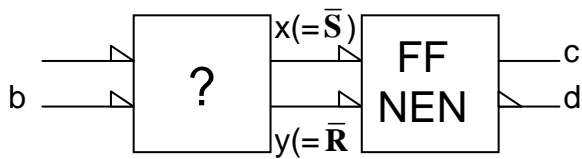
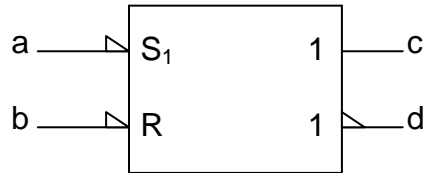


Oefeningen cursus blz. 7-21 tot 7-22

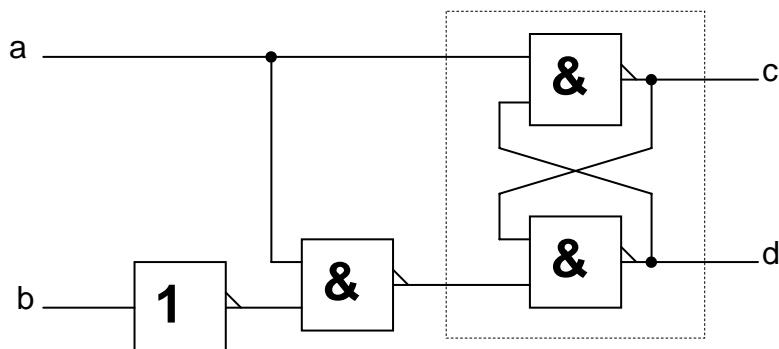
1. Asynchrone FF met prioriteit set.



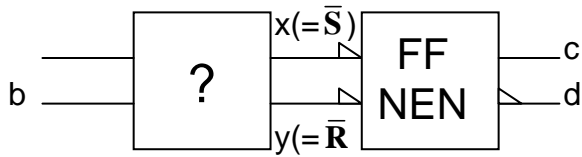
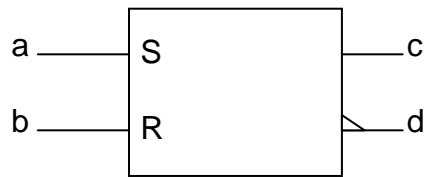
a	b	x	y	c	d	
0	0	0	1	1	0	set
0	1	0	1	1	0	set
1	0	1	0	0	1	reset
1	1	1	1	onveranderd	rust	

$$\begin{aligned}
 x &= a\bar{b} + ab \\
 &= a(\bar{b} + b) \\
 &= a
 \end{aligned}$$

$$\begin{aligned}
 y &= \bar{a}\bar{b} + \bar{a}b + ab \\
 &= \bar{a}(\bar{b} + b) + ab \\
 &= \bar{a} + ab \\
 &= \bar{a} + b \\
 &= \overline{a\bar{b}}
 \end{aligned}$$



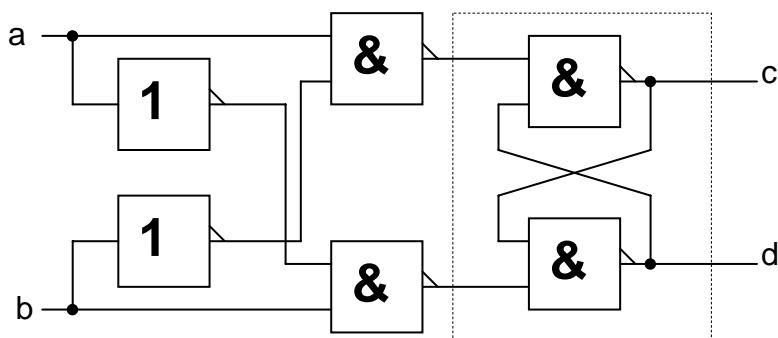
2. Asynchrone FF met prioriteit rust.



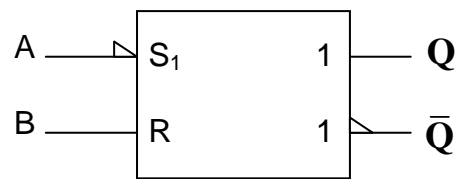
a	b	x	y	c	d
0	0	1	1	onveranderd	rust
0	1	0	1	1	0 set
1	0	1	0	0	1 reset
1	1	1	1	onveranderd	rust

$$\begin{aligned}
 x &= \bar{a}\bar{b} + \bar{a}b + ab \\
 &= \bar{a}(\bar{b} + b) + ab \\
 &= \bar{a} + ab \\
 &= \bar{a} + b \\
 &= \overline{ab}
 \end{aligned}$$

$$\begin{aligned}
 y &= \bar{a}\bar{b} + a\bar{b} + ab \\
 &= \bar{a}\bar{b} + \bar{a}(b + b) \\
 &= \bar{a}\bar{b} + a \\
 &= a + \bar{b} \\
 &= \overline{ab}
 \end{aligned}$$



3. Teken poortschema



A	B	x	y	Q	Q̄	
0	0	0	1	1	0	set
0	1	0	1	1	0	set
1	0	1	1	onveranderd	rust	
1	1	1	0	0	1	reset

$$x = A\bar{B} + AB$$

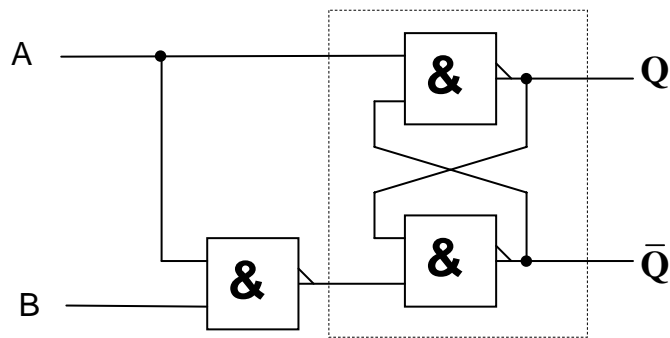
$$= A$$

$$y = \bar{A}\bar{B} + \bar{A}B + A\bar{B}$$

$$= \bar{A} + A\bar{B}$$

$$= \bar{A} + \bar{B}$$

$$= \overline{AB}$$



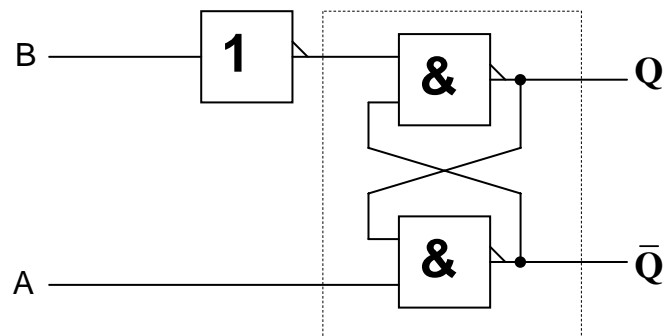
4. Teken poortschema



A	B	x	y	Q	Q̄	
0	0	1	0	0	1	set
0	1	0	0	1	1	verboden
1	0	1	1	onveranderd	rust	
1	1	0	1	1	0	reset

$$\begin{aligned}
 x &= \bar{A}\bar{B} + A\bar{B} \\
 &= (\bar{A} + A)\bar{B} \\
 &= \bar{B}
 \end{aligned}$$

$$\begin{aligned}
 y &= A\bar{B} + AB \\
 &= A(\bar{B} + B) \\
 &= A
 \end{aligned}$$

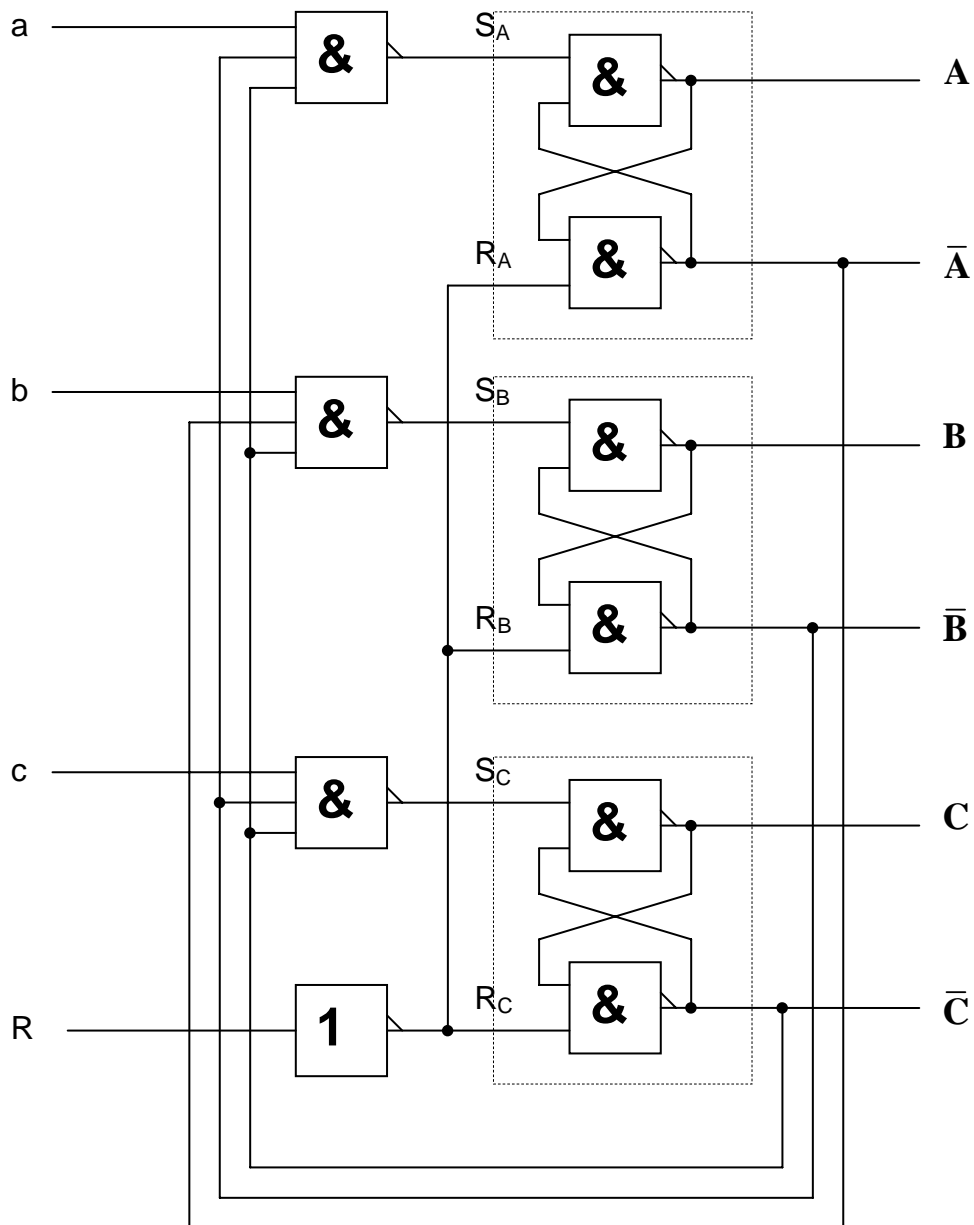


5. 'Quizmaster'-schakeling

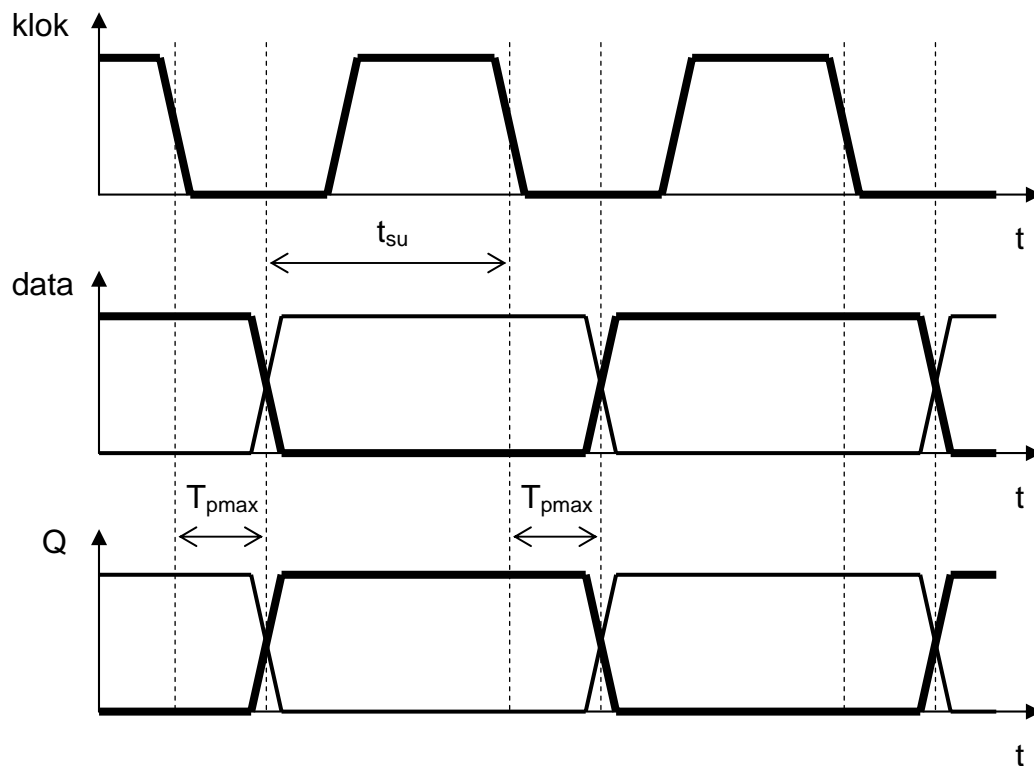
$$S_A = a\bar{B}\bar{C}$$

$$S_B = b\bar{A}\bar{C}$$

$$S_C = c\bar{A}\bar{B}$$



6. Timing van een D-flipflop



Bij de dalende flank van de klok zal, na de vertragingstijd t_p , het signaal van de data-ingang $D_t = \bar{Q}_{t-1}$ door de uitgang Q_t worden overgenomen. Dus met een vertragingstijd t_p na de dalende flank van de klok verandert de flipflop van toestand (toggled). De nieuwe toestand moet nu gedurende een tijd t_{su} worden aangehouden voor er opnieuw een dalend flank van de klok mag optreden.

$$T_{max} = t_p + t_{su}$$

$$f_{max} = \frac{1}{t_p + t_{su}}$$

De frequentie van de uitgang Q is de helft van de klokfrequentie. M. a. w. dit is een tweedeler.