

Ontwerp van een synchrone 4-bit afteller met JK-flipflops

Oud -> nieuw		Oud	Nieuw	FF4		FF3		FF2		FF1	
		Q4Q3Q2Q1	Q4Q3Q2Q1	J4	K4	J3	K3	J2	K2	J1	K1
15	14	1111	1110	x	0	x	0	x	0	x	1
14	13	1110	1101	x	0	x	0	x	1	1	x
13	12	1101	1100	x	0	x	0	0	x	x	1
12	11	1100	1011	x	0	x	1	1	x	1	x
11	10	1011	1010	x	0	0	x	x	0	x	1
10	9	1010	1001	x	0	0	x	x	1	1	x
9	8	1001	1000	x	0	0	x	0	x	x	1
8	7	1000	0111	x	1	1	x	1	x	1	x
7	6	0111	0110	0	x	x	0	x	0	x	1
6	5	0110	0101	0	x	x	0	x	1	1	x
5	4	0101	0100	0	x	x	0	0	x	x	1
4	3	0100	0011	0	x	x	1	1	x	1	x
3	2	0011	0010	0	x	0	x	x	0	x	1
2	1	0010	0001	0	x	0	x	x	1	1	x
1	0	0001	0000	0	x	0	x	0	x	x	1
0	15	0000	1111	1	x	1	x	1	x	1	x

J1: 1

J2: \bar{Q}_1

J3: $\bar{Q}_1\bar{Q}_2$

J4: $\bar{Q}_1\bar{Q}_2\bar{Q}_3$

K1: 1

K2: \bar{Q}_1

K3: $\bar{Q}_1\bar{Q}_2$

K4: $\bar{Q}_1\bar{Q}_2\bar{Q}_3$

J1

Q4Q3	Q2Q1			
	00	01	11	10
00	1	x	x	1
01	1	x	x	1
11	1	x	x	1
10	1	x	x	1

J2

Q4Q3	Q2Q1			
	00	01	11	10
00	1	0	x	x
01	1	0	x	x
11	1	0	x	x
10	1	0	x	x

J3

Q4Q3	Q2Q1			
	00	01	11	10
00	1	0	0	0
01	x	x	x	x
11	x	x	x	x
10	1	0	0	0

J4

Q4Q3	Q2Q1			
	00	01	11	10
00	1	0	0	0
01	0	0	0	0
11	x	x	x	x
10	x	x	x	x

K1

Q4Q3	Q2Q1			
	00	01	11	10
00	x	1	1	x
01	x	1	1	x
11	x	1	1	x
10	x	1	1	x

K2

Q4Q3	Q2Q1			
	00	01	11	10
00	x	x	0	1
01	x	x	0	1
11	x	x	0	1
10	x	x	0	1

K3

Q4Q3	Q2Q1			
	00	01	11	10
00	x	x	x	x
01	1	0	0	0
11	1	0	0	0
10	x	x	x	x

K4

Q4Q3	Q2Q1			
	00	01	11	10
00	x	x	x	x
01	x	x	x	x
11	0	0	0	0
10	1	0	0	0