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ONLINE LEARNING

Digital Electronics (SKEE1223)

Registers

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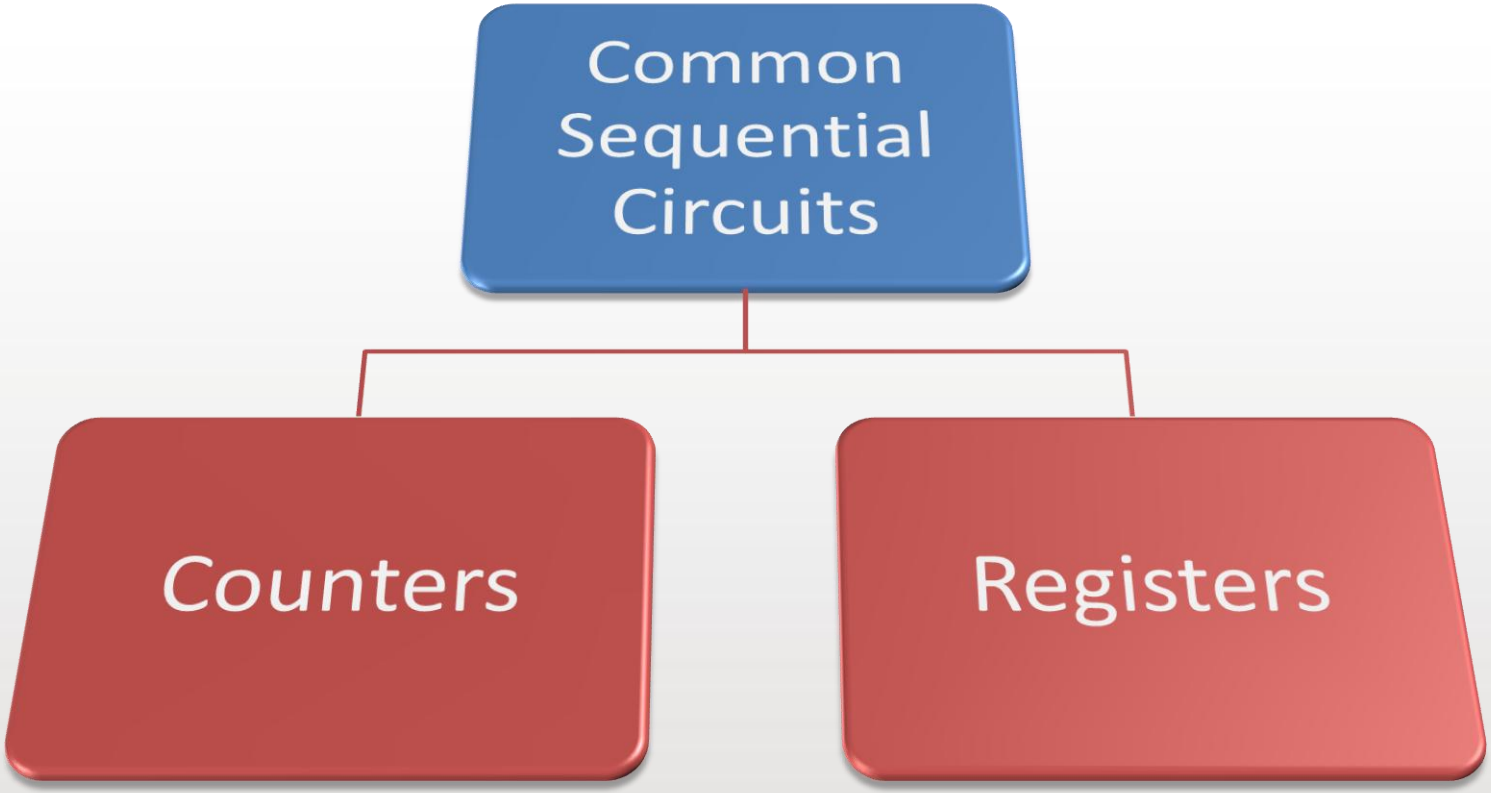
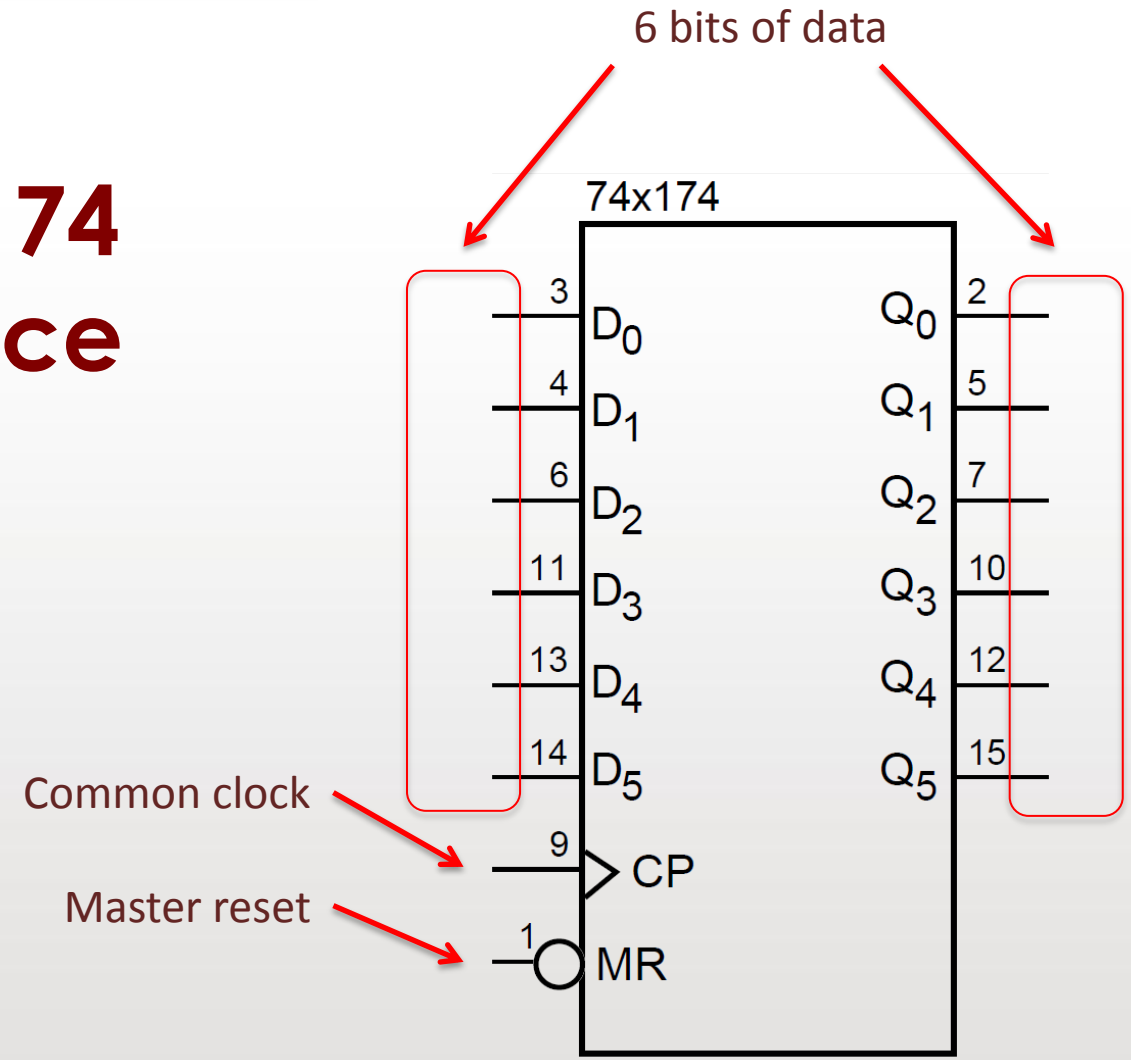

Common Sequential Circuits
Counters
Registers

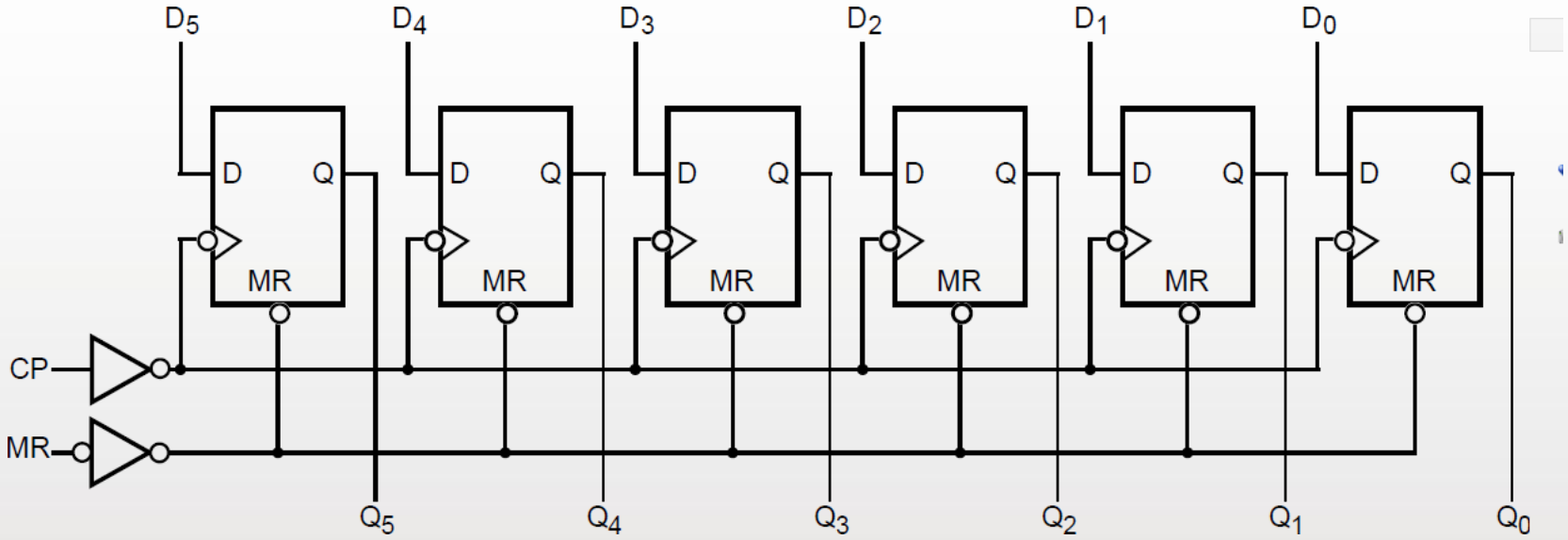
What are Registers?

- Registers are a group of flip-flops.
- Each flip-flop stores exactly one bit of data.
- A special type of register is the shift register
- Applications:
  - Data storage
  - Data format conversion

74x174 Device



74x174 Register

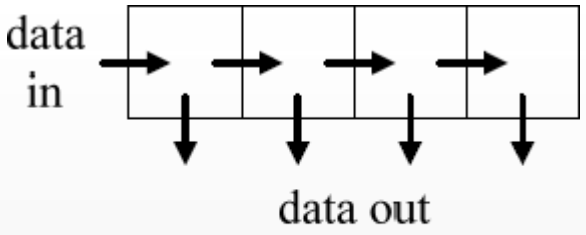


What are Shift Registers?

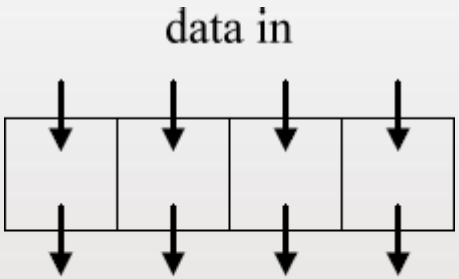
- Shift registers store data that comes one bit at every clock pulse
- At every clock pulse, one bit is loaded into the first flop-flop and all other bits are shifted to the next flip-flop
- 4 types of shift registers:
  - Serial Input Serial Output (SISO)
  - Serial Input Parallel Output (SIPO)
  - Parallel Input Parallel Output (PIPO)
  - Parallel Input Serial Output (PISO)

Types of Shift Registers

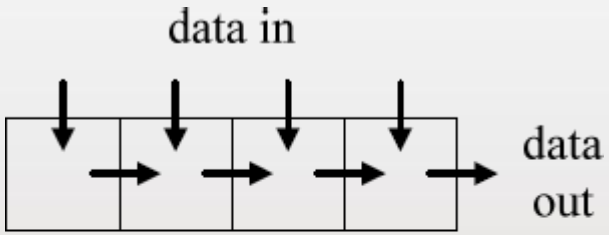
(a) SISO



(b) SIPO

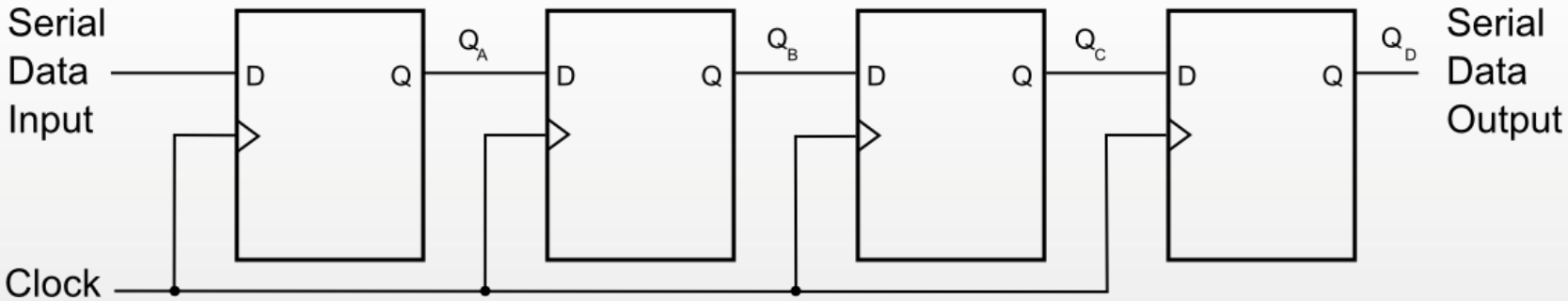


(c) PIPO

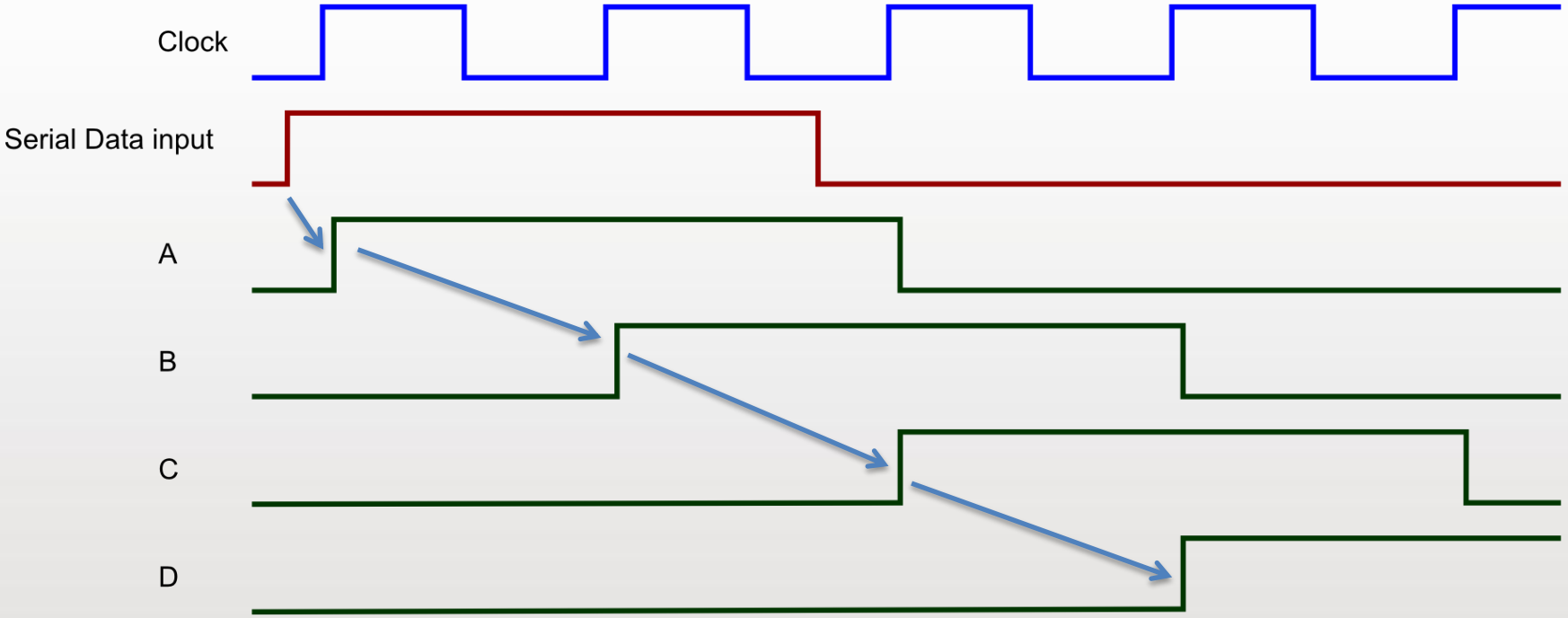


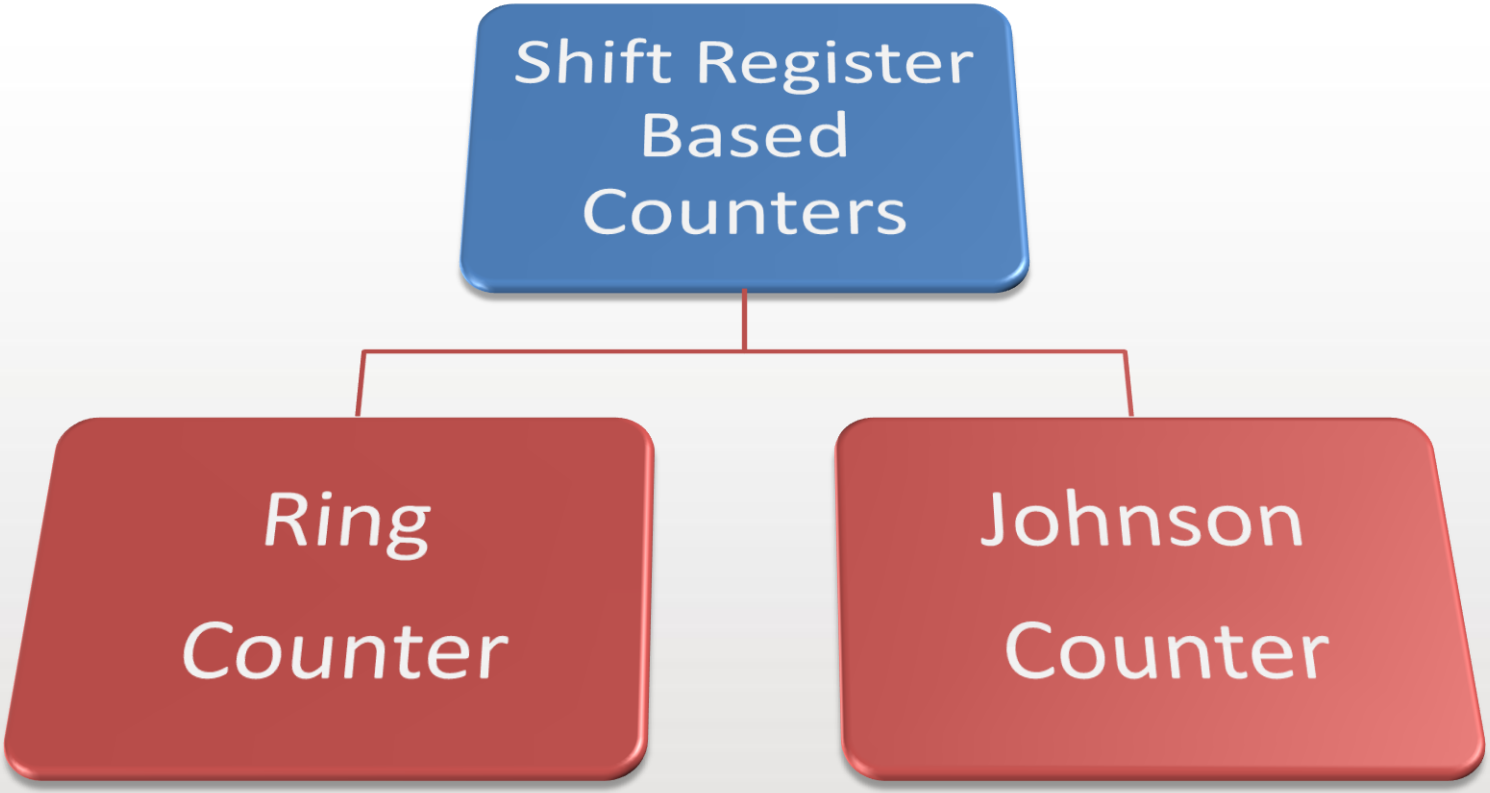
(d) PISO

SISO

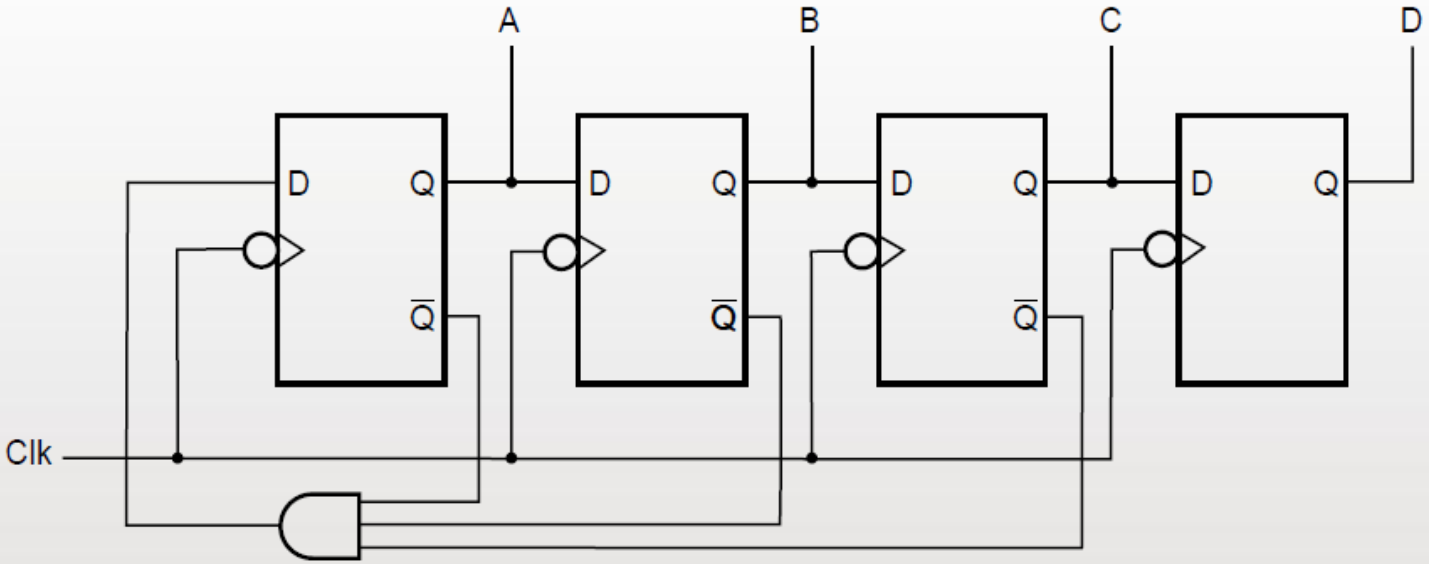

Serial
Data
Input
D
Q
Q_A
D
Q
Q_B
D
Q
Q_C
D
Q
Q_D
Serial
Data
Output
Clock

SISO Timing

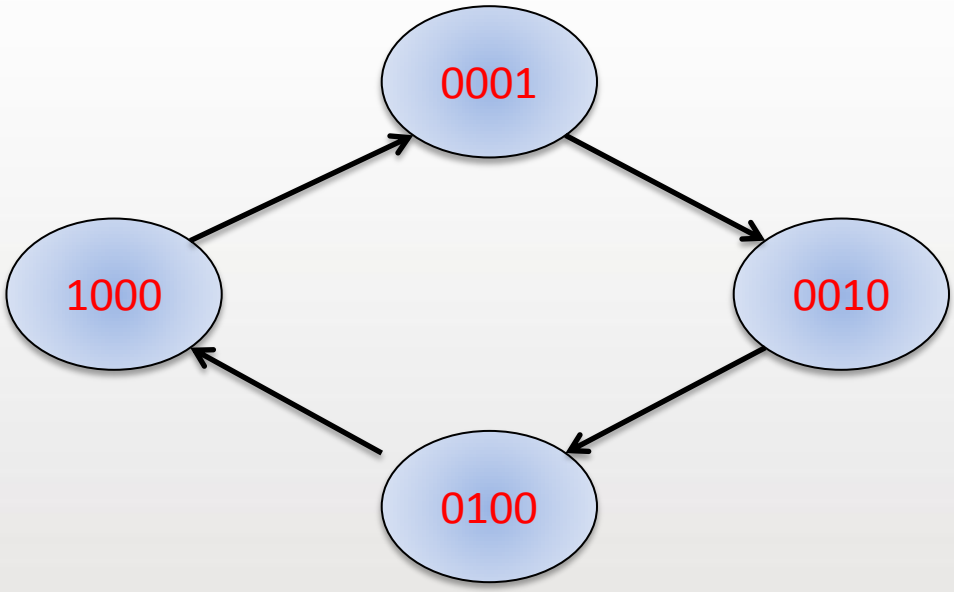



Shift Register Based Counters
Ring Counter
Johnson Counter

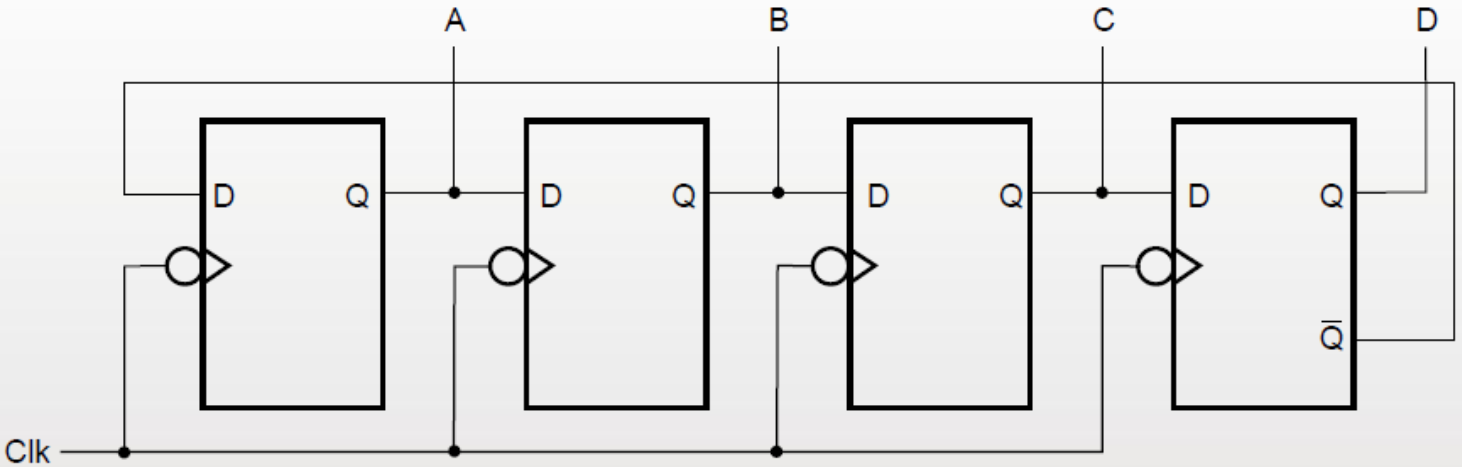
Ring Counter



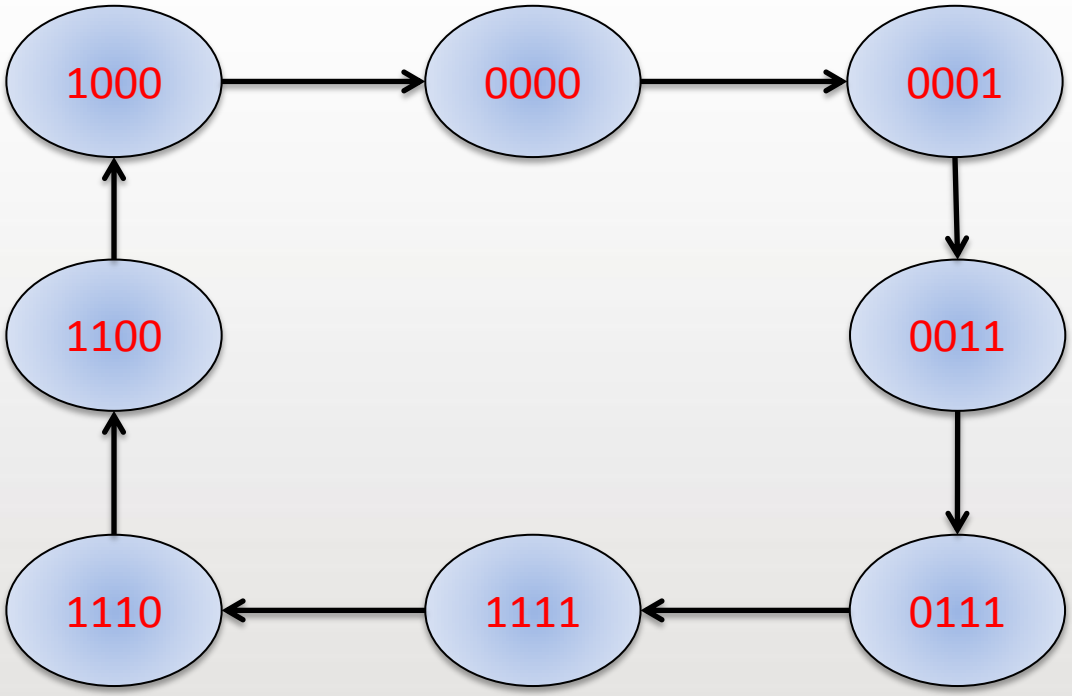
Ring Counter State Diagram



Johnson Counter



Johnson Counter State Diagram



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