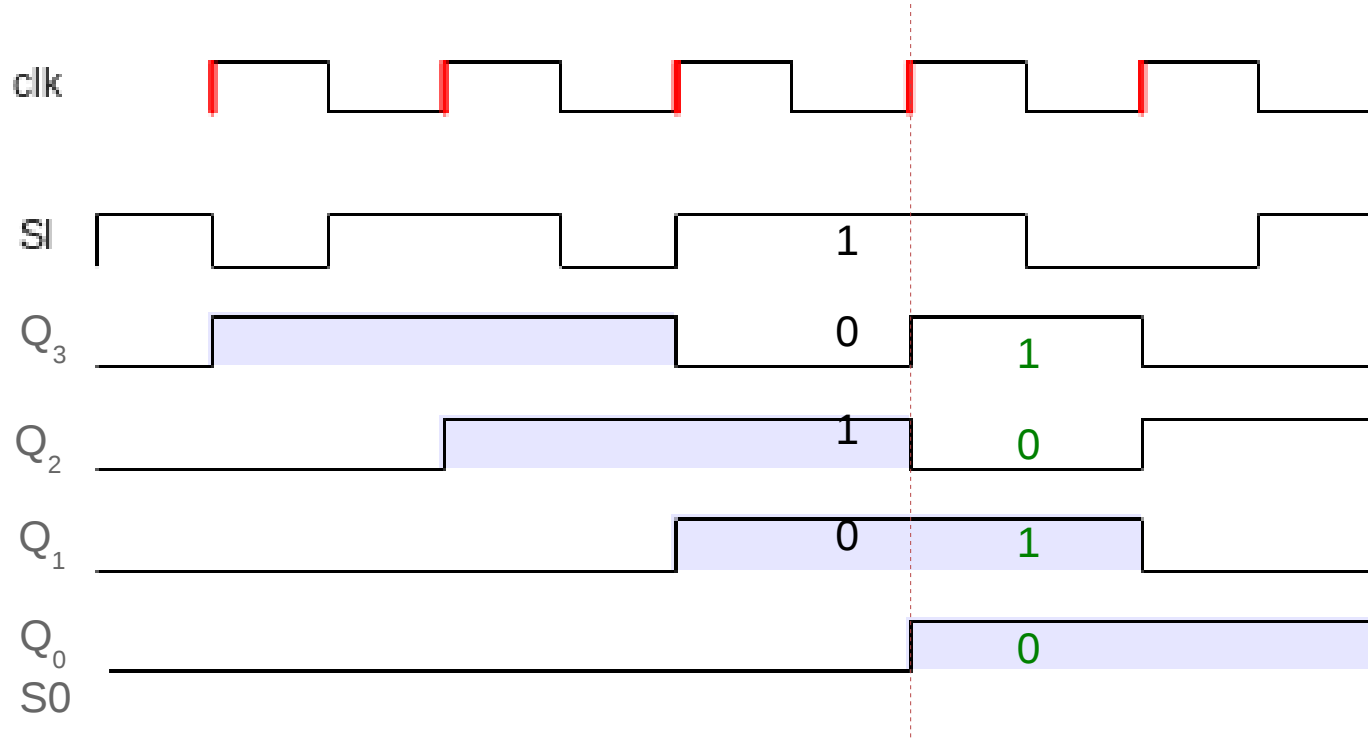
Shift Register Timing - Cycle 3



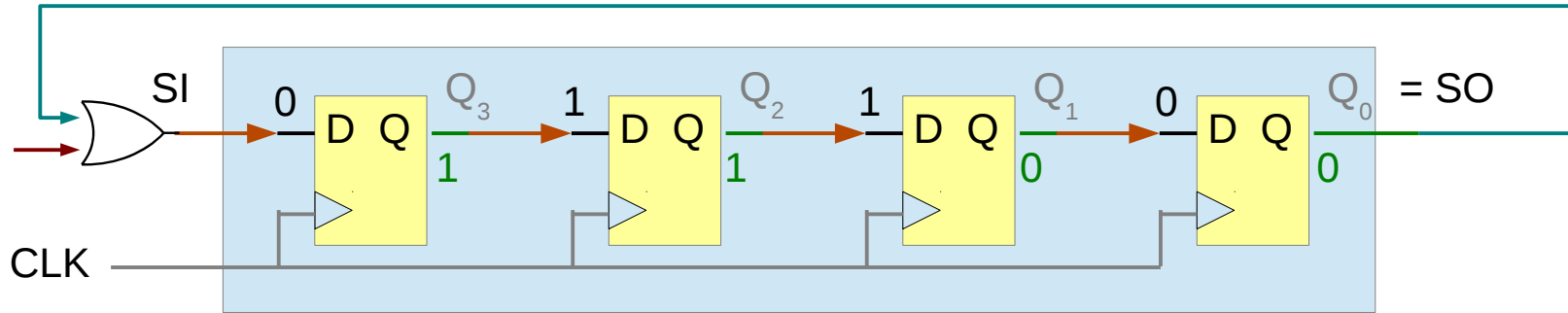
Shift Register Timing - Cycle 4



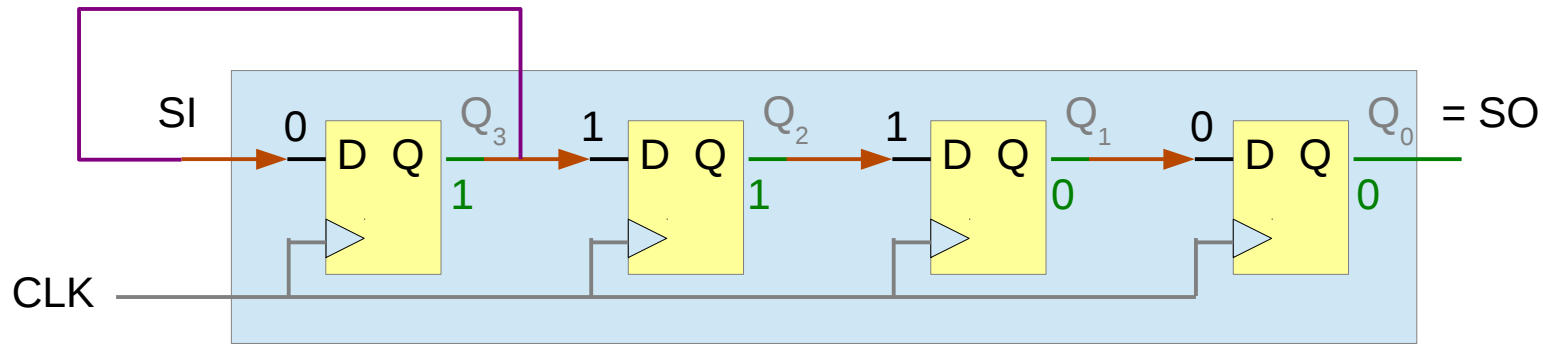
Connected in serial,
but parallel assignments



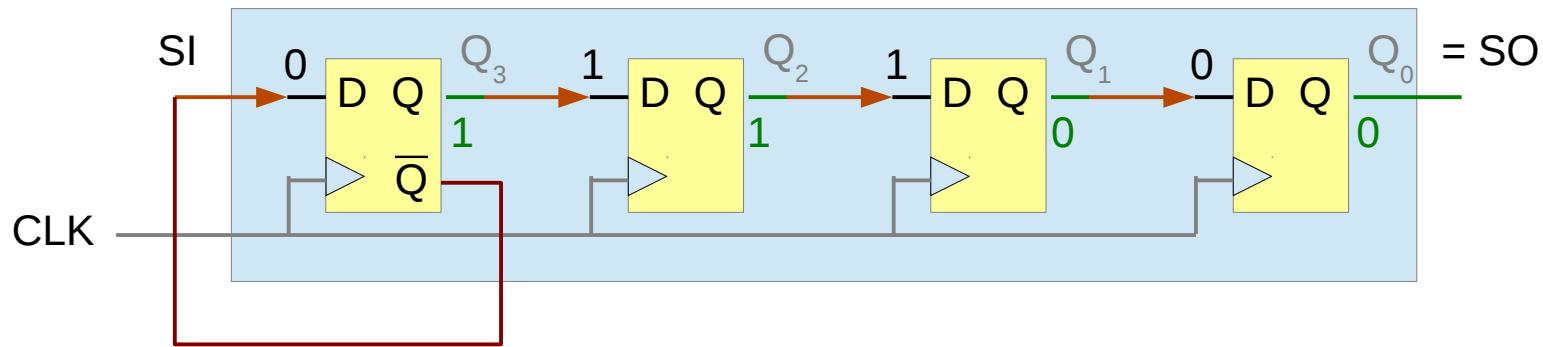
Rotate



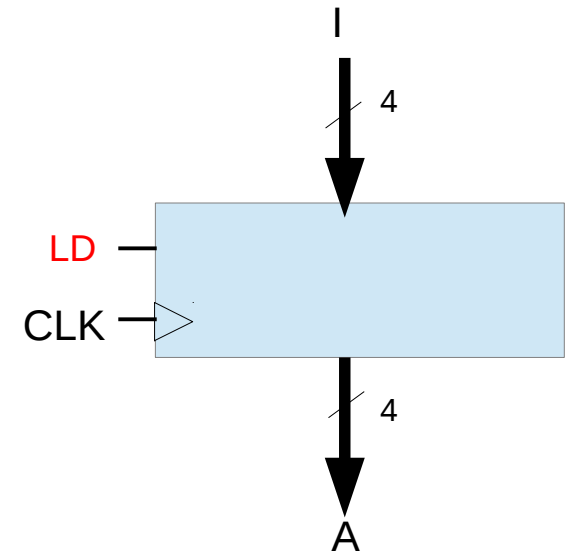
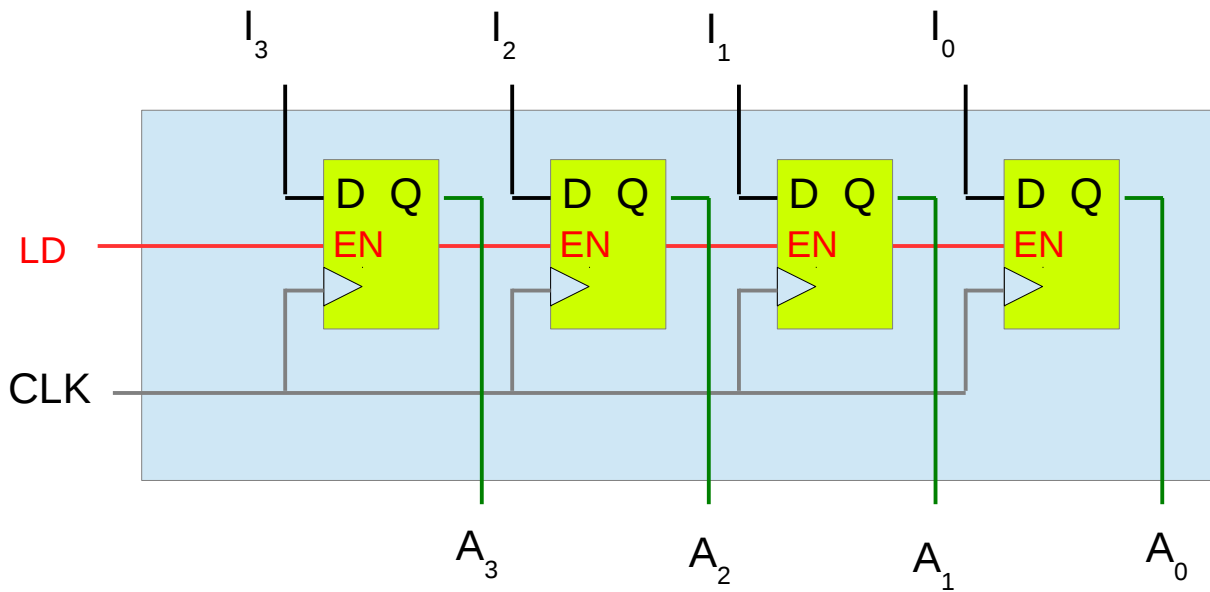
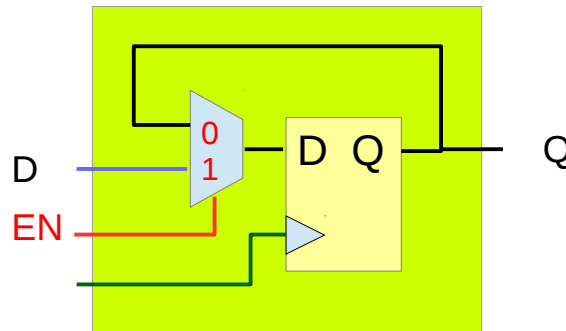
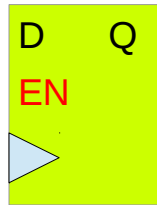
Divide By 2 with a Sign Extension



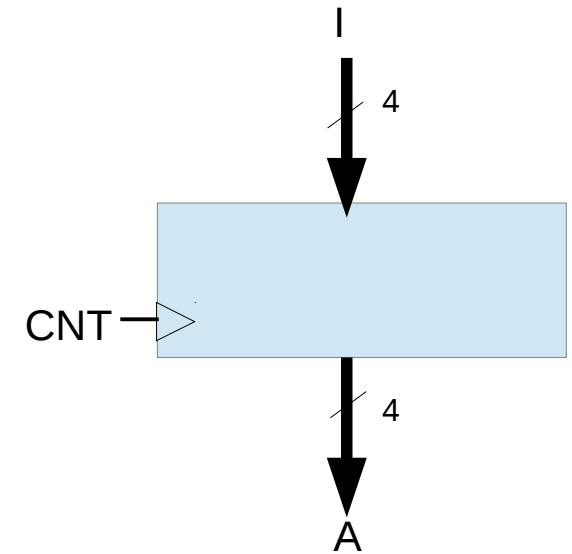
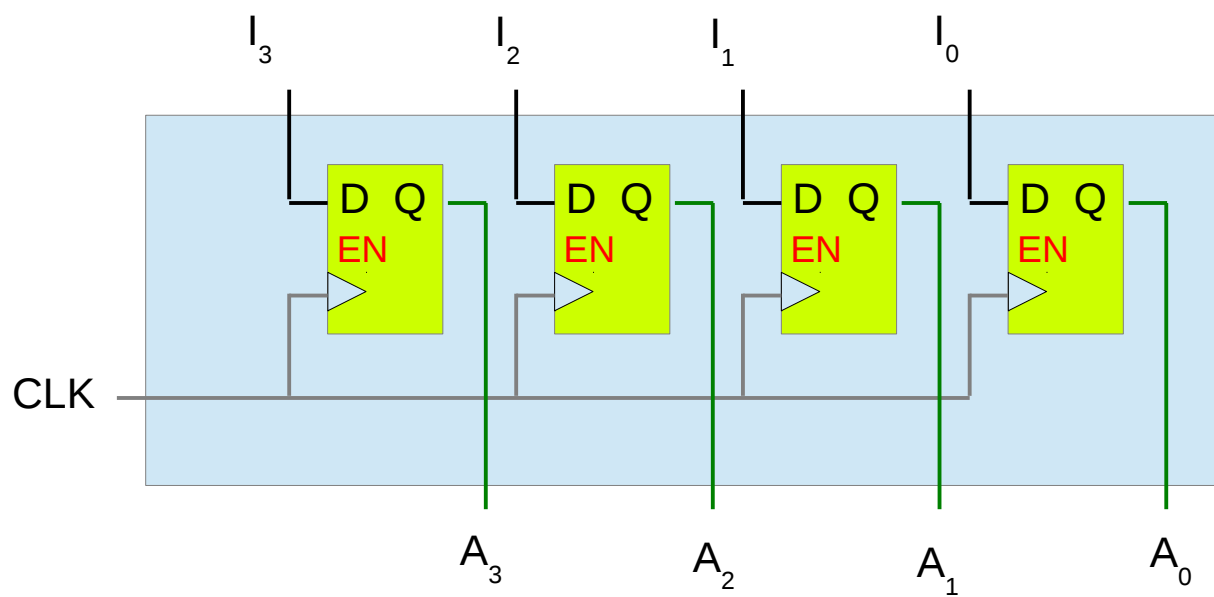
Toggleing Input



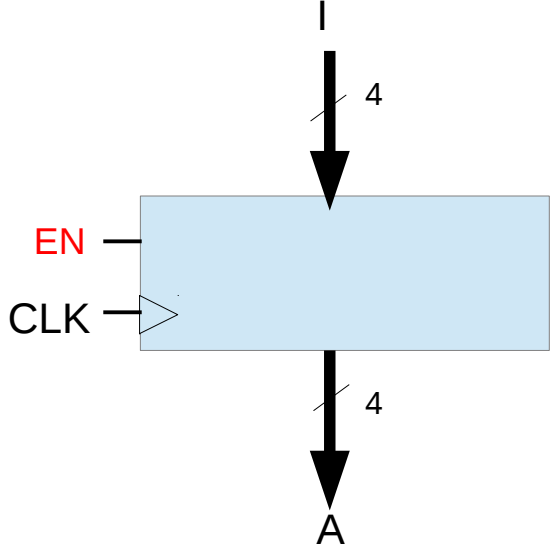
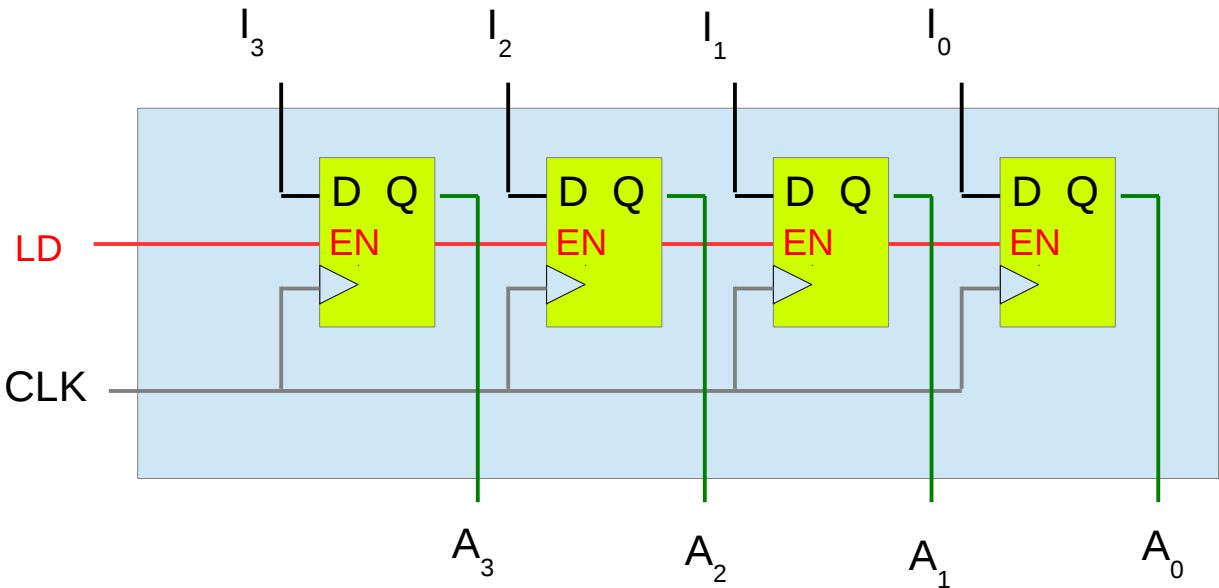
Register with Parallel Load



Ripple Counter



Synchronous Binary Counter



References

- [1] <http://en.wikipedia.org/>
- [2] M. M. Mano, C. R. Kime, "Logic and Computer Design Fundamentals", 4th ed.
- [3] D.M. Harris, S. L. Harris, "Digital Design and Computer Architecture"