* CSE 232 HW3 Yeşim Yalçın - 200104004094

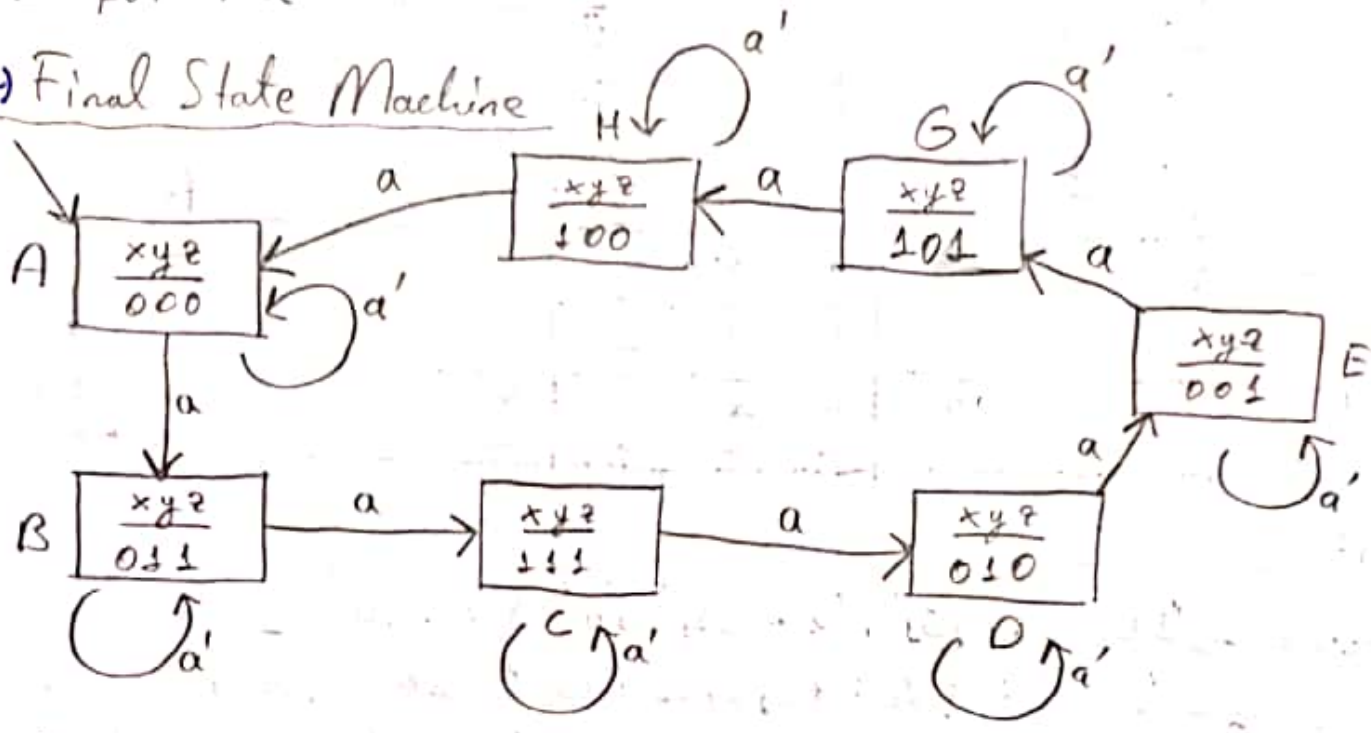
* 3 outputs: x, y, z

000 → 011 → 111 → 010 → 001 → 101 → 100

(100 → 000)

1 input : a

1-) Final State Machine



2-) Architecture

* 7 states = 3 bit registers (s_2, s_1, s_0) + input a
* 3 bits for the following state (n_2, n_1, n_0) + 3 outputs (x, y, z)

3-) Encoding States

* A = 000
* B = 001
* C = 010
* D = 011
* E = 100
* G = 101
* H = 110

4-) State Table

	S_2	S_1	S_0	a	n_2	n_1	n_0	x	y	z
A	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	1	0	0	0
B	0	0	1	0	0	0	1	0	1	1
	0	0	1	1	0	1	0	0	1	1
C	0	1	0	0	0	1	0	1	1	1
	0	1	0	1	0	1	1	1	1	1
D	0	1	1	0	0	1	1	0	1	0
	0	1	1	1	1	0	0	0	1	0
E	1	0	0	0	1	0	0	0	0	1
	1	0	0	1	1	0	1	0	0	1
G	1	0	1	0	1	0	1	1	0	1
	1	0	1	1	1	1	0	1	0	1
H	1	1	0	0	1	1	0	1	0	0
	1	1	0	1	0	0	0	1	0	0
X	1	1	1	0	x	x	x	x	x	x
	1	1	1	1	x	x	x	x	x	x

Don't care conditions

5-) Boolean Expressions

* $n_2 = S_2'S_1S_0a + S_2S_1'S_0'a + S_2S_1'S_0a' + S_2S_1'S_0a' + S_2S_1S_0a + S_2S_1S_0'a'$
* $n_1 = S_2'S_1'S_0a + S_2'S_1S_0'a + S_2'S_1S_0'a + S_2'S_1S_0a' + S_2S_1'S_0a + S_2S_1S_0a'$
* $n_0 = S_2'S_1'S_0'a + S_2'S_1'S_0a' + S_2'S_1S_0'a + S_2'S_1S_0a' + S_2S_1'S_0'a + S_2S_1'S_0a'$
* $x = S_2'S_1S_0'a' + S_2'S_1S_0'a + S_2S_1'S_0a' + S_2S_1'S_0a + S_2S_1S_0a' + S_2S_1S_0'a$
* $y = S_2'S_1'S_0a' + S_2'S_1'S_0a + S_2'S_1S_0'a' + S_2'S_1S_0'a + S_2'S_1S_0a' + S_2'S_1S_0a$
* $z = S_2'S_1'S_0a' + S_2'S_1'S_0a + S_2'S_1S_0'a' + S_2'S_1S_0'a + S_2S_1'S_0'a' + S_2S_1'S_0'a + S_2S_1'S_0a' + S_2S_1'S_0a + S_2S_1'S_0a'$

*n_2

S_2S_1 \ S_0a	00	01	11	10
00	0	0	0	0
01	0	0	1	0
11	1	0	x	x
10	1	1	1	1

$n_2 = S_2S_1' + S_2a' + S_1S_0a$

*n_1

S_2S_1 \ S_0a	00	01	11	10
00	0	0	1	0
01	1	1	0	1
11	1	0	x	x
10	0	0	1	0

$n_1 = S_1a' + S_1S_0a + S_2'S_1S_0'$

*n_0

S_2S_1 \ S_0a	00	01	11	10
00	0	1	0	1
01	0	1	0	1
11	0	0	x	x
10	0	1	0	1

$n_0 = S_0a' + S_2'S_0'a + S_1'S_0'a$

✱x

S_2S_1 \ S_0a	00	01	11	10
00	0	0	0	0
01	1	1	0	0
11	1	1	x	x
10	0	0	1	1

$X = S_1S_0' + S_2S_0$

✱y

S_2S_1 \ S_0a	00	01	11	10
00	0	0	1	1
01	1	1	1	1
11	0	0	x	x
10	0	0	0	0

$y = S_2'S_0 + S_2'S_1$

✱z

S_2S_1 \ S_0a	00	01	11	10
00	0	0	1	1
01	1	1	0	0
11	0	0	x	x
10	1	1	1	1

$z = S_1'S_0 + S_2S_1' + S_2'S_1S_0'$

✱Controller