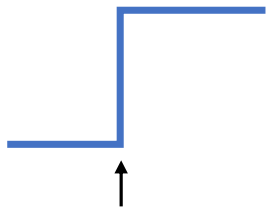
Finite State Machine

Finite State Machine

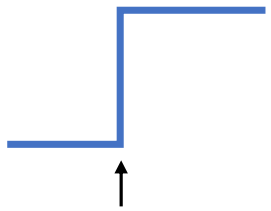
- **Design a Combinational Circuit to detect positive transition of a Signal.**



0 to 1 Transition

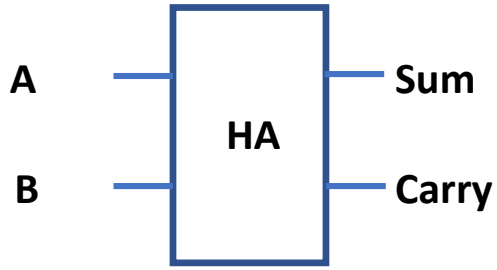
Finite State Machine

- **Design a Combinational Circuit to detect positive transition of a Signal.**



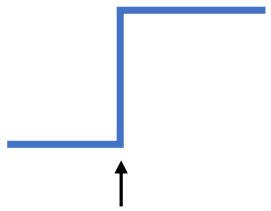
0 to 1 Transition

Lets take Half Adder Example



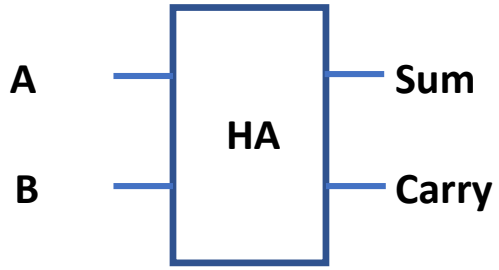
Finite State Machine

- **Design a Combinational Circuit to detect positive transition of a Signal.**



0 to 1 Transition

Lets take Half Adder Example

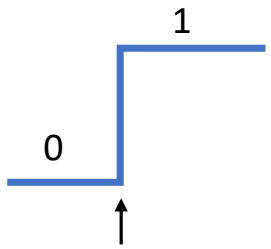


Truth Table

A	B	Sum	Carry
0	0		
0	1		
1	0		
1	1		

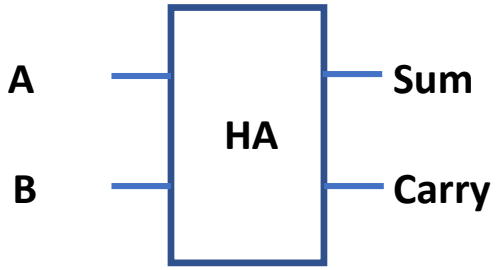
Finite State Machine

- **Design a Combinational Circuit to detect positive transition of a Signal.**



0 to 1 Transition

Lets take Half Adder Example



Sum = A xor B

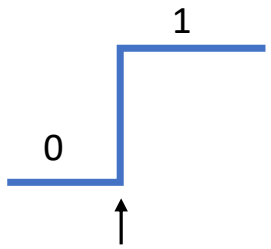
Carry = A and B

Truth Table

A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Finite State Machine

- **Design a Combinational Circuit to detect positive transition of a Signal.**

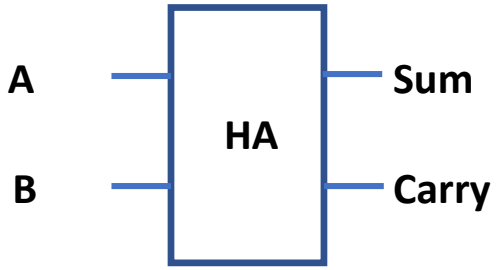


0 to 1 Transition

Truth Table

A	Y
0	
1	

Lets take Half Adder Example



Sum = A xor B

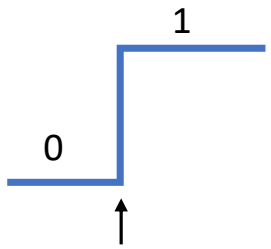
Carry = A and B

Truth Table

A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Finite State Machine

- **Design a Combinational Circuit to detect positive transition of a Signal.**



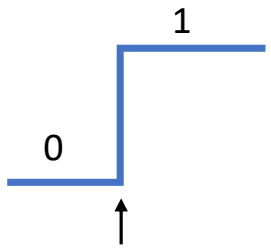
0 to 1 Transition

Truth Table

A	Y
0	0
1	0

Finite State Machine

- **Design a Combinational Circuit to detect positive transition of a Signal.**



0 to 1 Transition

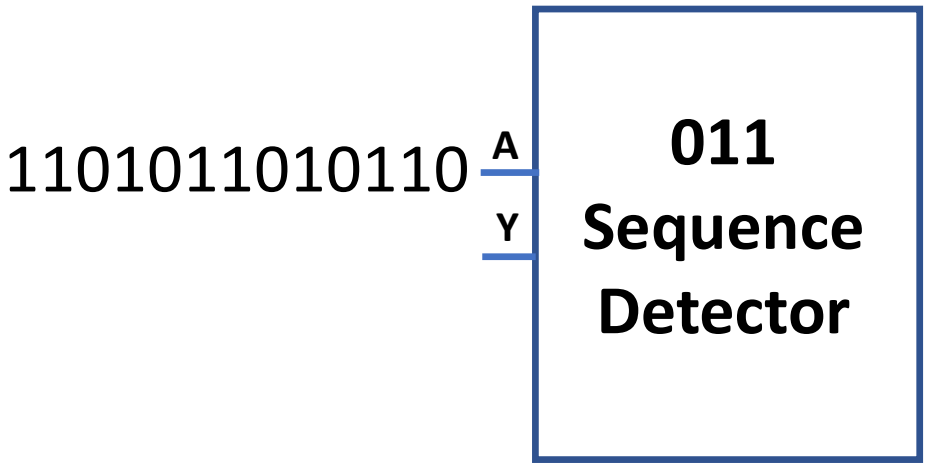
Truth Table

A	Y
0	0
1	0

A	**X**	**Y**
0	0	0
0	1	0
1	0	1
1	1	0

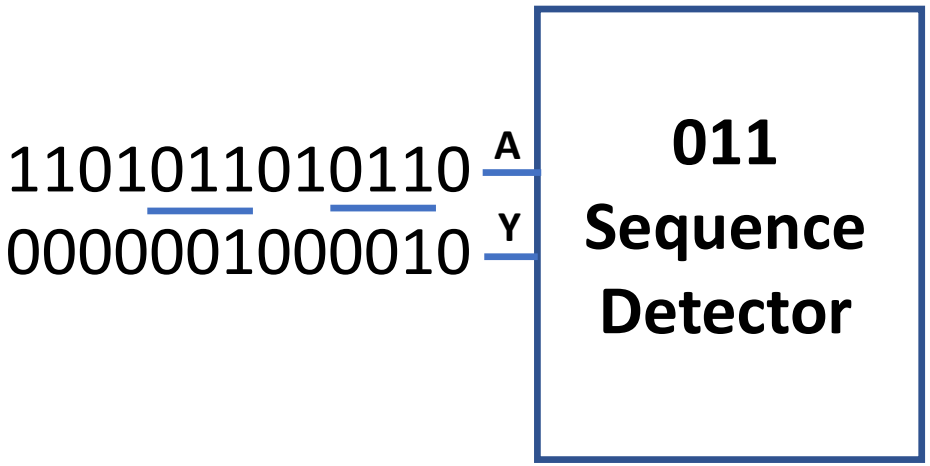
Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**



Finite State Machine

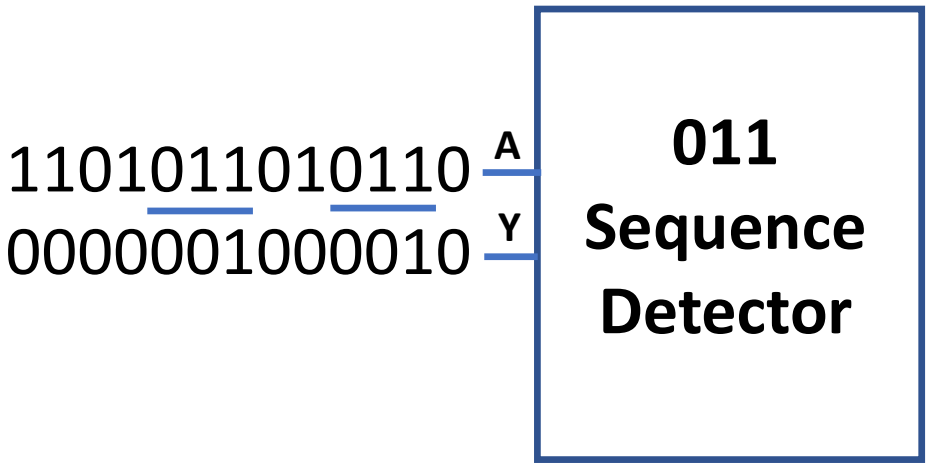
- **Design a System which can detect 011 sequence from given Bits string.**



Number of past inputs sequence we must remember

Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**

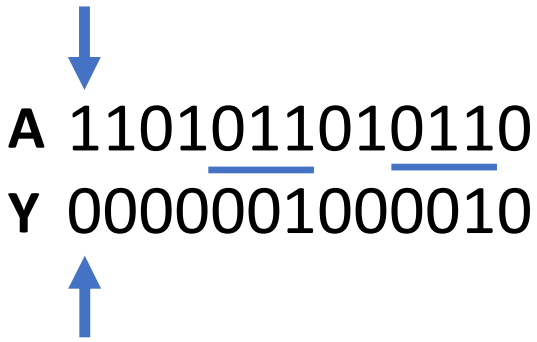


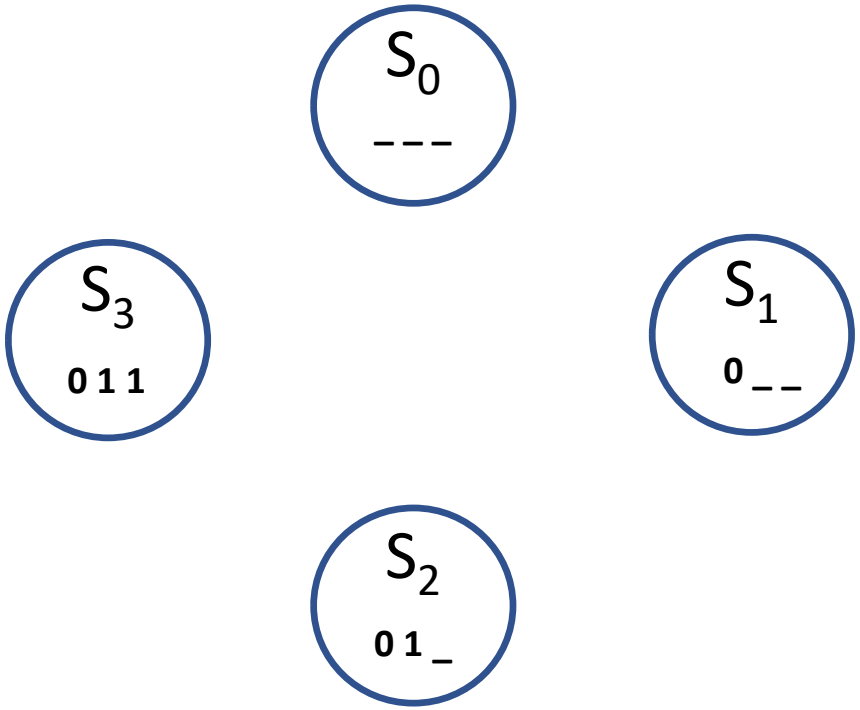
Number of past inputs sequence we must remember

Init
0
01
011

Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**



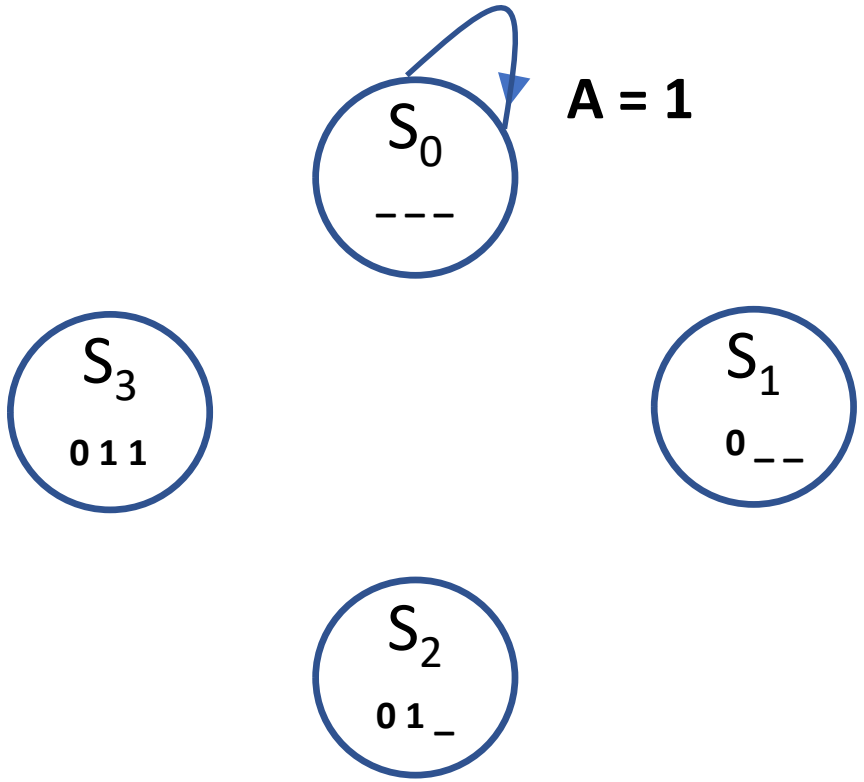


Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**

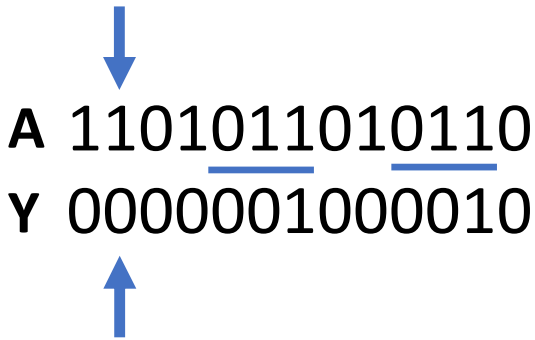
A 1101011010110

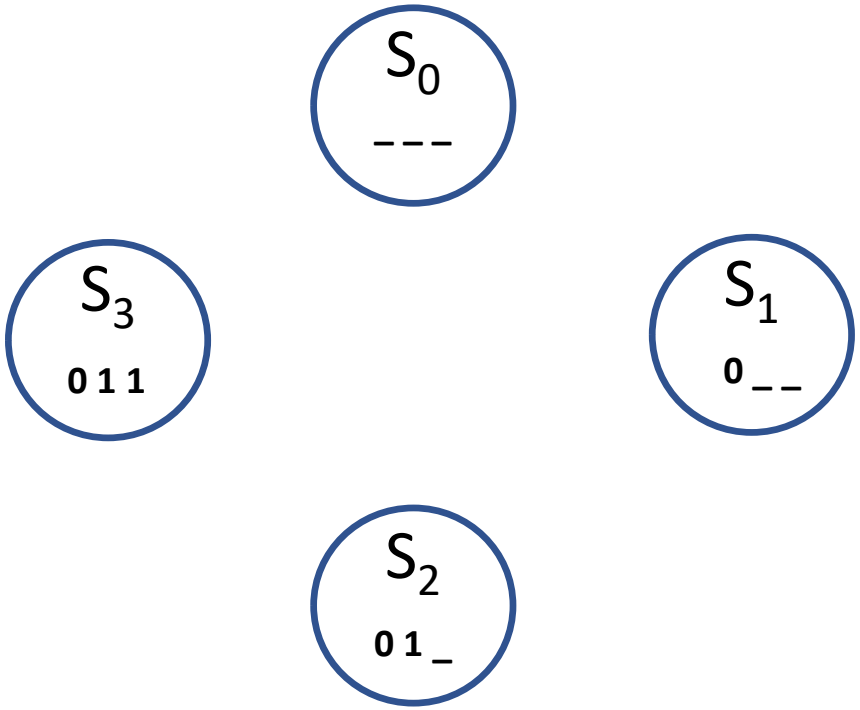
Y 0000001000010



Finite State Machine

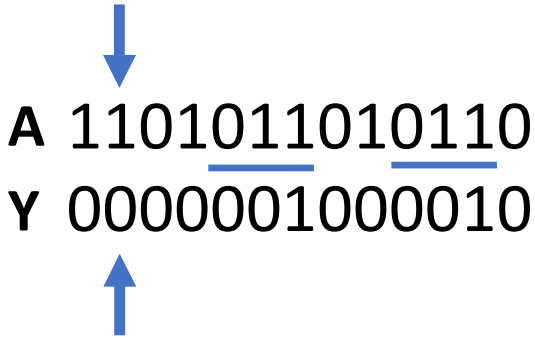
- **Design a System which can detect 011 sequence from given Bits string.**

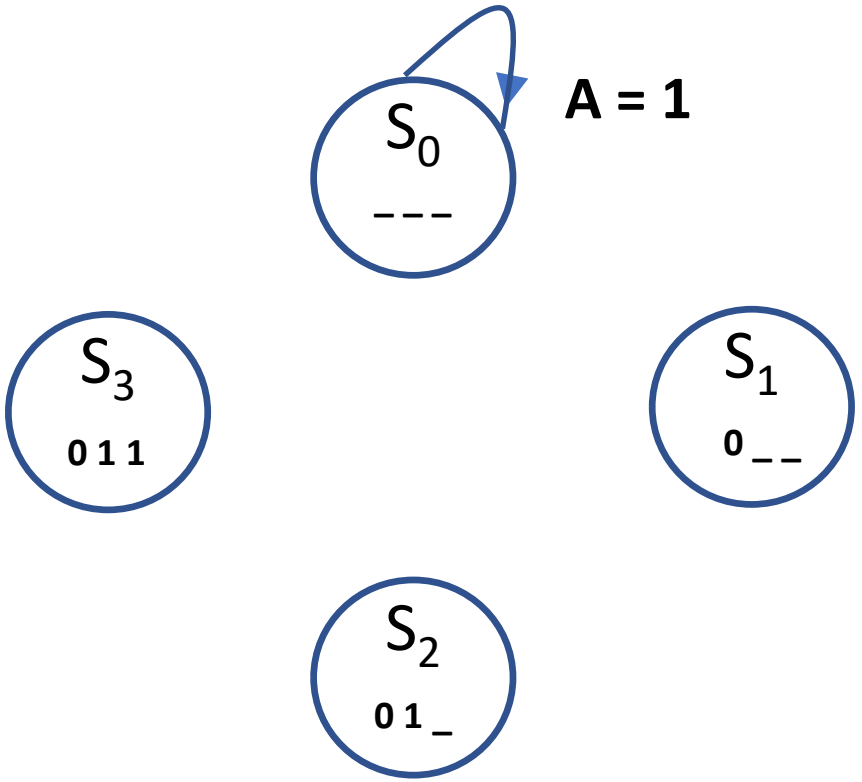




Finite State Machine

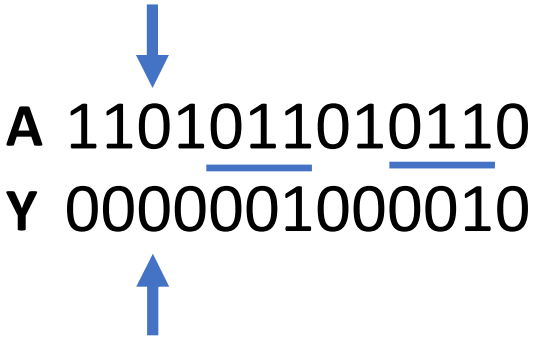
- **Design a System which can detect 011 sequence from given Bits string.**

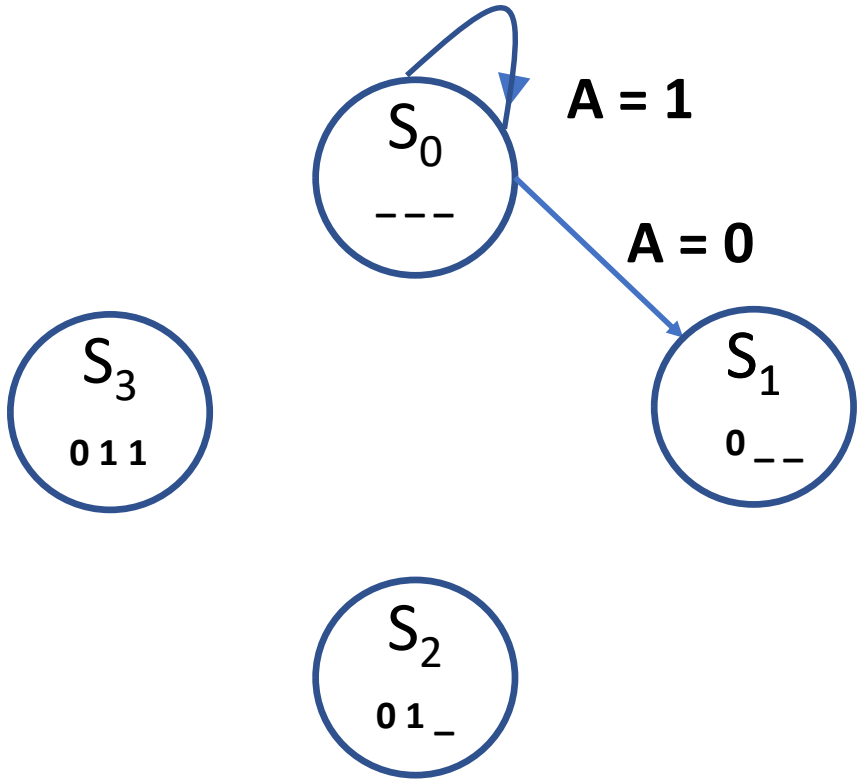




Finite State Machine

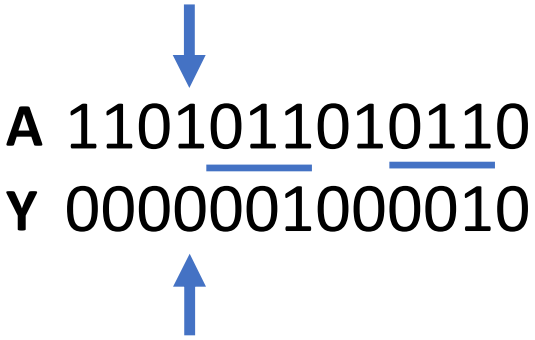
- **Design a System which can detect 011 sequence from given Bits string.**

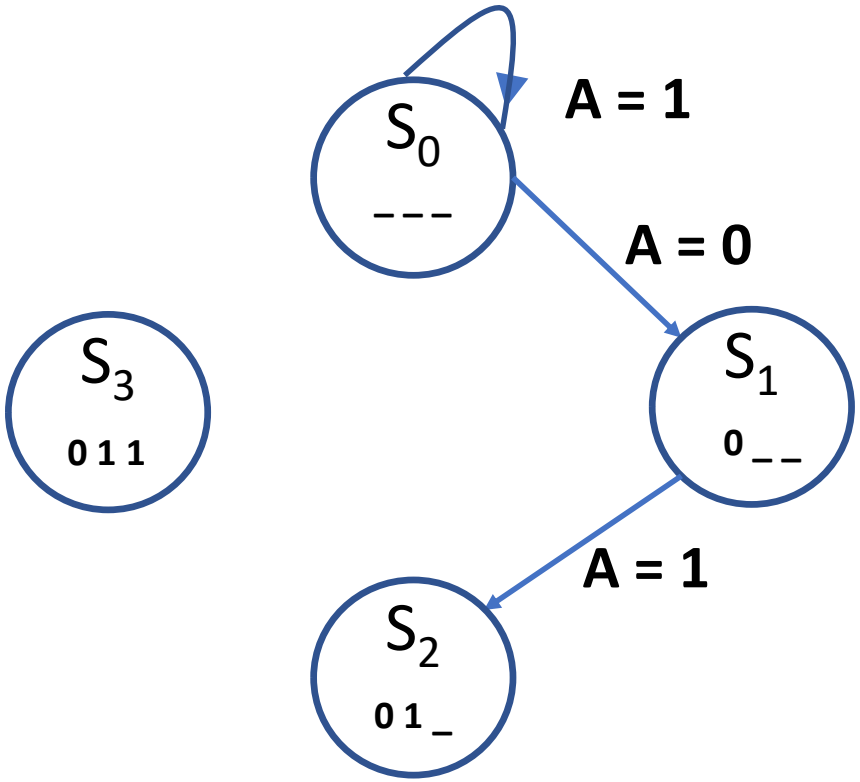




Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**





Finite State Machine

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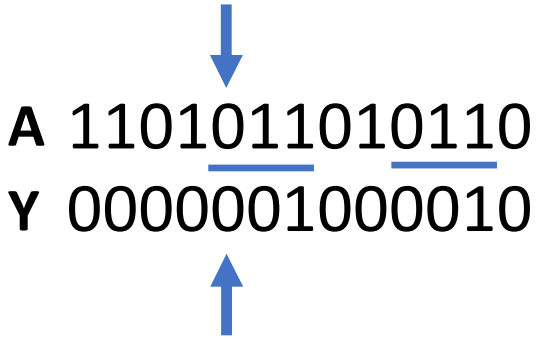

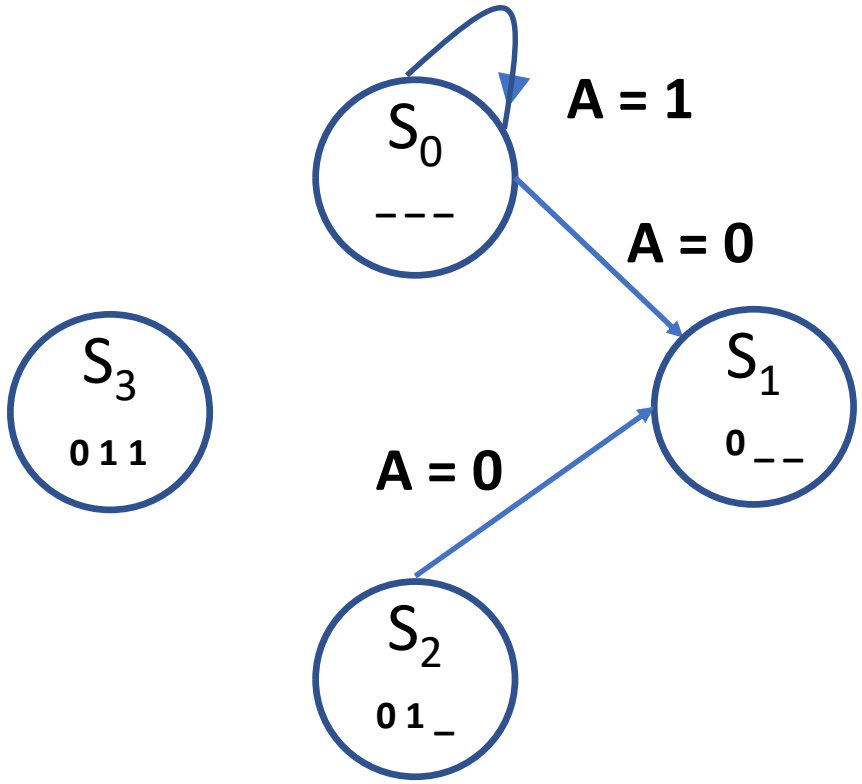

Finite State Machine

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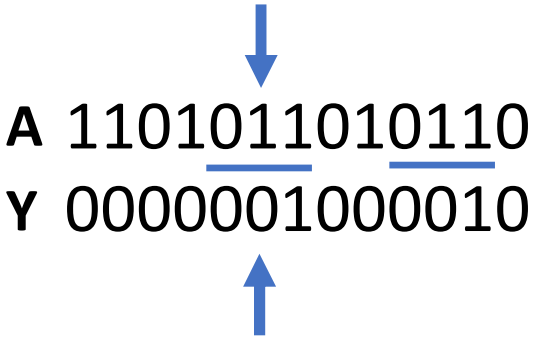
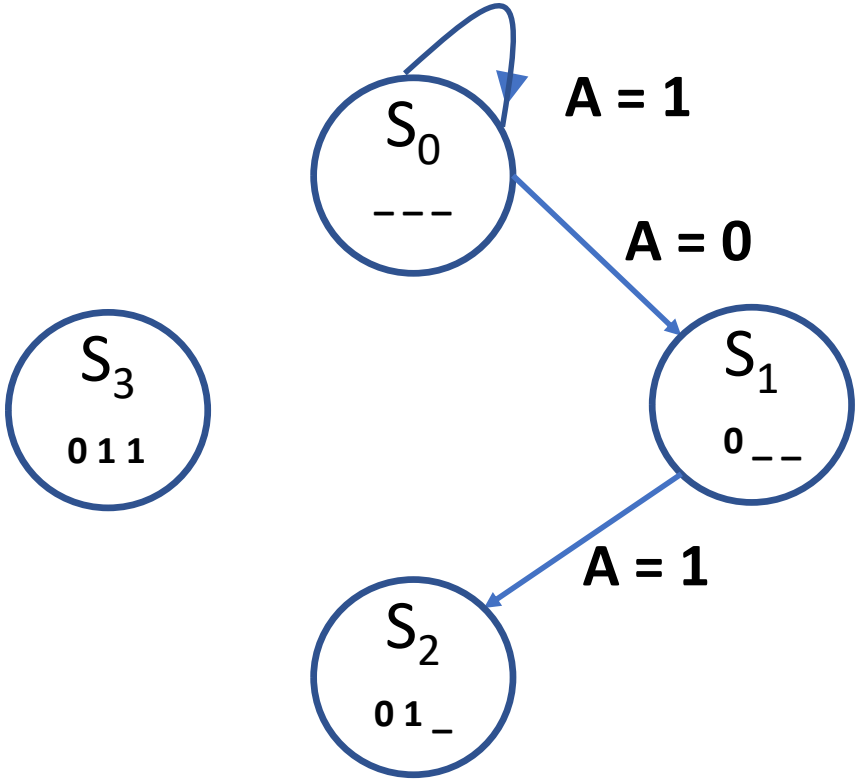
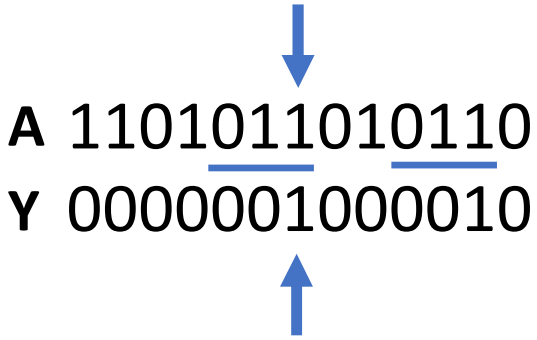
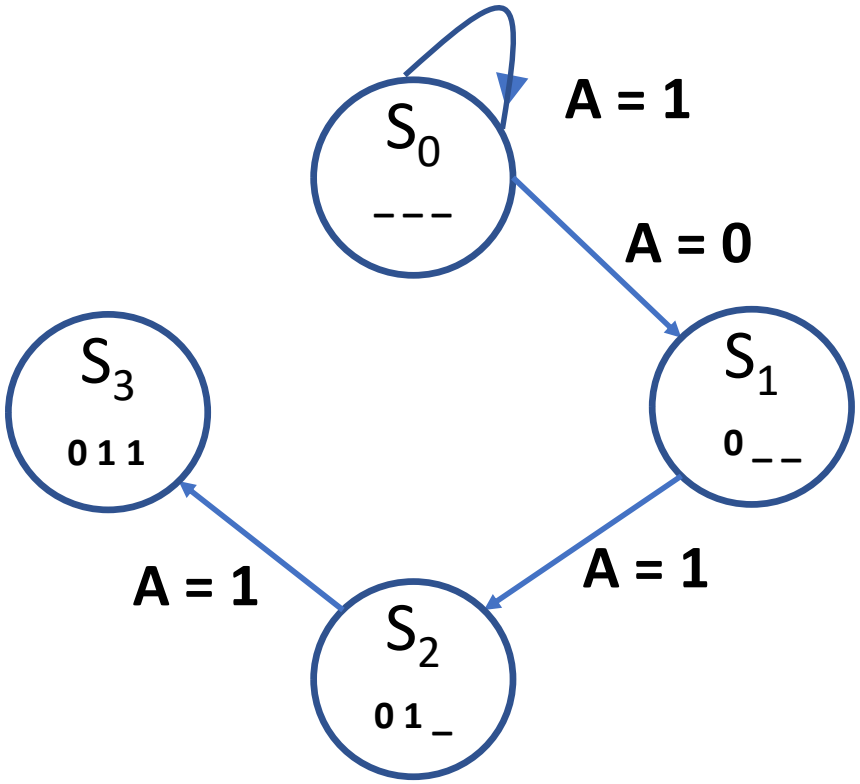




Finite State Machine

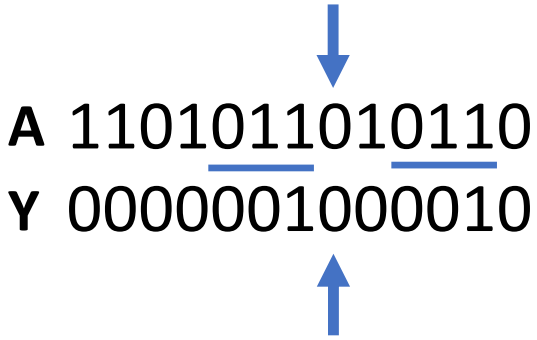
- **Design a System which can detect 011 sequence from given Bits string.**

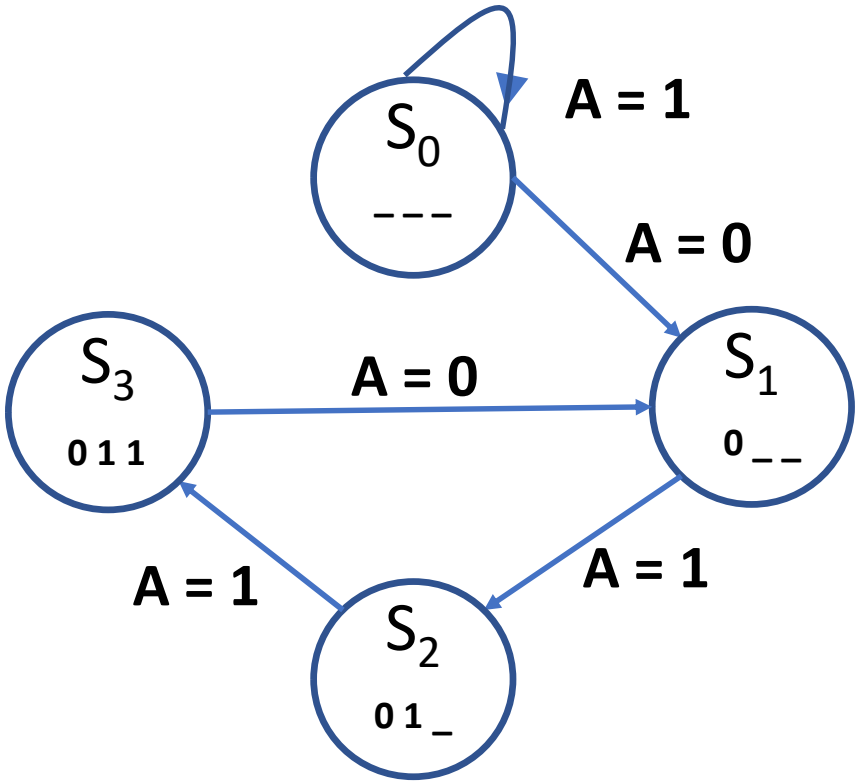




Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**

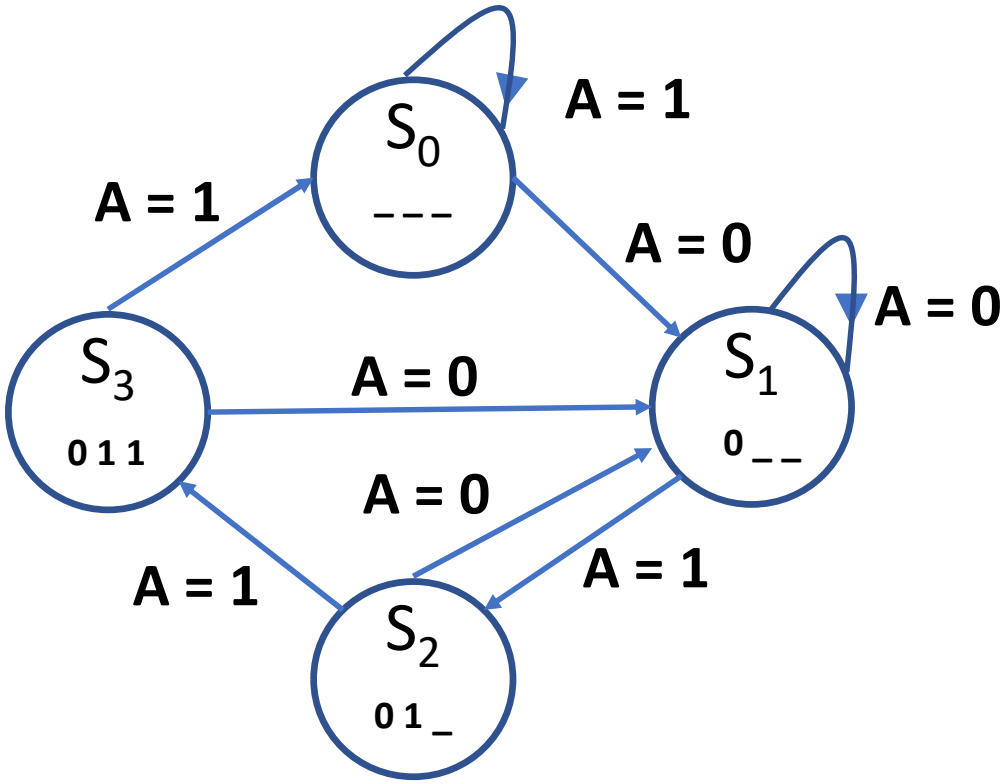




Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**

A 1101011010110
Y 0000001000010



Finite State Machine

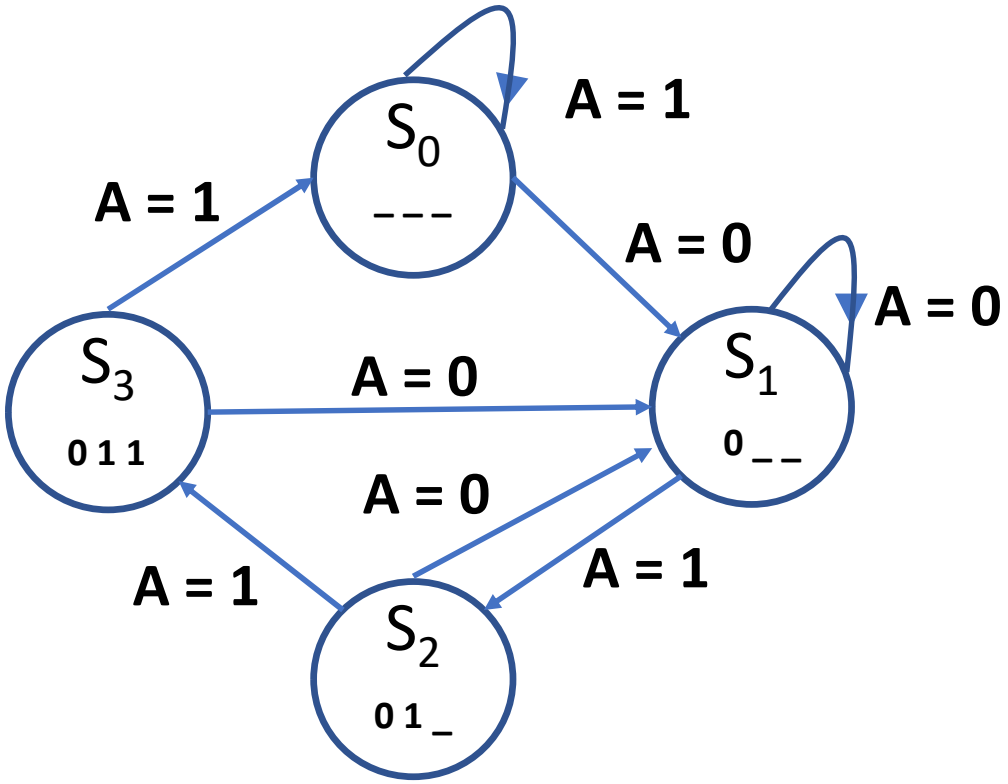
- **Design a System which can detect 011 sequence from given Bits string.**

A 1101011010110

Y 0000001000010

Bits required to encode the number of states

State	State encode	State Label
Init	00	S_0
0	01	S_1
01	10	S_2
011	11	S_3

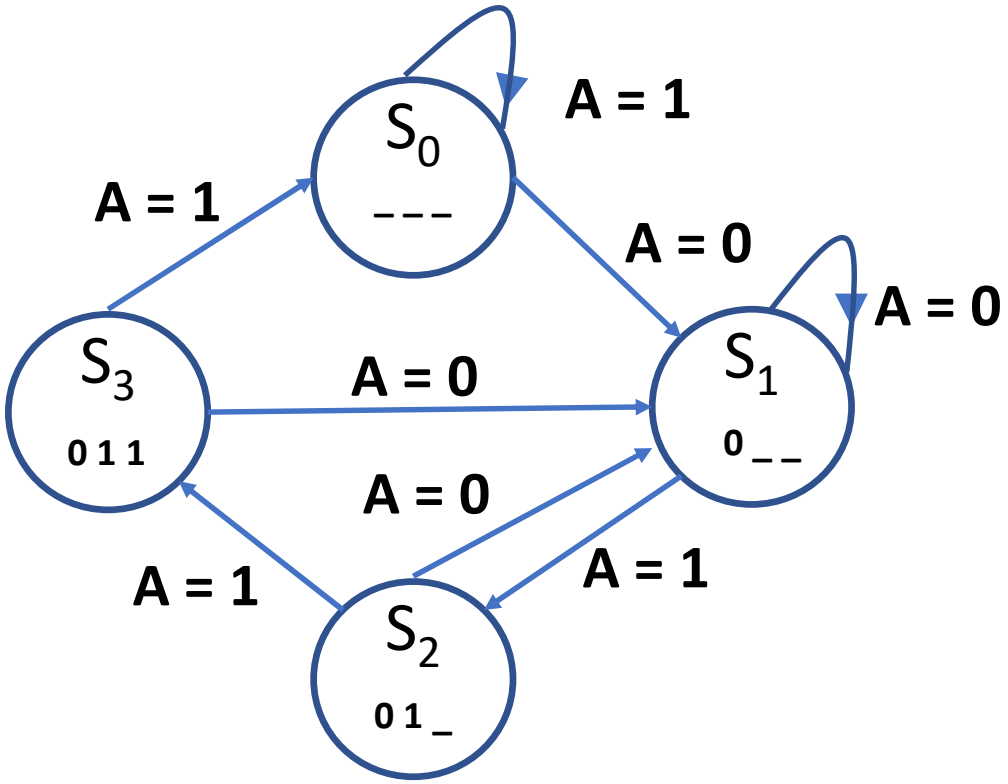


Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**

State Table

PS	A	NS	Y
00	0	01	0
00	1	00	0
01	0	01	0
01	1	10	0
10	0	01	0
10	1	11	0
11	0	01	1
11	1	00	1

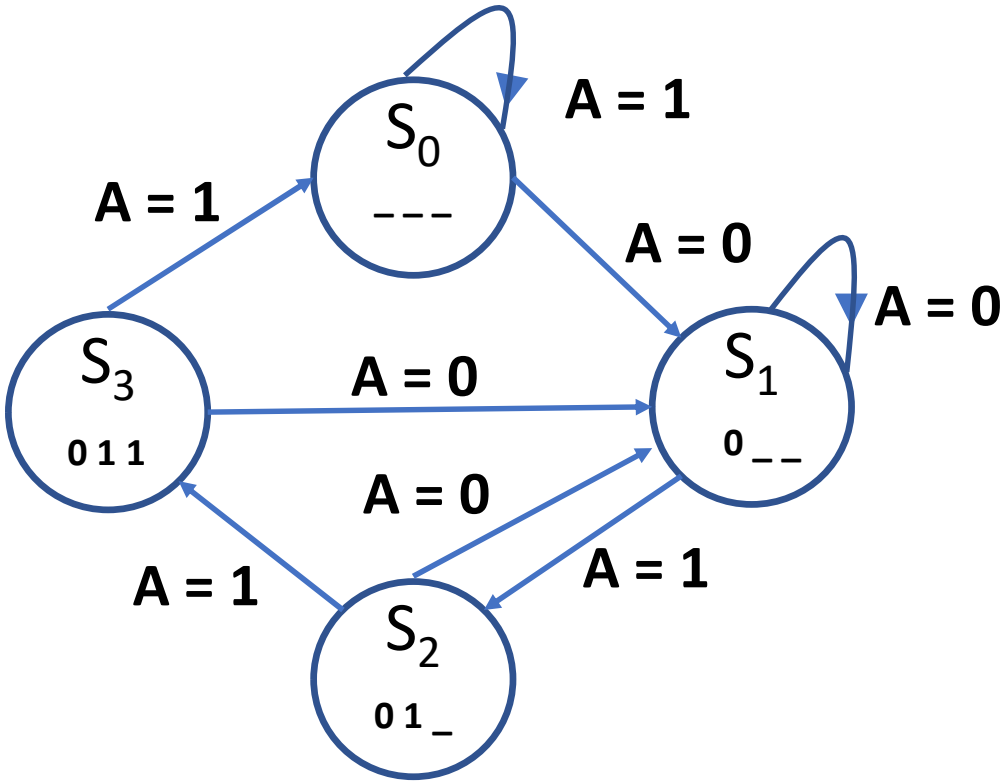


Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**

State Table

PS	A	NS	Y
00	0	01	0
00	1	00	0
01	0	01	0
01	1	10	0
10	0	01	0
10	1	11	0
11	0	01	1
11	1	00	1



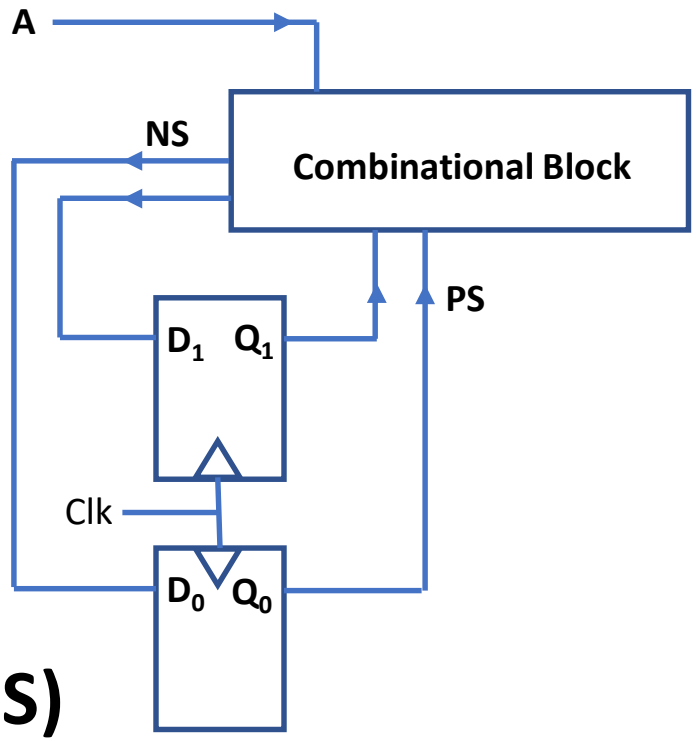
NS = F(PS, A) , Y = F(PS)

Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**

State Table

PS	A	NS	Y	D_1	D_0
00	0	01	0	0	1
00	1	00	0	0	0
01	0	01	0	0	1
01	1	10	0	1	0
10	0	01	0	0	1
10	1	11	0	1	1
11	0	01	1	0	1
11	1	00	1	0	0



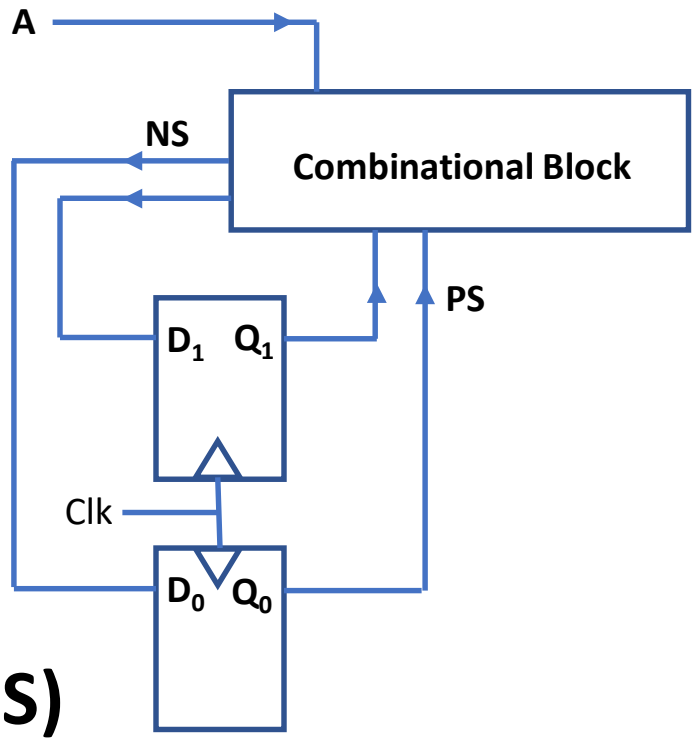
NS = F(PS, A) , Y = F(PS)

Finite State Machine

- Design a System which can detect 011 sequence from given Bits string

State Table

PS	A	NS	Y	D_1 D_0
00	0	01	0	0 1
00	1	00	0	0 0
01	0	01	0	0 1
01	1	10	0	1 0
10	0	01	0	0 1
10	1	11	0	1 1
11	0	01	1	0 1
11	1	00	1	0 0



Q_1 \ Q_0A	0 0	0 1	1 1	1 0
0	0	0	1	0
1	0	1	0	0

$D_1 = (Q_1 \; xor Q_0) \; and \; A$

Q_1 \ Q_0A	0 0	0 1	1 1	1 0
0	1	0	0	1
1	1	1	0	1

$D_0 = \overline{A} \; or \; (Q_1 . \overline{Q_0})$

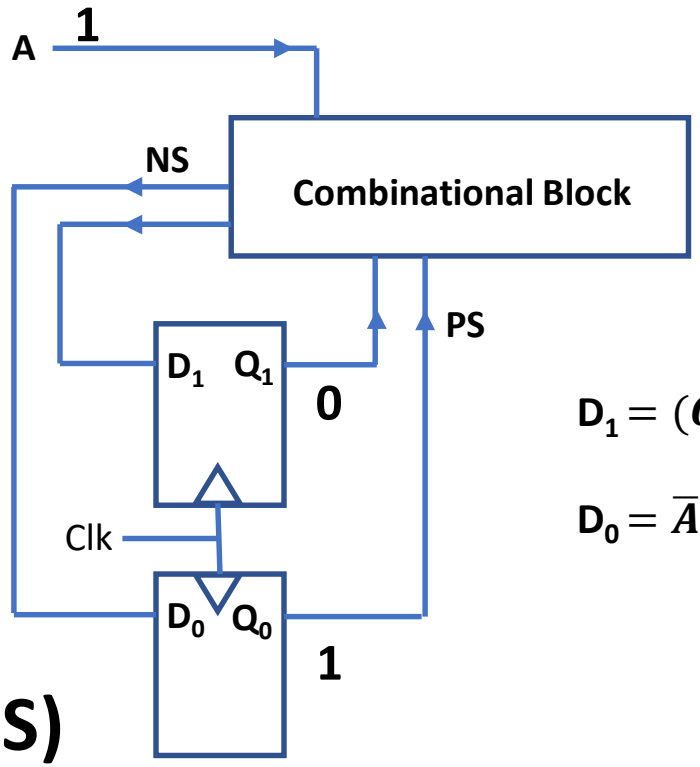
NS = F(PS, A) , Y = F(PS)

Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**

State Table

PS	A	NS	Y	D_1 D_0
00	0	01	0	0 1
00	1	00	0	0 0
01	0	01	0	0 1
→ 01	1	10	0	1 0
10	0	01	0	0 1
10	1	11	0	1 1
11	0	01	1	0 1
11	1	00	1	0 0



$D_1 = (Q_1 \; xor Q_0) \; and \; A$

$D_0 = \overline{A} \; or \; (Q_1 . \overline{Q_0})$

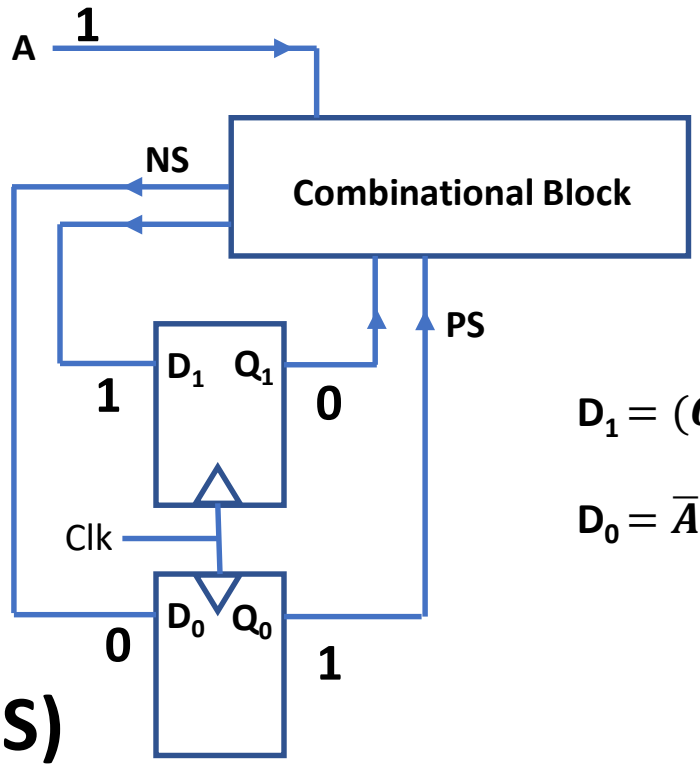
NS = F(PS, A) , Y = F(PS)

Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**

State Table

PS	A	NS	Y	D_1 D_0
00	0	01	0	0 1
00	1	00	0	0 0
01	0	01	0	0 1
→ 01	1	10	0	1 0
10	0	01	0	0 1
10	1	11	0	1 1
11	0	01	1	0 1
11	1	00	1	0 0



$D_1 = (Q_1 \; xor Q_0) \; and \; A = 1$

$D_0 = \overline{A} \; or \; (Q_1 . \overline{Q_0}) = 0$

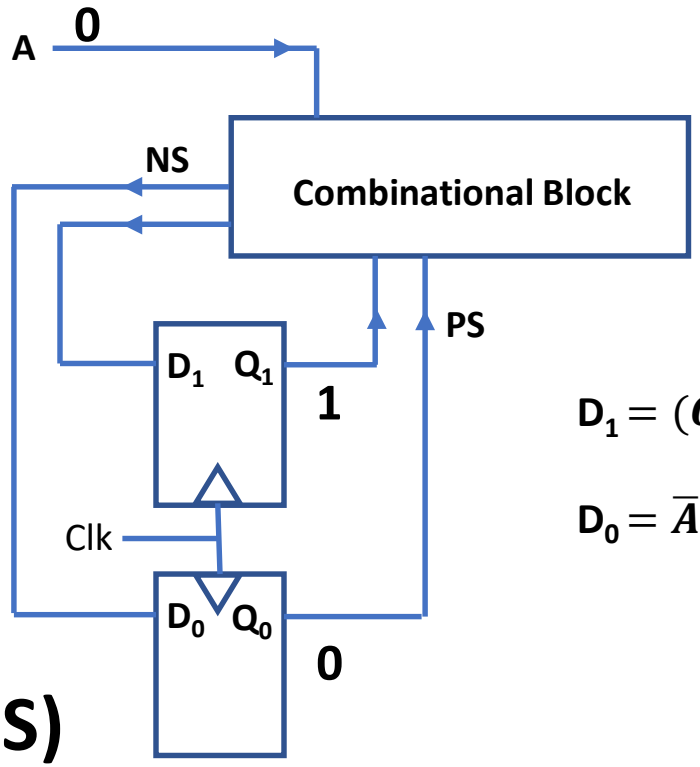
NS = F(PS, A) , Y = F(PS)

Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**

State Table

PS	A	NS	Y	D_1 D_0
00	0	01	0	0 1
00	1	00	0	0 0
01	0	01	0	0 1
01	1	10	0	1 0
→ 10	0	01	0	0 1
10	1	11	0	1 1
11	0	01	1	0 1
11	1	00	1	0 0



$D_1 = (Q_1 \; xor Q_0) \; and \; A$

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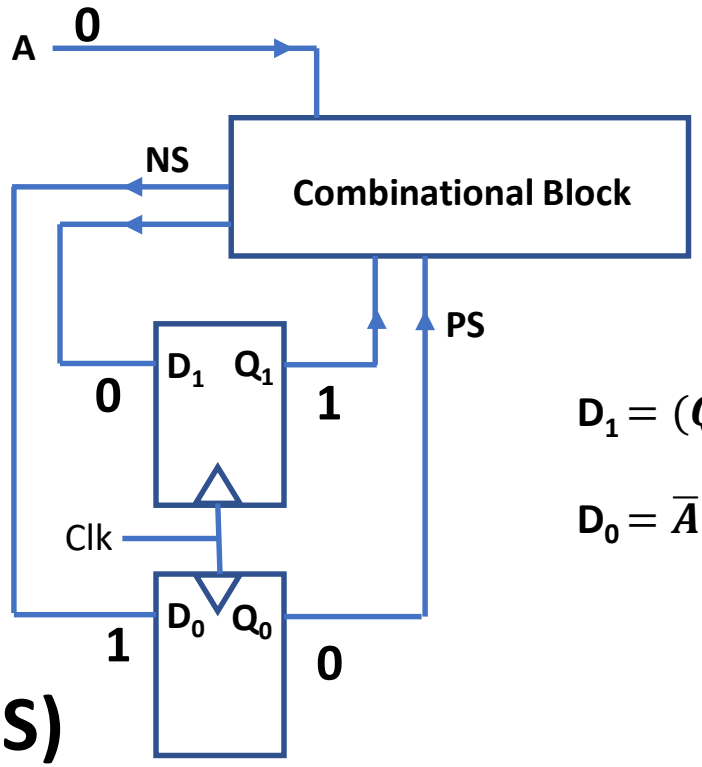
01	0	01	0	0 1
01	1	10	0	1 0
→ 10	0	01	0	0 1
10	1	11	0	1 1
11	0	01	1	0 1
11	1	00	1	0 0



$D_1 = (Q_1 \; xor Q_0) \; and \; A = 0$

$D_0 = \overline{A} \; or \; (Q_1 . \overline{Q_0}) = 1$

NS = F(PS, A) , Y = F(PS)

Finite State Machine

- **Design a System which can detect 011 sequence from given Bits string.**

State Table

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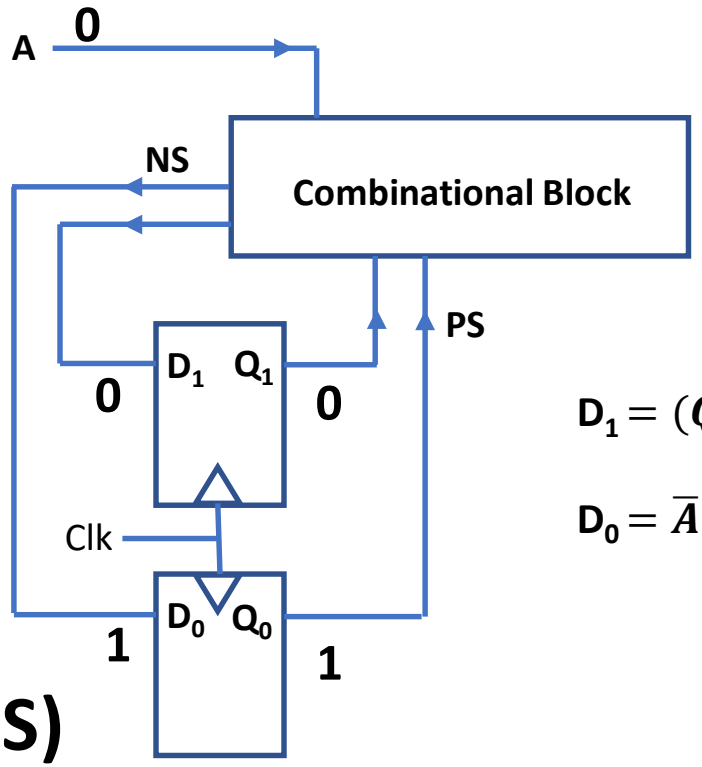
01	0	01	0	0 1
01	1	10	0	1 0
→ 10	0	01	0	0 1
10	1	11	0	1 1
11	0	01	1	0 1
11	1	00	1	0 0



$D_1 = (Q_1 \; xor Q_0) \; and \; A$

$D_0 = \overline{A} \; or \; (Q_1 . \overline{Q_0})$

NS = F(PS, A) , Y = F(PS)

Thank You

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