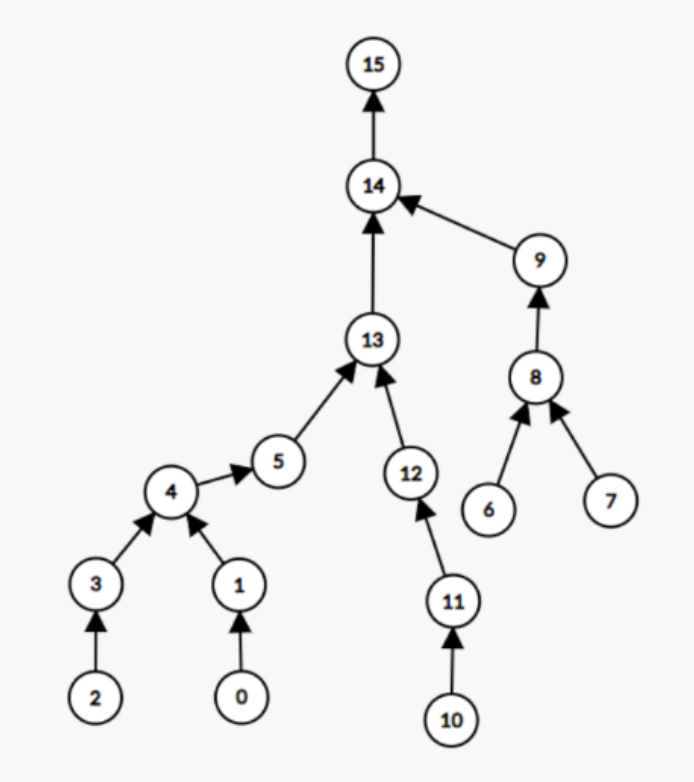
Lógica de Estados & FF.D:



Q_n	Q_{n+1}
q_0	q_1
q_1	q_4
q_2	q_3
q_3	q_4
q_4	q_5
q_5	q_{13}
q_6	q_8
q_7	q_8
q_8	q_9
q_9	q_{14}
q_{10}	q_{11}
q_{11}	q_{12}
q_{12}	q_{13}
q_{13}	q_{14}
q_{14}	q_{15}
q_{15}	q_{15}

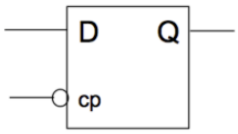
→

	Q_n	Q_{n+1}
	ABCD	ABCD
q_0	0000	0001
q_1	0001	0100
q_2	0010	0011
q_3	0011	0100
q_4	0100	0101
q_5	0101	1101
q_6	0110	1000
q_7	0111	1000
q_8	1000	1001
q_9	1001	1110
q_{10}	1010	1011
q_{11}	1011	1100
q_{12}	1100	1101
q_{13}	1101	1110
q_{14}	1110	1111
q_{15}	1111	1111

dificultades:

	Q_n	D
	ABCD	
q_0	0000	2
q_1	0001	4
q_2	0010	1
q_3	0011	5
q_4	0100	5
q_5	0101	7
q_6	0110	4
q_7	0111	4
q_8	1000	6
q_9	1001	3
q_{10}	1010	8
q_{11}	1011	7
q_{12}	1100	9
q_{13}	1101	7
q_{14}	1110	8
q_{15}	1111	9

Flip Flop (D)



D	Q^{n+1}
0	0
1	1

Tabla característica

Q^n	Q^{n+1}	D
0	0	0
0	1	1
1	0	0
1	1	1

Tabla de excitación

D_A :

AB\CD	00	01	11	10
00	0	0	0	0
01	0	1	1	1
11	1	1	1	1
10	1	1	1	1

$$D_A = A + BD + BC$$

D_B :

AB\CD	00	01	11	10
00	0	1	1	0
01	1	1	0	0
11	1	1	1	1
10	0	1	1	0

$$D_B = \bar{B}D + B\bar{C} + AB$$

D_C :

AB\CD	00	01	11	10
00	0	0	0	1
01	0	0	0	0
11	0	1	1	1
10	0	1	0	1

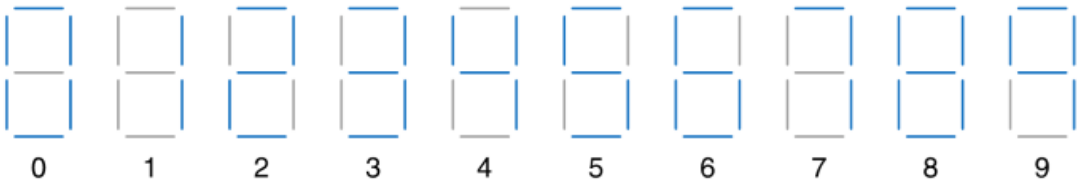
$$D_C = \bar{B}C\bar{D} + A\bar{C}D + ABC$$

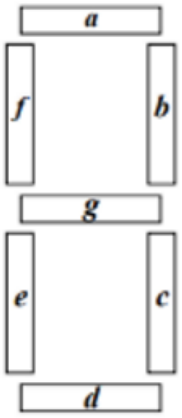
D_D :

AB\CD	00	01	11	10
00	1	0	0	1
01	1	1	0	0
11	1	0	1	1
10	1	0	0	1

$$D_D = \bar{B}\bar{D} + \bar{C}\bar{D} + \bar{A}B\bar{C} + ABC$$

Lógica de salida:





Q = estados

Dif = dificultad en base 10

a, b, ... g = 7 bits dificultad en binario

Q	Dif	a	b	c	d	e	f	g
ABCD								
0000	2	1	1	0	1	1	0	1
0001	4	0	1	1	0	0	1	1
0010	1	0	1	1	0	0	0	0
0011	5	1	0	1	1	0	1	1
0100	5	1	0	1	1	0	1	1
0101	7	1	1	1	0	0	0	0
0110	4	0	1	1	0	0	1	1
0111	4	0	1	1	0	0	1	1
1000	6	1	0	1	1	1	1	1
1001	3	1	1	1	1	0	0	1
1010	8	1	1	1	1	1	1	1
1011	7	1	1	1	0	0	0	0
1100	9	1	1	1	0	0	1	1
1101	7	1	1	1	0	0	0	0
1110	8	1	1	1	1	1	1	1
1111	9	1	1	1	0	0	1	1

a:

AB\CD	00	01	11	10
00	1	0	1	0
01	1	1	0	0
11	1	1	1	1
10	1	1	1	1

$a = A + \bar{C}\bar{D} + B\bar{C} + \bar{B}CD$

e:

AB\CD	00	01	11	10
00	1	0	0	0
01	0	0	0	0
11	0	0	0	1
10	1	0	0	1

$e = \bar{B}\bar{C}\bar{D} + AC\bar{D}$

b:

AB\CD	00	01	11	10
00	1	1	0	1
01	0	1	1	1
11	1	1	1	1
10	0	1	1	1

$b = \bar{A}\bar{B}\bar{C} + BC + AB + \bar{C}D + C\bar{D} + AC$

f:

AB\CD	00	01	11	10
00	0	1	1	0
01	1	0	1	1
11	1	0	1	1
10	1	0	0	1

$F = B\bar{D} + A\bar{D} + \bar{A}\bar{B}D + BC$

c:

AB\CD	00	01	11	10
00	0	1	1	1
01	1	1	1	1
11	1	1	1	1
10	1	1	1	1

$c = A + B + C + D$

g:

AB\CD	00	01	11	10
00	1	1	1	0
01	1	0	1	1
11	1	0	1	1
10	1	1	0	1

$g = \bar{B}\bar{C} + \bar{A}\bar{B}D + BC + \bar{C}\bar{D} + A\bar{D}$

d:

AB\CD	00	01	11	10
00	1	0	1	0
01	1	0	0	0
11	0	0	0	1
10	1	1	0	1

$d = \bar{A}\bar{C}\bar{D} + A\bar{B}\bar{C} + \bar{A}\bar{B}CD + AC\bar{D}$