Switching Circuit & Logic Design

Lecture 20 :
Synchronous Circuit

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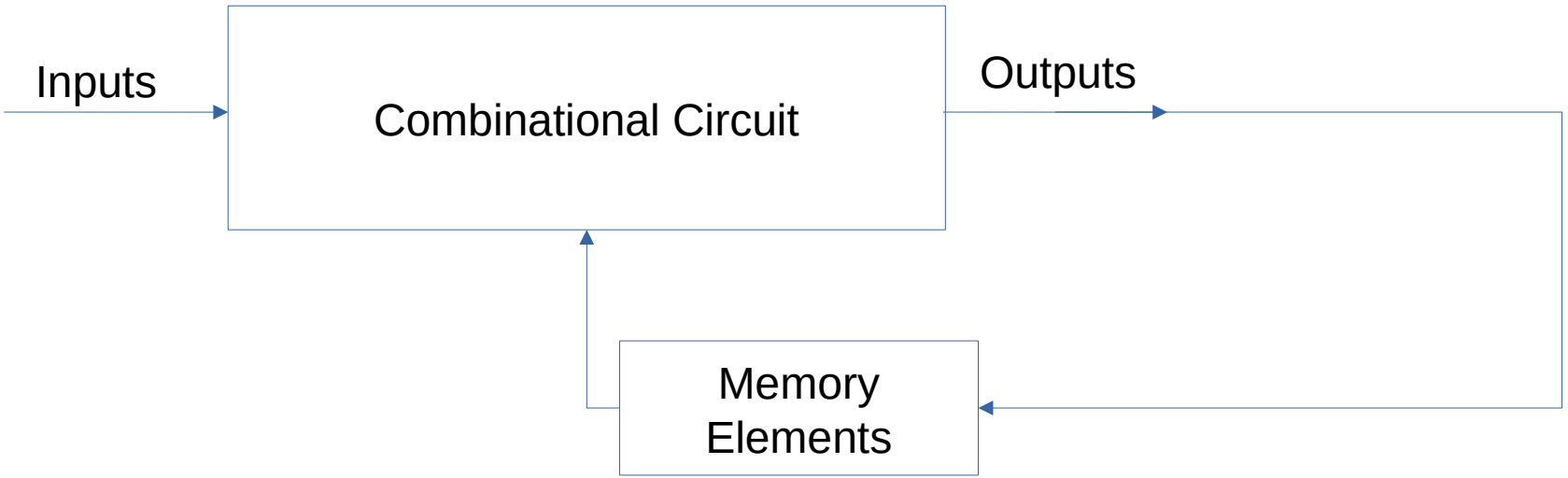

Latches and Flip-Flops

Most important memory element is flip-flop

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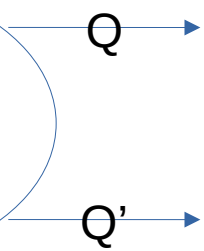
Flip-flop has only “TWO” outputs



Latches and Flip-Flops

Most important memory element is flip-flop

Flip-flops are made by an assembly of gates

Flip-flop has only “TWO” outputs

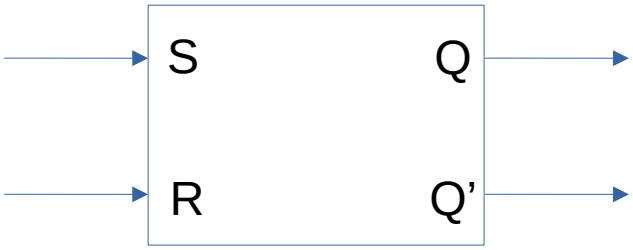
Q

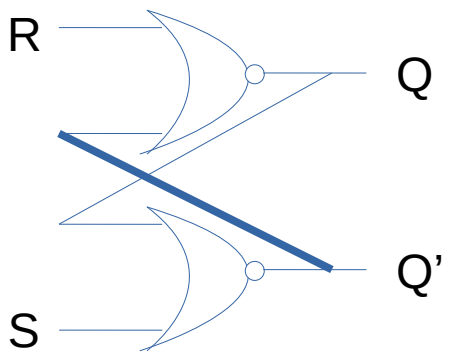
Q’

Flip-flop has only “TWO” stable states

“ONE” bit memory

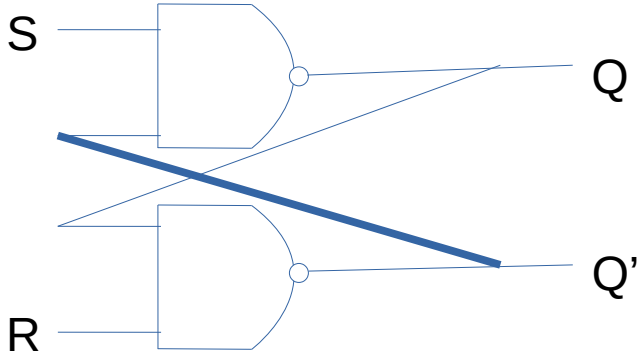
S-R latch



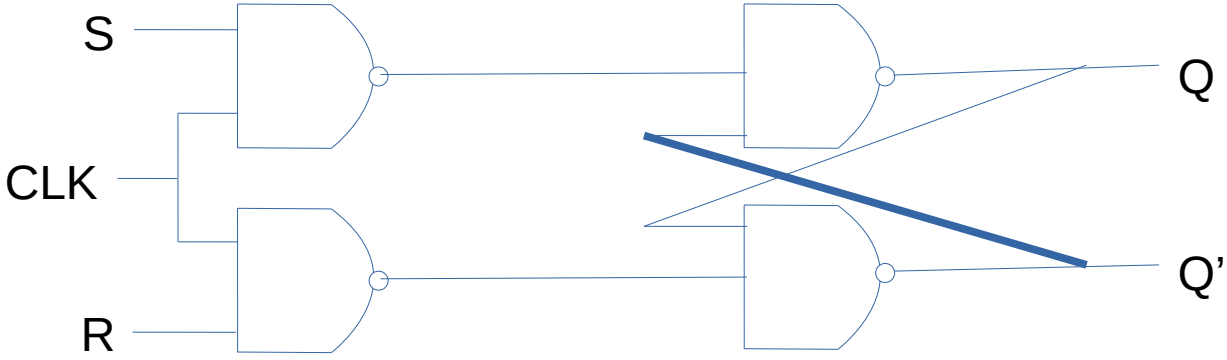


S	R	Q_n	Q_{n+1}	State
0	0	0	0	No Change
0	0	1	1	
0	1	0	0	Reset
0	1	1	0	
1	0	0	1	Set
1	0	1	1	
1	1	0	x	Indeterminate/Invalid
1	1	1	x	

S-R Latch with NAND



Flip-Flop



clk	S	R	Q_n	Q_{n+1}	State
1	0	0	0	0	No Change
1	0	0	1	1	
1	0	1	0	0	Reset
1	0	1	1	0	
1	1	0	0	1	Set
1	1	0	1	1	
1	1	1	0	x	Indeterminate/ Invalid
1	1	1	1	x	
0	x	x	0	0	No Change
0	x	x	1	1	