

Finite State Automata

FS with output

Mealy Machine

Moore Machine

FS without output

DFA

NFA

Mealy Machine

$$(Q, \Sigma, \Delta, \delta, \lambda, q_0)$$

Q = Finite Set of States

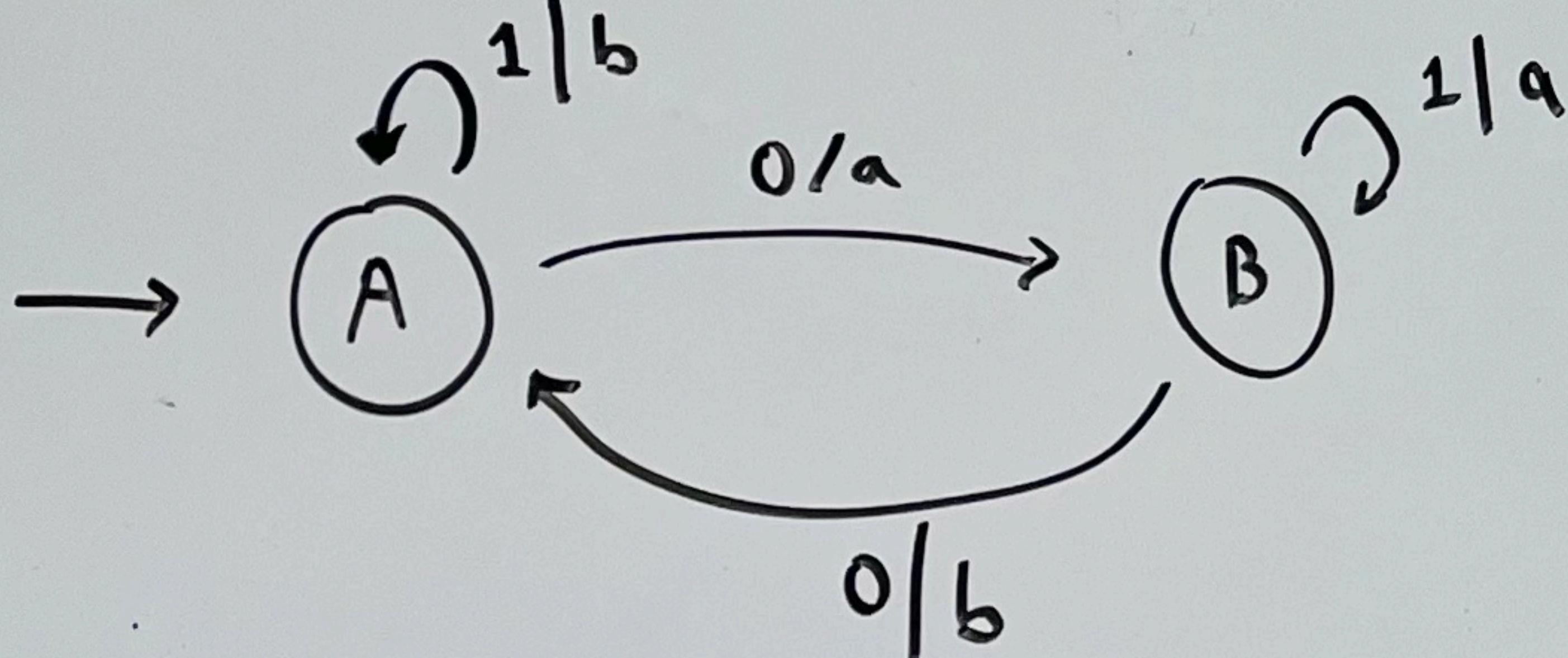
Σ = Finite non-empty set of Input alphabets

Δ = The set of Output alphabets

δ = Transition Function: $Q \times \Sigma \rightarrow Q$

λ = Output Function: $Q \times \Sigma \rightarrow \Delta$

q_0 = Initial State / Start State



Moore Machine

$$(Q, \Sigma, \Delta, \delta, \lambda, q_0)$$

✓

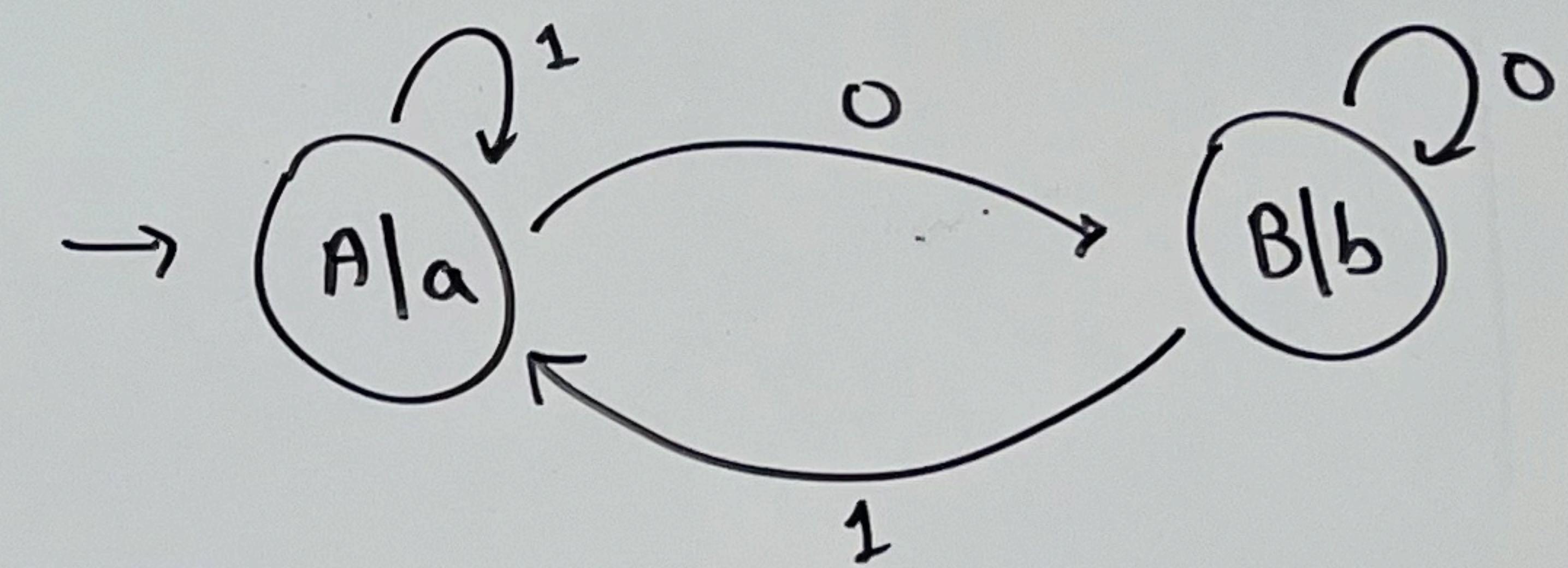
✓

✓

✓

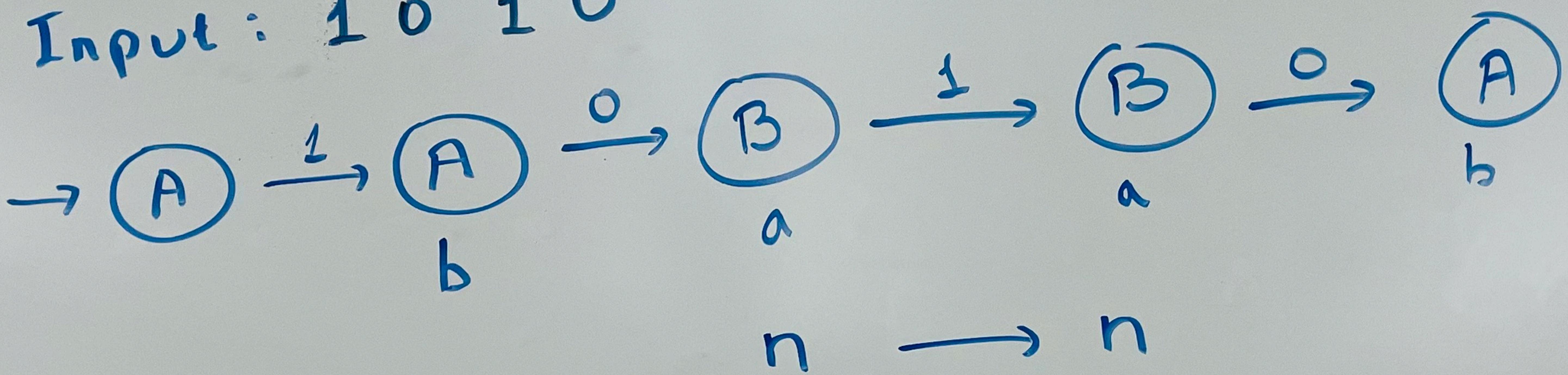
λ = Output function: $Q \rightarrow \Delta$

✓



Mealy Machine

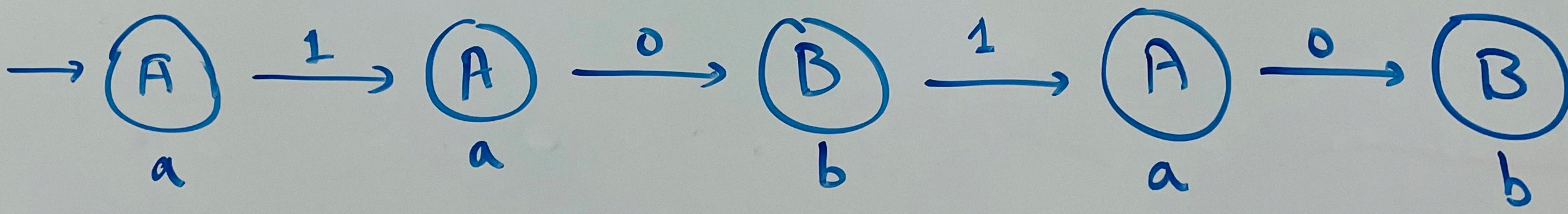
Input: 1 0 1 0



$\rightarrow \Delta$

Moore Machine

Input: 1 0 1 0



$\circlearrowleft 0$

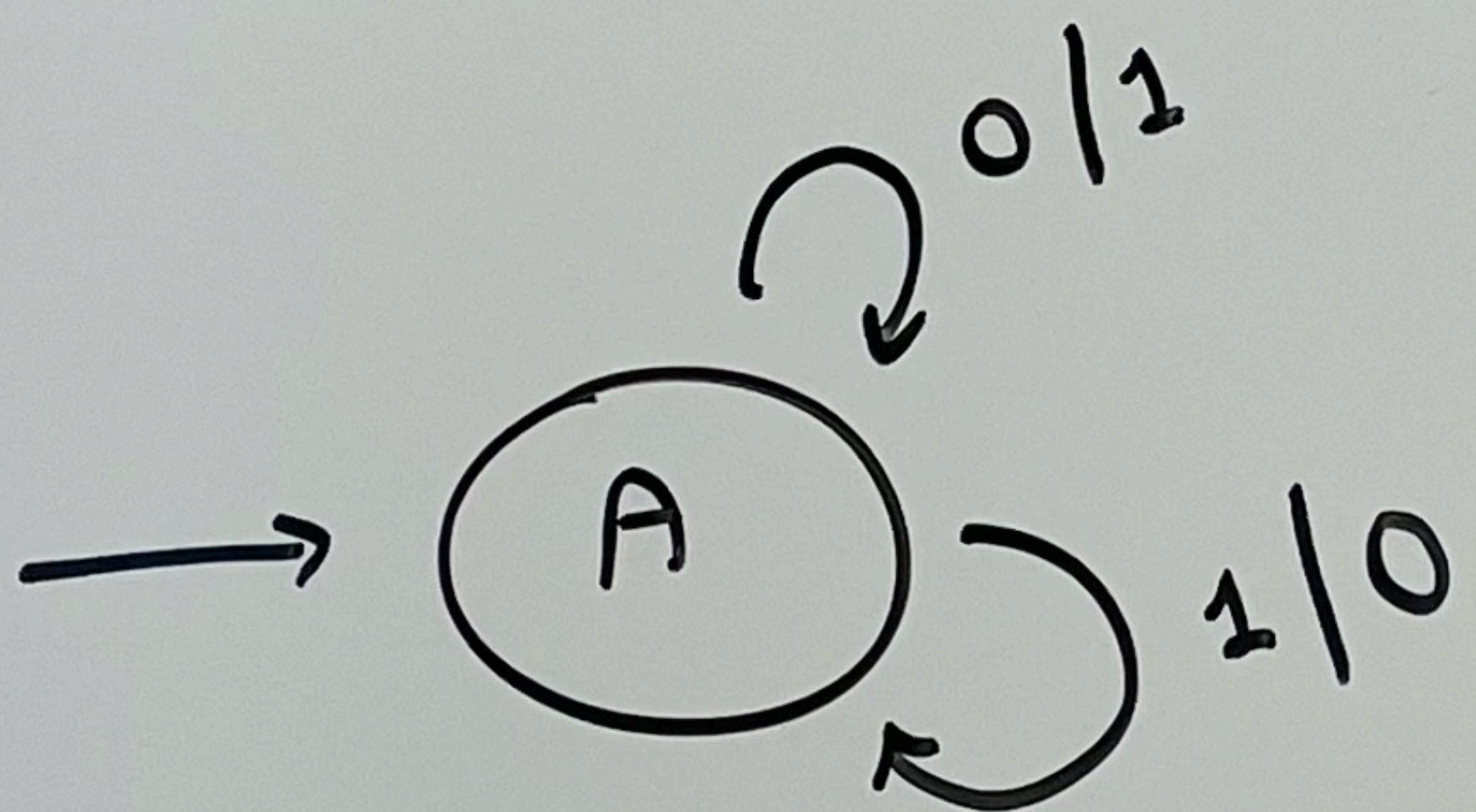
$n \rightarrow n+1$

Mealy Machine

* Example 1

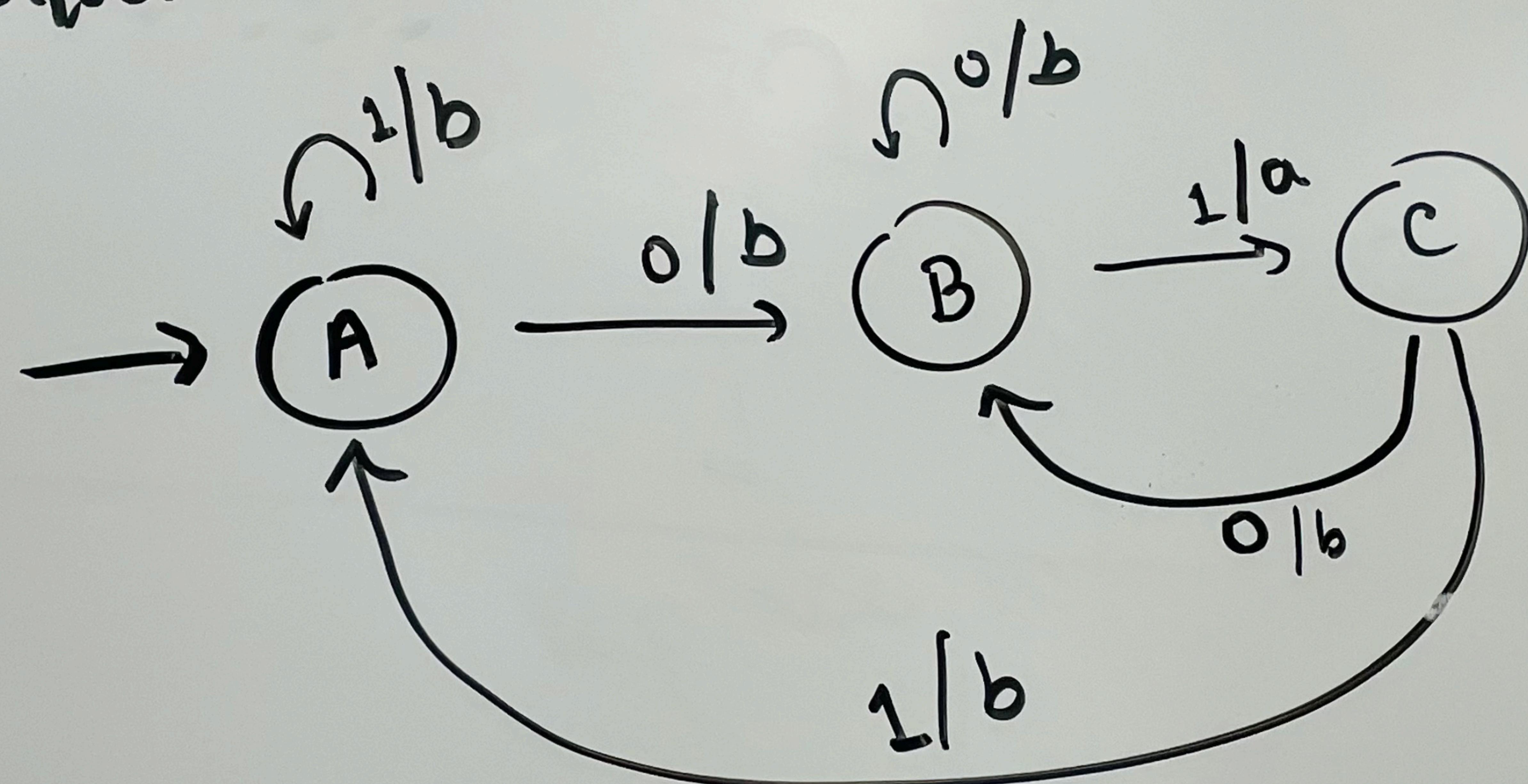
Construct a Mealy machine that produces the
1's complement of any binary input string.

1's complement : $\begin{matrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 & 0 \end{matrix}$



* Example 2

Construct a Mealy Machine that prints 'a' whenever the sequence '01' is encountered in any input string

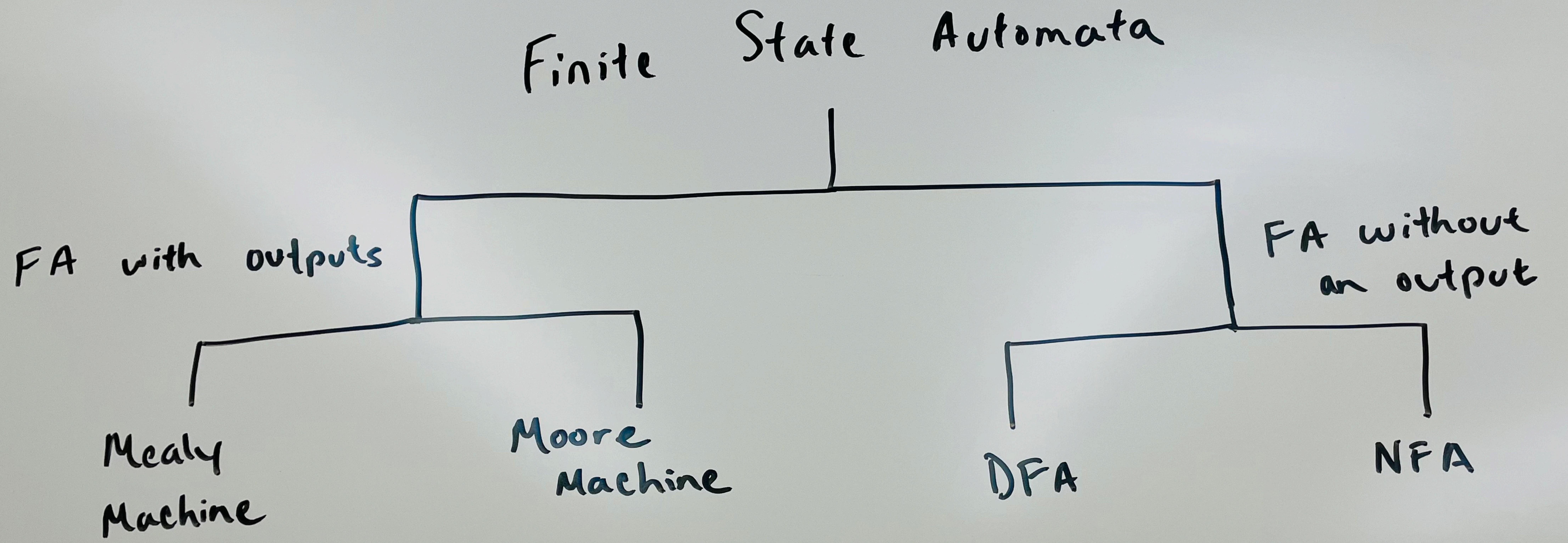


0 1 0

b a b b

1 0 0 0

b b b b



Mealy Machine
 $(Q, \Sigma, \Delta, \delta, \lambda, q_0)$

where

Q : Finite Set of States

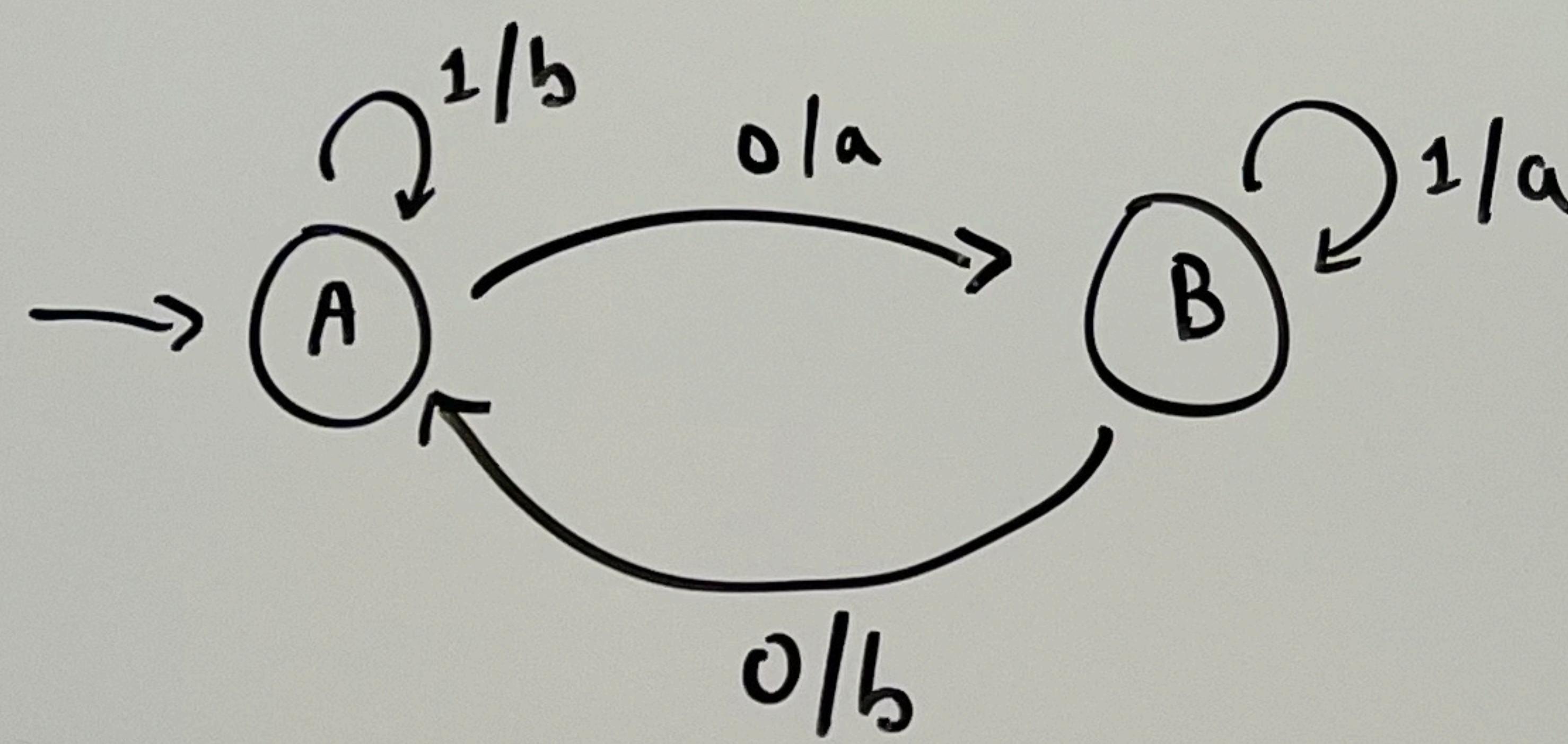
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q_0 = Initial State / Start State



Moore Machine
 $(Q, \Sigma, \Delta, \delta, \lambda, q_0)$

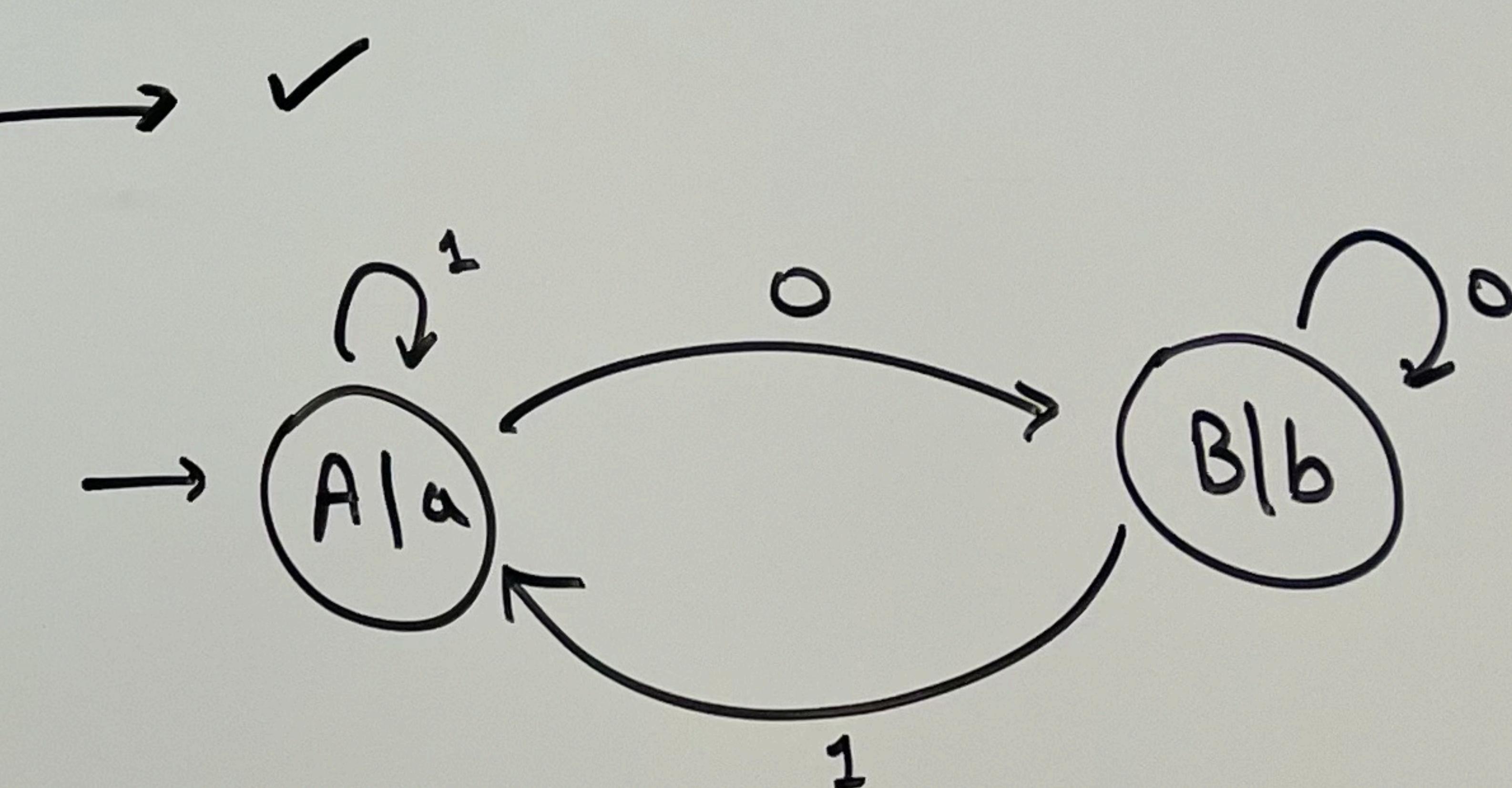
Q : Finite Set of States

Σ : Finite non-empty set of Input Alphabets

Δ = The set of Output alphabets

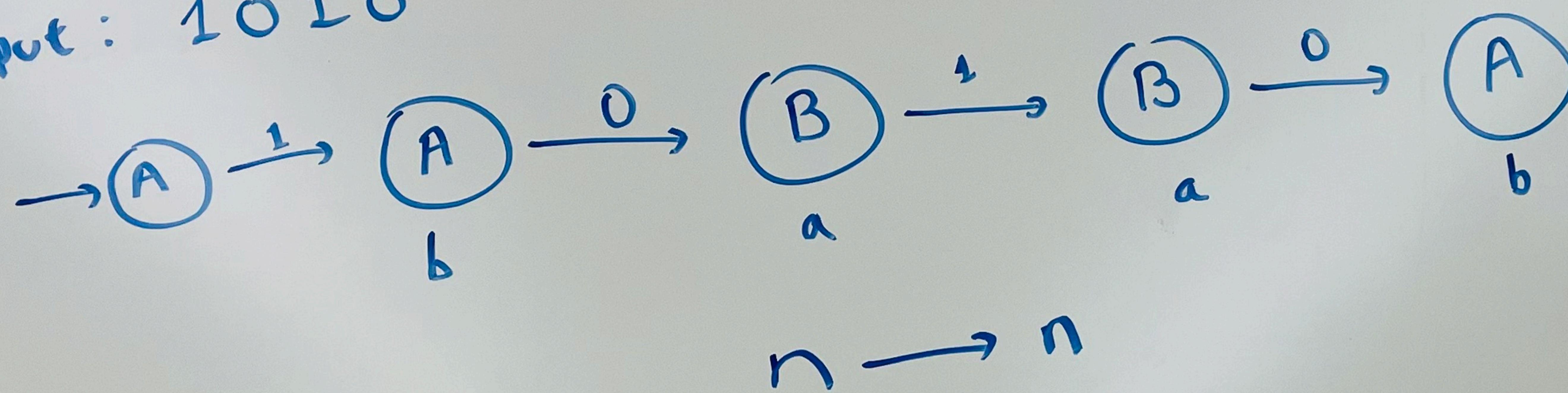
δ = Transition Function : $Q \times \Sigma \rightarrow Q$

λ = Output Function : $Q \rightarrow \Delta$



Mealy Machine

Input : 1010

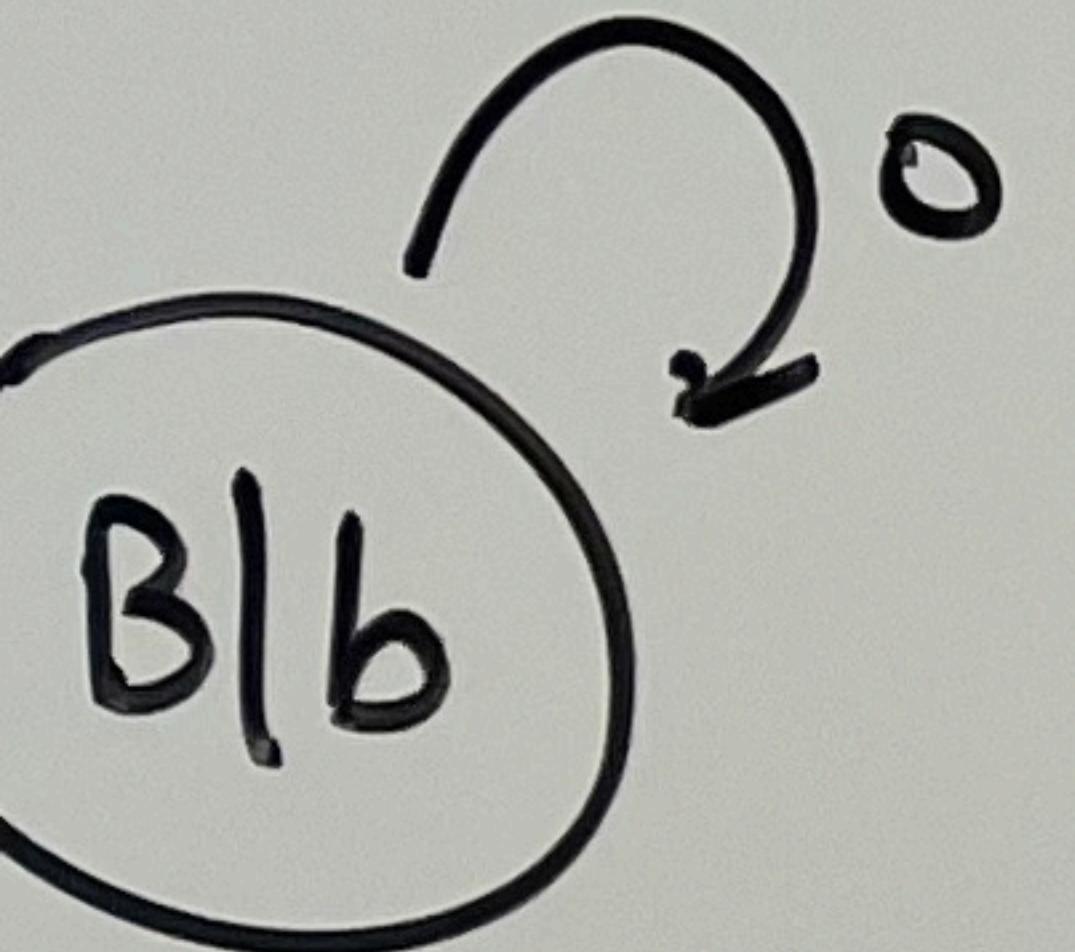
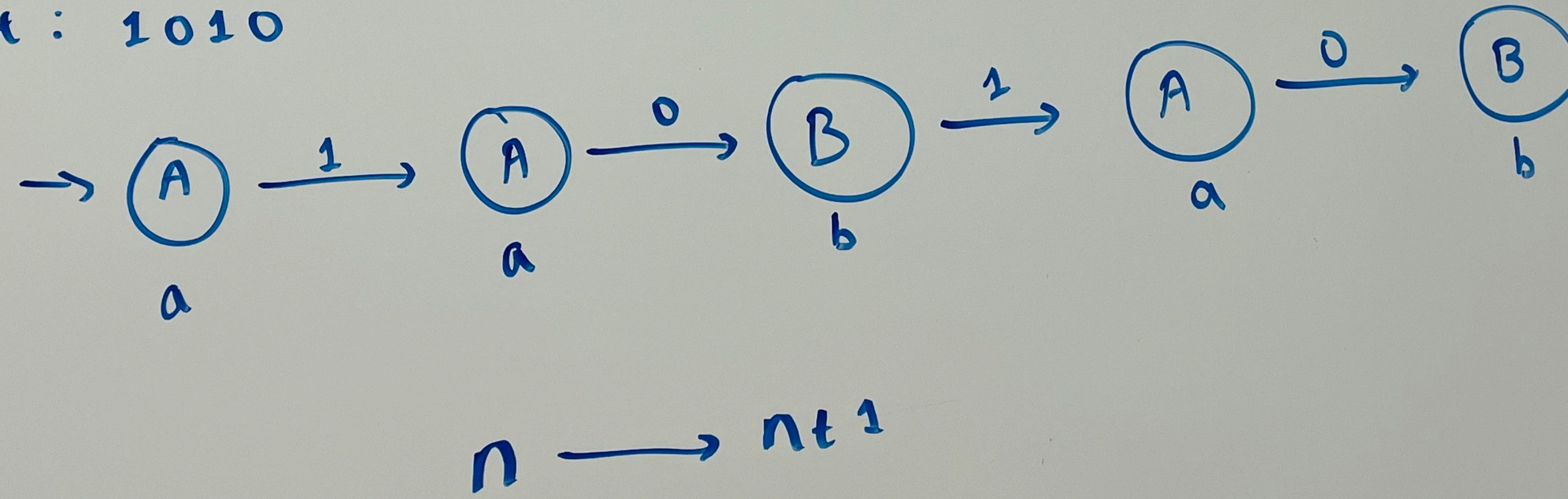


$a \rightarrow \Delta$

$n \rightarrow n$

Moore Machine

Input : 1010



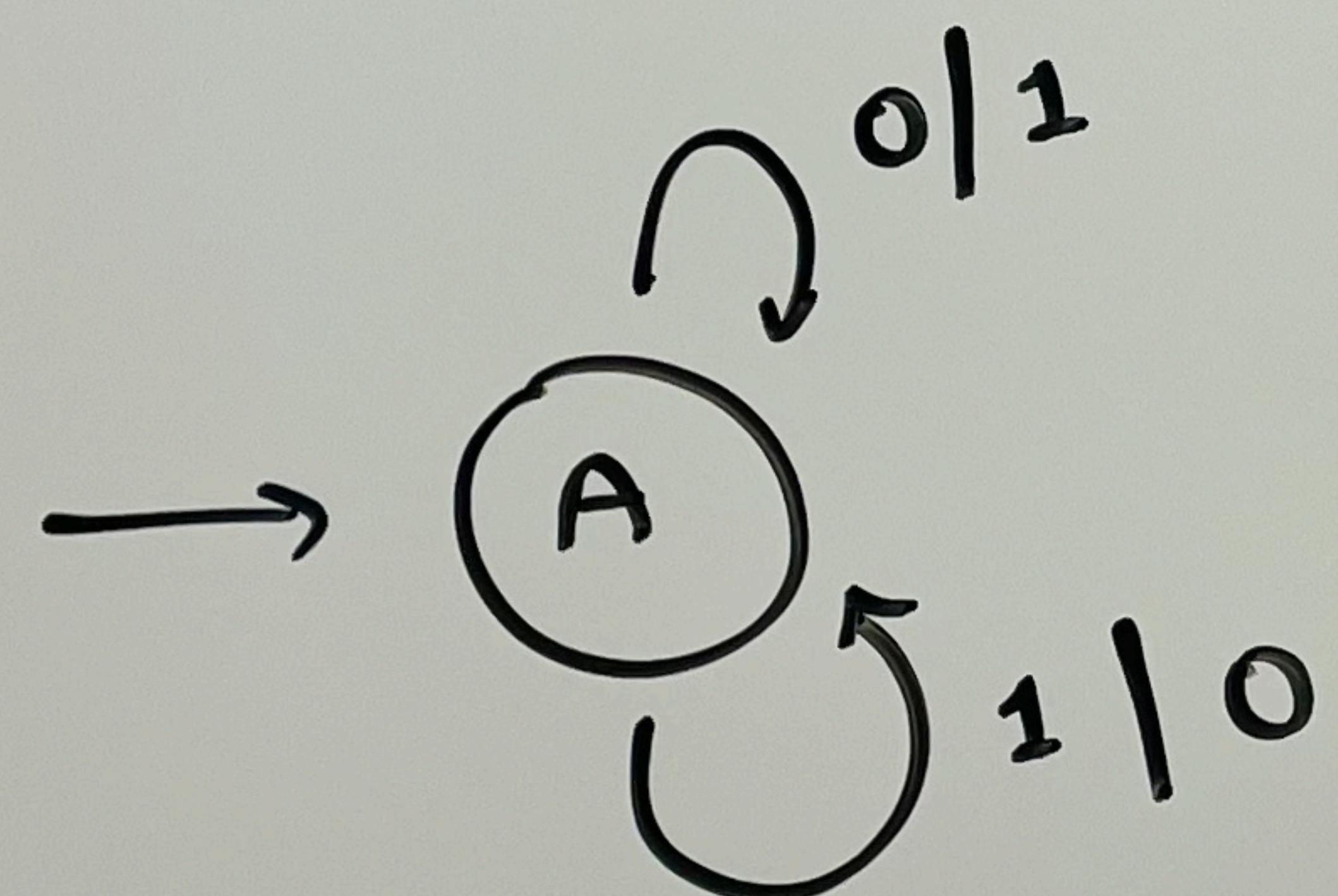
$n \rightarrow n+1$

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*Example 1

Mealy Machine

Construct a Mealy Machine that produces the 1's complement of any binary input string.

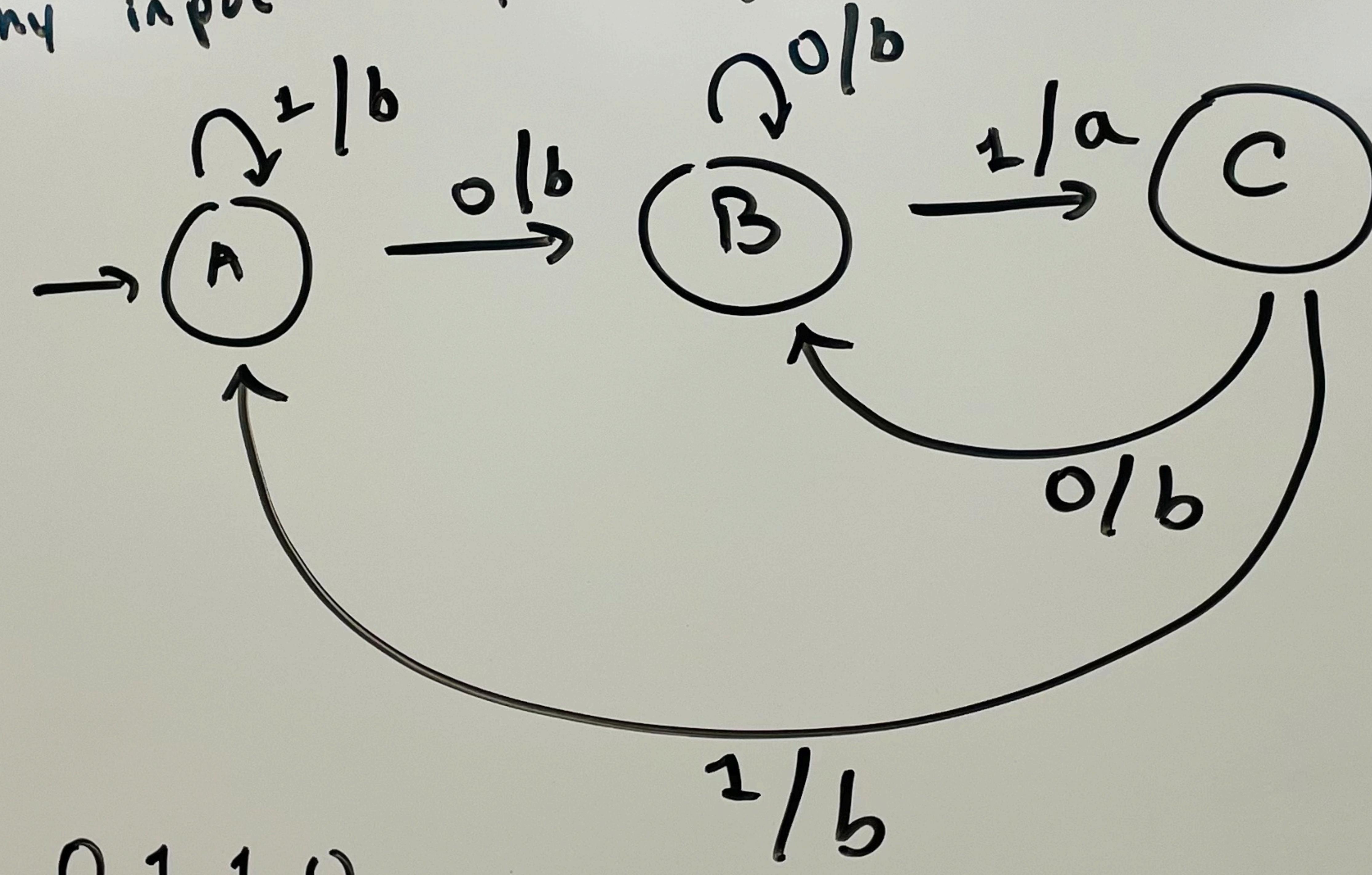


Binary number $\rightarrow 100101$
1's complement $\rightarrow 011010$

* Example 2

Construct a Mealy machine that prints 'a' whenever the sequence '01' is encountered in

any input binary string.



0 1 1 0

b a b b

1/b

1000

b b b b