JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Technische Informatik: Abgabe 8

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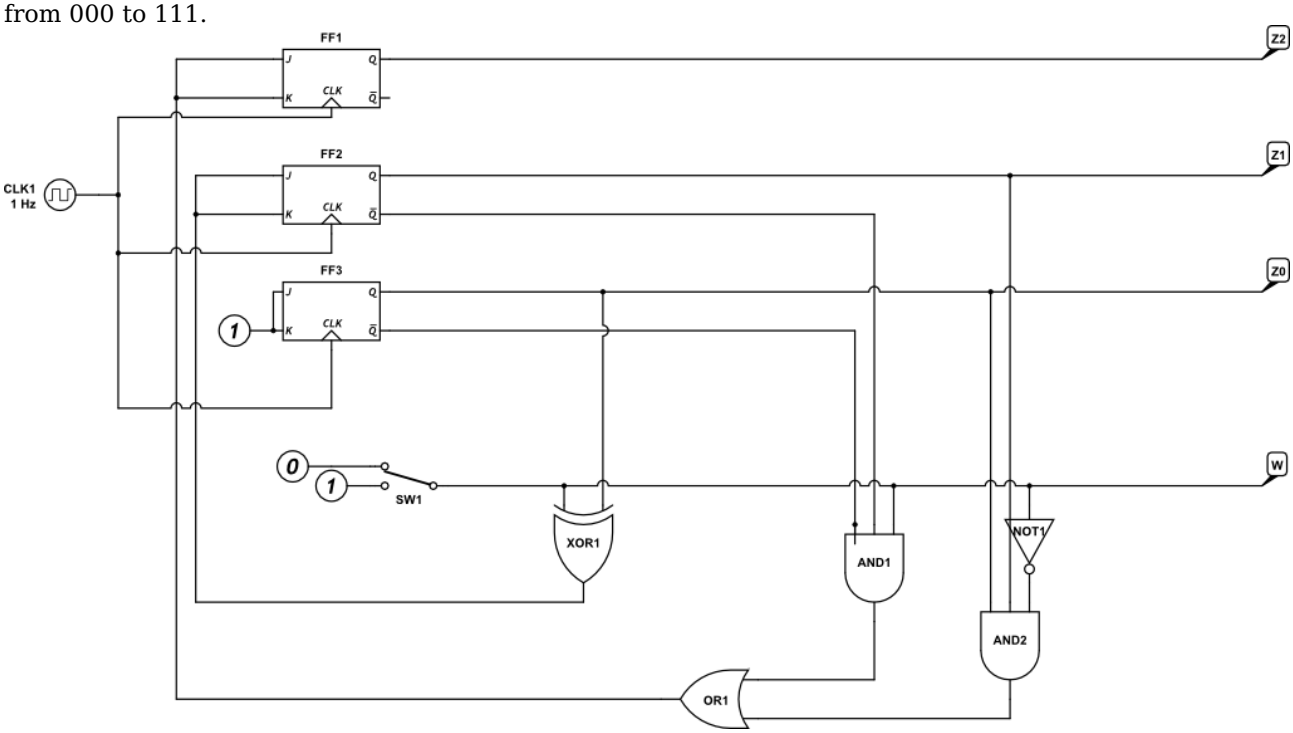
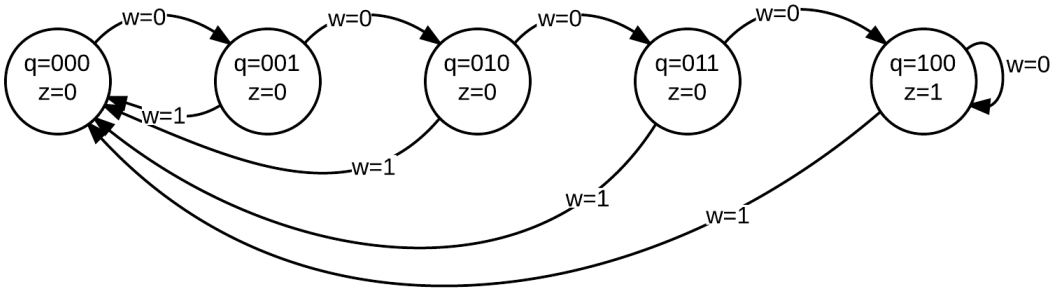
Exercise 8.1 (JK Flipflop Ringcounter)

@Andrey You wanted to try to get to that circuit, right? It should work out if you name the states naturally from 000 to 111.



Exercise 8.2 (JK Flipflip for 4 equal inputs)

First we make one input signal w out of the w_1 and w_2 to make the automaton simpler. Therefore we XOR the two signals to one. If both signals are equal XOR makes $w = 0$. If they are different XOR will be $w = 1$. The state diagram for the automaton:



State	Next state								Output
	$w=0$				$w=1$				
$y_2y_1y_0$	$Y_2Y_1Y_0$	J_2K_2	J_1K_1	J_0K_0	$Y_2Y_1Y_0$	J_2K_2	J_1K_1	J_0K_0	z
000	001	0d	0d	1d	000	0d	0d	0d	0
001	010	0d	1d	d1	000	0d	0d	d1	0
010	011	0d	d0	1d	000	0d	d1	0d	0
011	100	1d	d1	d1	000	0d	d1	d1	0
100	100	d0	0d	0d	000	d1	0d	0d	1
101	ddd	dd	dd	dd	000	dd	dd	dd	d
110	ddd	dd	dd	dd	000	dd	dd	dd	d
111	ddd	dd	dd	dd	000	dd	dd	dd	d

This leads to these K-maps:

J_0	y_1y_0			
wy_2	00	01	11	01
00	1	d	d	1
01		d	d	d
11		d	d	d
10		d	d	

J_1	y_1y_0			
wy_2	00	01	11	01
00		1	d	d
01		d	d	d
11		d	d	d
10			d	d

J_2	y_1y_0			
wy_2	00	01	11	01
00			1	
01	d	d	d	d
11	d	d	d	d
10				

K_0	y_1y_0			
wy_2	00	01	11	01
00	d	1	1	d
01	d	d	d	d
11	d	d	d	d
10	d	1	1	d

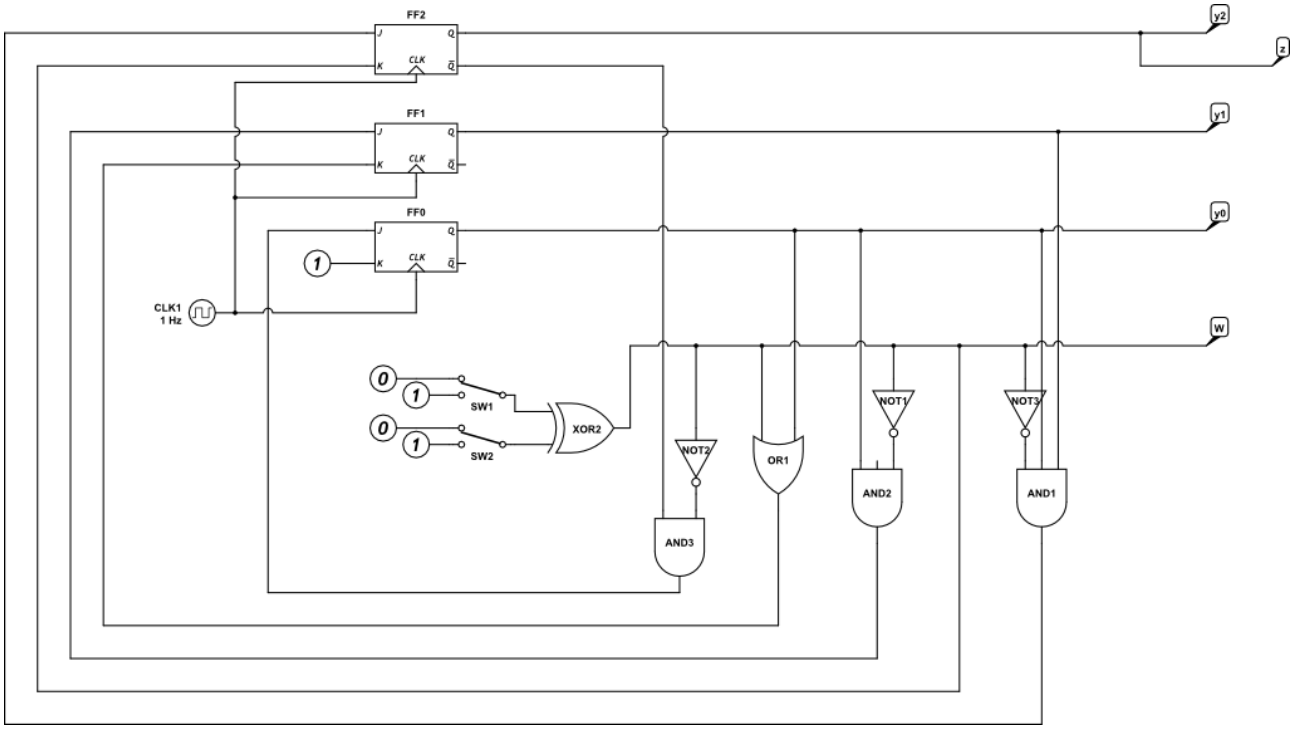
K_1	y_1y_0			
wy_2	00	01	11	01
00	d	d	1	
01	d	d	d	d
11	d	d	d	d
10	d	d	d	1

K_2	y_1y_0			
wy_2	00	01	11	01
00	d	d	d	d
01		d	d	d
11	1	d	d	d
10	d	d	d	d

These K-maps lead us to:

$$
\begin{aligned}
J_0 &= \bar{w}\bar{y}_2 \\
J_1 &= \bar{w}y_0 \\
J_2 &= \bar{w}y_1y_0 \\
K_0 &= 1 \\
K_1 &= w + y_0 \\
K_2 &= w
\end{aligned}
$$

Which brings us to this circuit:



Exercise 8.3 (TODO)

TODO Andrey?