

Architecture d'une FSN

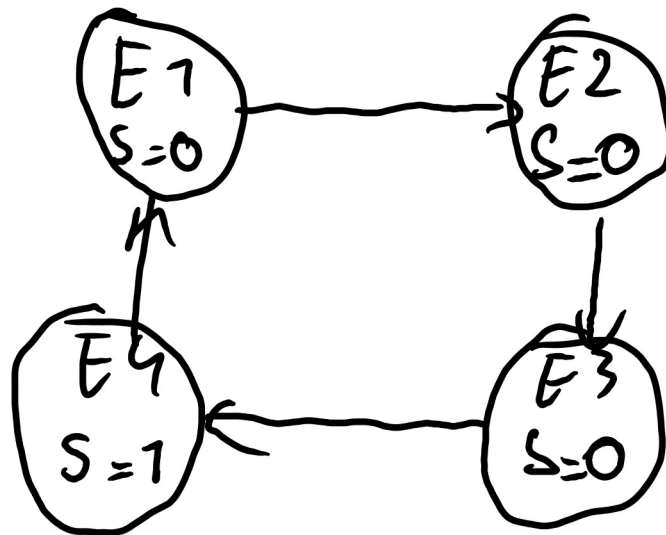


Nombre de bascule D nécessaire :

$$N_D = \frac{\ln(\text{état})}{\ln(2)}$$

Exercice 1

Q1



$$E1 = 00$$

$$E2 = 01$$

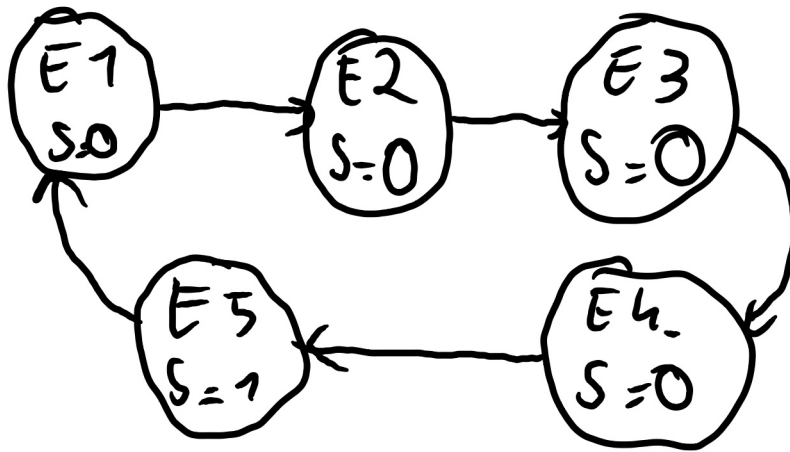
$$E3 = 10$$

$$E4 = 11$$

$$S = E4 = Q_1 Q_0$$

On convertit chaque état en nombre (ici 2 bits suffisent) Puis en fonction de l'état on calcul la sortie S

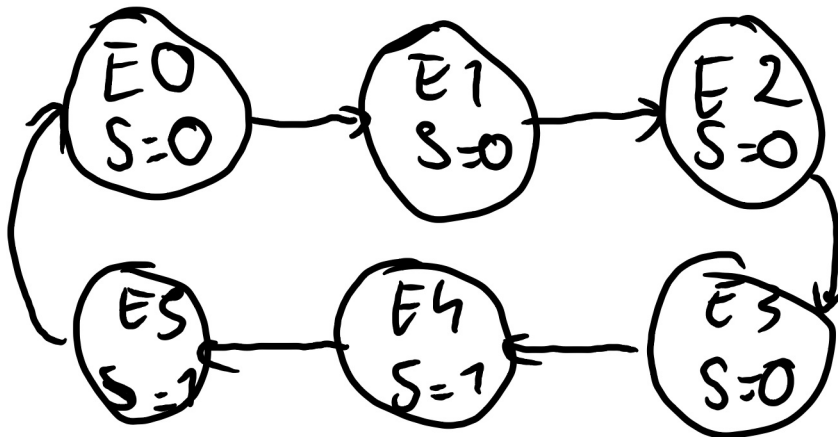
Q2 Diviseur par 5



$E_1 = 000$
 $E_2 = 001$
 $E_3 = 010$
 $E_4 = 011$
 $E_5 = 100$

$S = Q_2$

Question 3



$E_0 = 000$
 $E_1 = 001$
 $E_2 = 010$
 $E_3 = 011$
 $E_4 = 100$
 $E_5 = 101$

$S = Q_2 \overline{Q_1}$

Question 4

Clear Asynchrone

↳ Indépendant de l'horloge

↳ force la sortie à 0

Schéma du Registre d'état

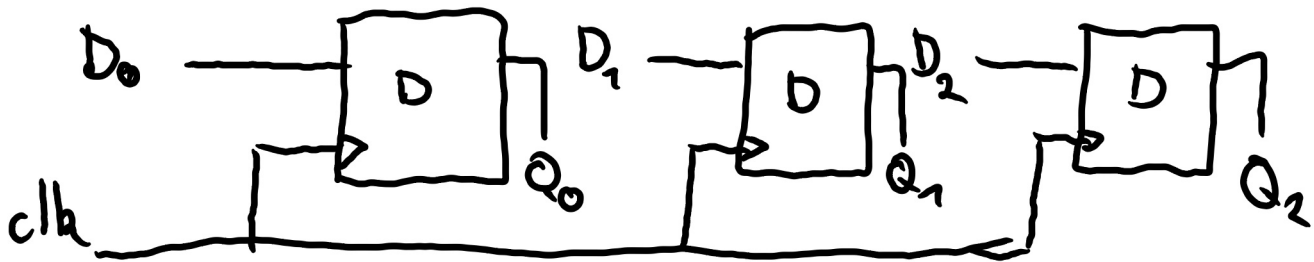


Schéma du circuit Next State

Q_2	Q_1	Q_0	D_2	D_1	D_0	Reset
0	0	0	0	0	1	0
0	0	1	0	1	0	0
0	1	0	0	1	1	0
0	1	1	1	0	0	0
1	0	0	1	0	1	0
1	0	1	1	1	0	0
1	1	0	X	X	X	1

N'arrivera

Jamais donc don't care

$Q_2 \backslash Q_1 Q_0$	00	01	11	10
0	1	0	0	1
1	1	0	x	x

$$D_0 = \overline{Q_0}$$

$Q_2 \backslash Q_1 Q_0$	00	01	11	10
0	0	1	0	1
1	0	1	x	x

$$D_1 = \overline{Q_1} Q_0 + Q_1 Q_0 \\ = Q_1 \oplus Q_0$$

$Q_2 \backslash Q_1 Q_0$	00	01	11	10
0	0	0	1	0
1	1	1	x	x

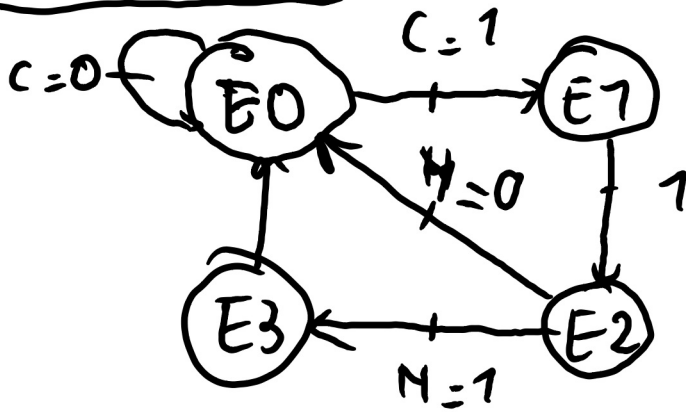
$$D_2 = Q_1 Q_0 + Q_2$$

$$\text{Reset} = Q_2 Q_1$$

Circuit de Sortie

$$S = E^4 + E^5 = Q_2 \overline{Q_1} \overline{Q_0} + Q_2 \overline{Q_1} Q_0 \\ = Q_2 Q_1 (\overline{Q_0} + Q_0) = Q_2 Q_1$$

Exercice n°2



4 états → 2 bascules

$E0 = 00$

$E1 = 01$

$E2 = 10$

$E3 = 11$

Table de transition

Etat		Q_1	Q_0
\bar{C}	E0	0	0
	E1	0	1
	E2	1	0
	E3	1	1

Diagram showing transitions from the table: E0 to E1 (C), E1 to E0 (N), E1 to E2 (1), E2 to E1 (1), E2 to E3 (N), E3 to E2 (1), E3 to E0 (C).

Etat	Etat actuel		Entrées		Etat suivant		Sortie
	Q_1	Q_0	C	N	D_1	D_0	S
E0	0	0	0	X	0	0	0
E0	0	0	1	X	0	1	0
E1	0	1	X	X	1	0	clk
E2	1	0	X	0	0	0	clk
E2	1	0	X	1	1	0	clk
E3	1	1	X	X	0	0	clk

Q_1, Q_0					
C	H	Q_1, Q_0			
		00	01	11	10
0	0	0	0	0	0
0	1	0	0	0	1
1	1	1	0	0	1
1	0	1	0	0	0

$$D_0 = \overline{Q_1} \overline{Q_0} H + \overline{Q_1} \overline{Q_0} C$$

Q_1, Q_0					
C	H	Q_1, Q_0			
		00	01	11	10
0	0	0	1	0	0
0	1	0	1	0	1
1	1	0	1	0	1
1	0	0	1	0	0

$$D_1 = Q_1 \overline{Q_0} H + \overline{Q_1} Q_0$$

Q_1, Q_0					
C	H	Q_1, Q_0			
		00	01	11	10
0	0	0	H	H	H
0	1	0	H	H	H
1	1	0	H	H	H
1	0	0	H	H	H

$$S = (Q_0 + Q_1) \cdot C / k$$

