Digital Electronics and Computer Organization

Digital Design

Lecture 19: Sequence Detector



Innovate achieve ¹ lead

CKV



Design of sequence detector (1001)

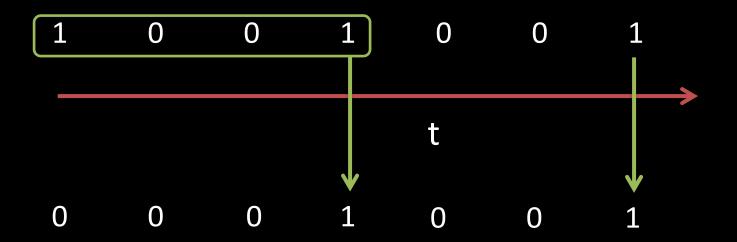
Bit stream as input

1	0	0	1	0	1	0	0	1
								_
				t				
			\checkmark					\checkmark
0	0	0	1	0	0	0	0	1



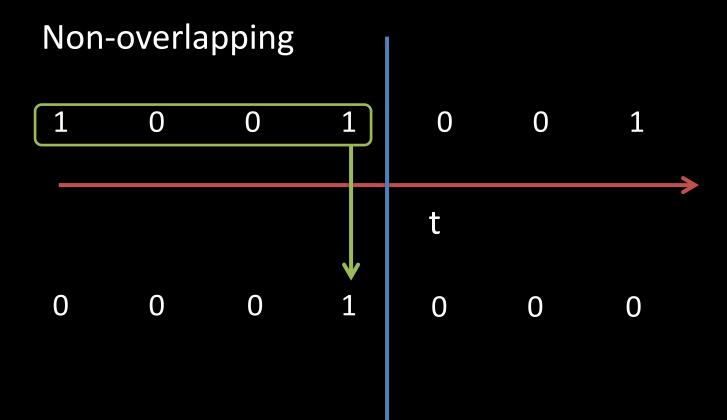
Design of sequence detector (1001)

Overlapping





Design of sequence detector (1001)

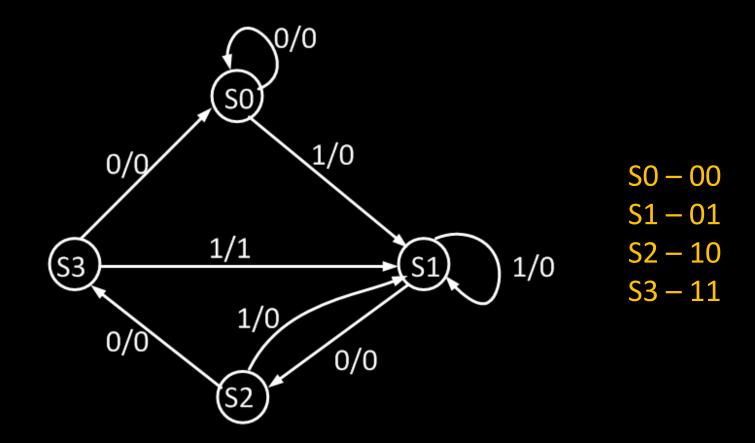




Design of sequence detector overlapping (1001)



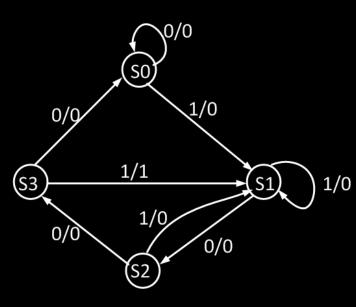
Design of sequence detector overlapping (1001)







Design of sequence detector overlapping (1001)



S0 –	00
S1 –	01
S2 –	10
C 2	11

Pre	sent St	ate	in		Out		
	Q _A	\mathbf{Q}_{B}	X		Q _{A(t+1)}	Q _{B(t+1)}	Y
S0	0	0	0	S0	0	0	0
S0	0	0	1	S1	0	1	0
S1	0	1	0	S2	1	0	0
S1	0	1	1	S1	0	1	0
S2	1	0	0	S3	1	1	0
S2	1	0	1	S1	0	1	0
S3	1	1	0	SO	0	0	0
S3	1	1	1	S1	0	1	1

 $D_B = X + Q_A Q_B'$

 $Y = Q_A Q_B X$

 $D_A = Q_A'Q_BX' + Q_AQ_B'X'$

Present State			in		Next Sta	ate	Out		
	Q _A	Q _B	Х		Q _{A(t+1)}	Q _{B(t+1)}	Y	D _A	D _B
S0	0	0	0	S 0	0	0	0	0	0
S0	0	0	1	S1	0	1	0	0	1
S1	0	1	0	S2	1	0	0	1	0
S1	0	1	1	S1	0	1	0	0	1
S2	1	0	0	S 3	1	1	0	1	1
S2	1	0	1	S1	0	1	0	0	1
S3	1	1	0	SO	0	0	0	0	0
S3	1	1	1	S1	0	1	1	0	1

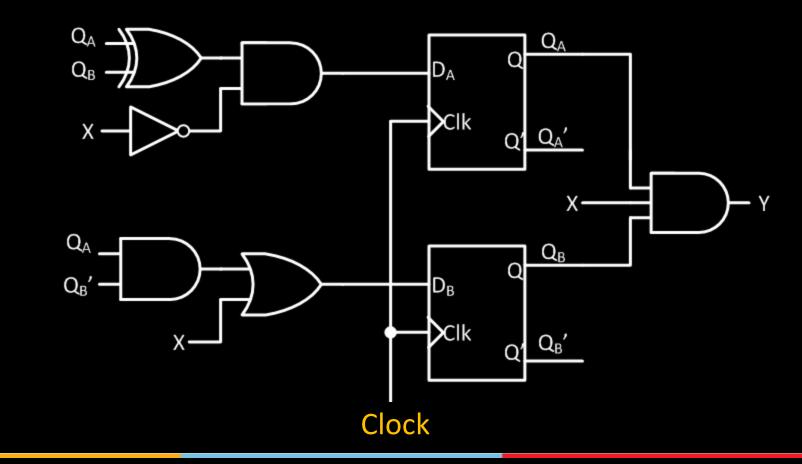
Design of Clocked sequential Circuits







$$D_{A} = Q_{A}'Q_{B}X' + Q_{A}Q_{B}'X' = (Q_{A} \bigoplus Q_{B})X' \qquad Y = Q_{A}Q_{B}X$$
$$D_{B} = X + Q_{A}Q_{B}'$$



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Present State			in	Next State			Out				
	Q _A	Q _B	X		Q _{A(t+1)}	Q _{B(t+1)}	Y	J _A	K _A	J _B	K _B
S0	0	0	0	S0	0	0	0	0	Х	0	X
S0	0	0	1	S1	0	1	0	0	Х	1	X
S1	0	1	0	S2	1	0	0	1	Х	Х	1
S1	0	1	1	S1	0	1	0	0	Х	Х	0
S2	1	0	0	S 3	1	1	0	Х	0	1	X
S2	1	0	1	S1	0	1	0	Х	1	1	X
S3	1	1	0	SO	0	0	0	Х	1	Х	1
S3	1	1	1	S1	0	1	1	Х	1	Х	0

 $Y = Q_A Q_B X$

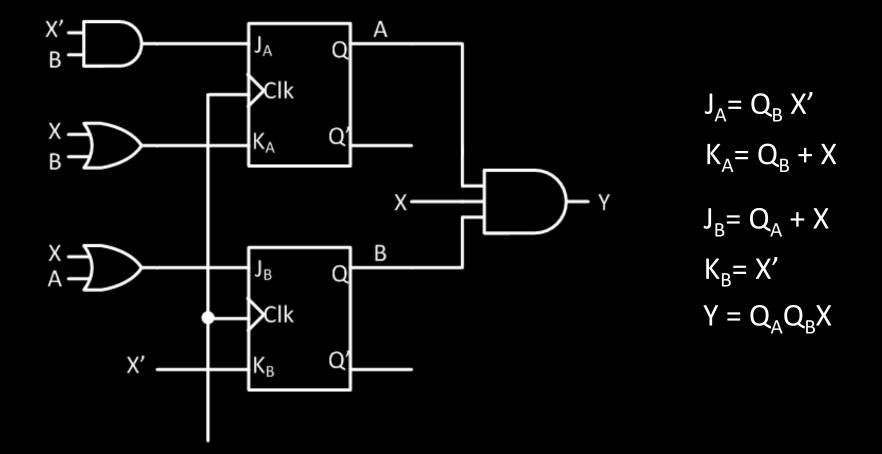
$$J_{A} = Q_{B} X' \qquad K_{A} = Q_{B} + X$$
$$J_{B} = Q_{A} + X \qquad K_{B} = X'$$

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Design of sequence detector overlapping (1001)- JK Flip-flop



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Next class

State Reduction





Thank You

10/8/2020