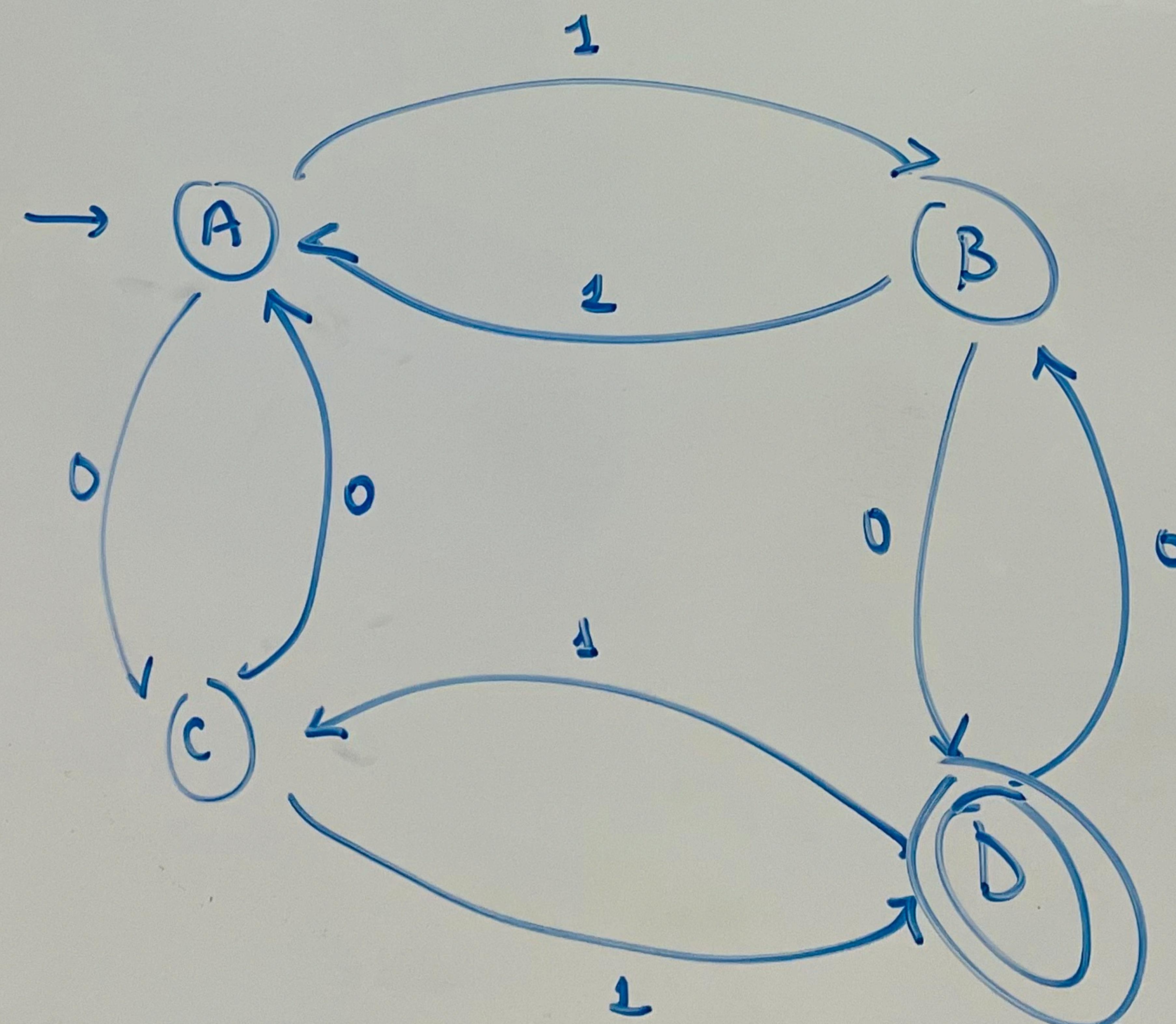


NFA - Non-Deterministic

Finite Automata

Deterministic Finite Automata (DFA)

- * In DFA, given the current state, we know where the next state will be
- * It has only one unique next state
- * If has no choices or randomness



Non D

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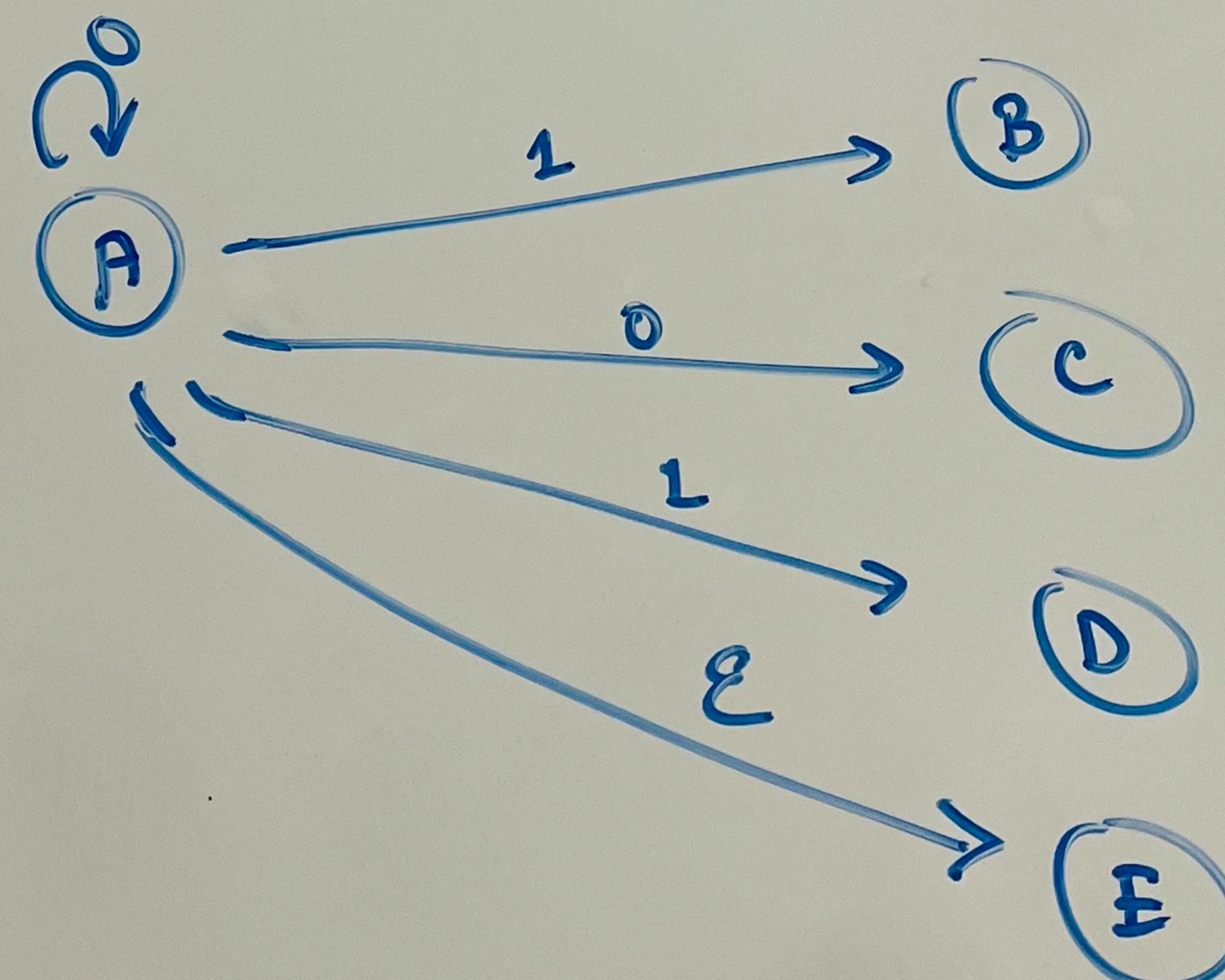
* The

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Finite Automata

Non Deterministic Finite Automata (NFA)

- * In NFA, given the current state, there could be multiple next states
- * The next state may be chosen at random or
- * All the next states may be chosen at parallel



* Example

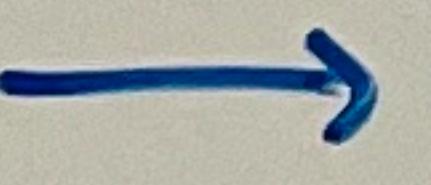
$$L = \{ \text{Se} \}$$



In sta

In N

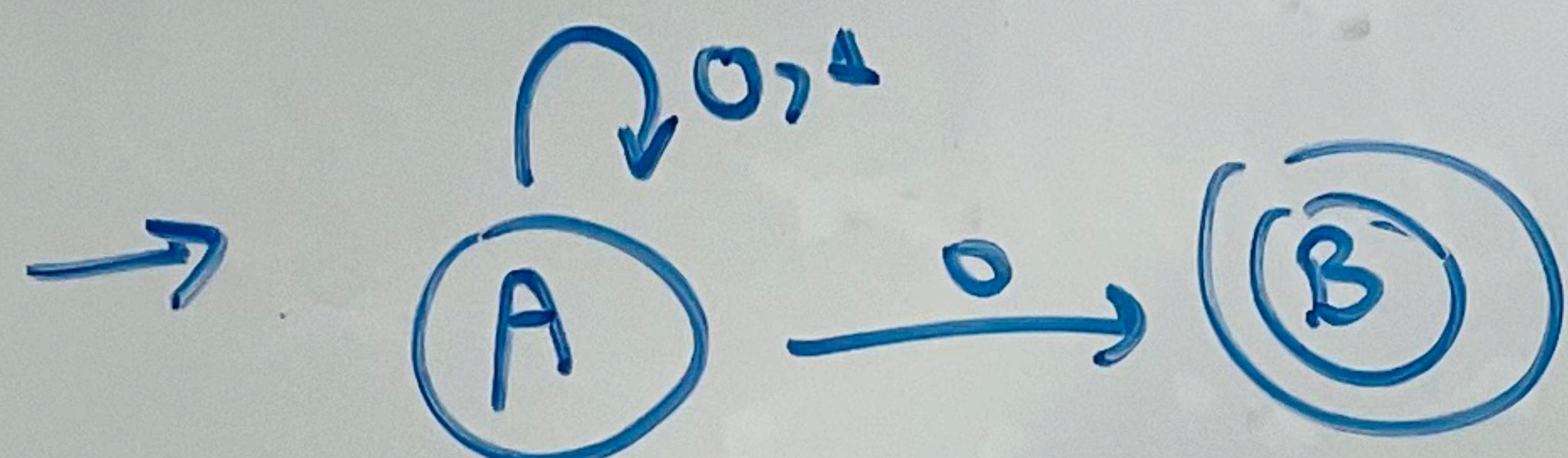
Eg: 100.



If

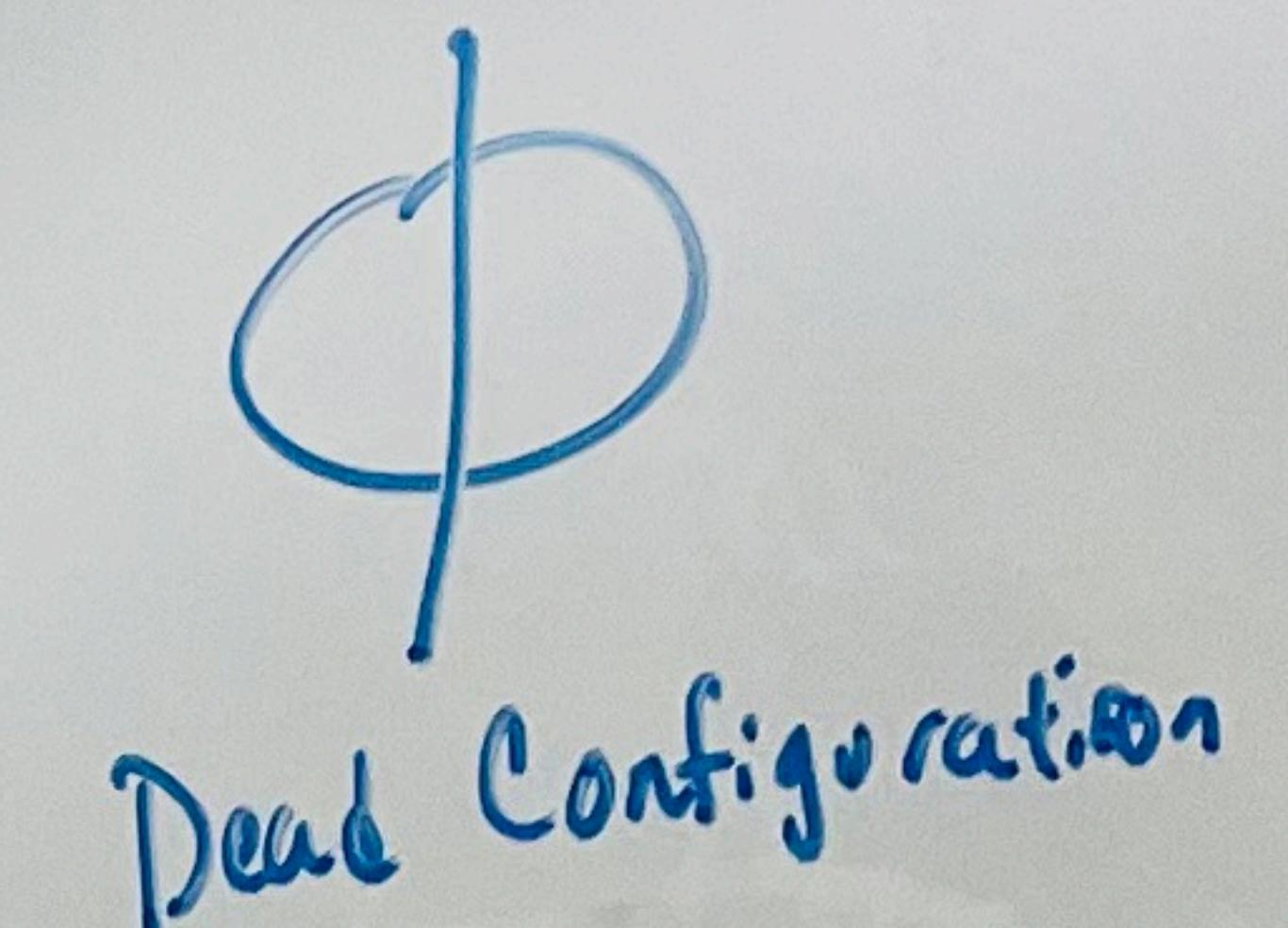
* Example 1

$L = \{ \text{Set of all strings that end with } 0 \}$

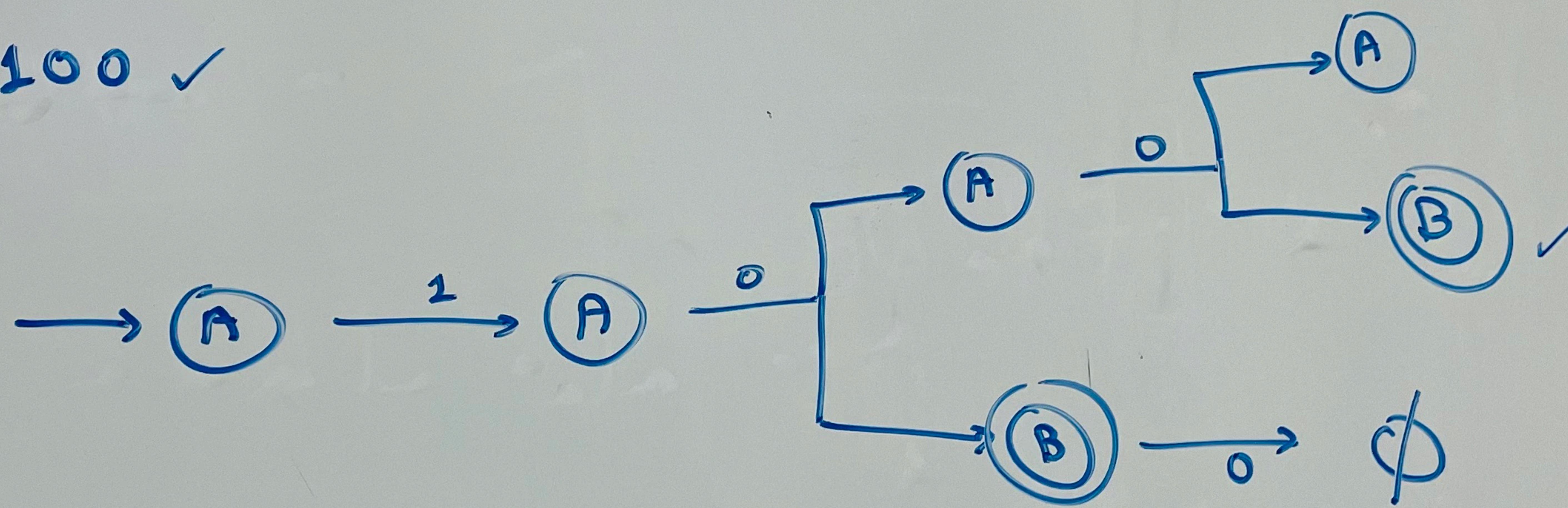


In State B, we don't go anywhere.

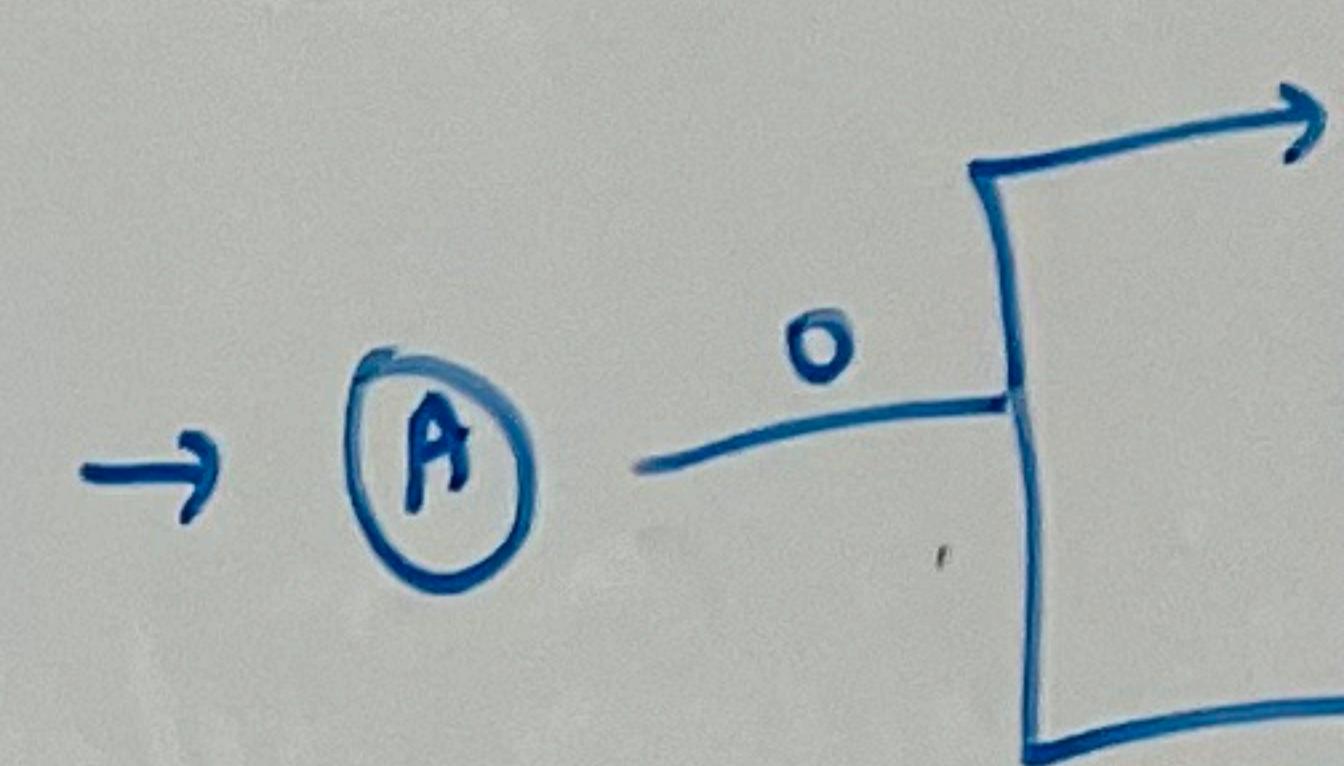
In NFA, you can leave it like this.



Eg: 100 ✓



Eg: 01 ✗

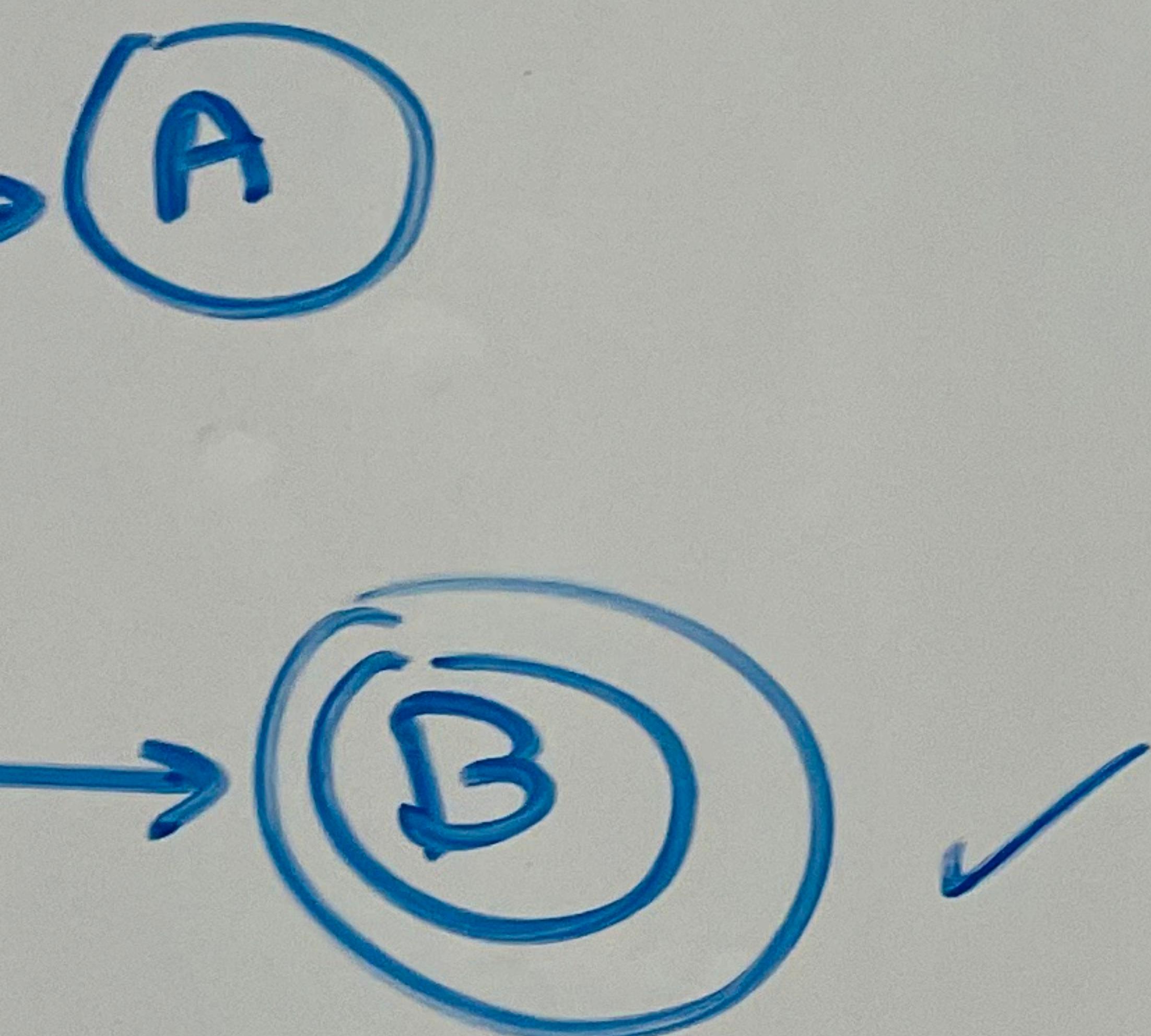
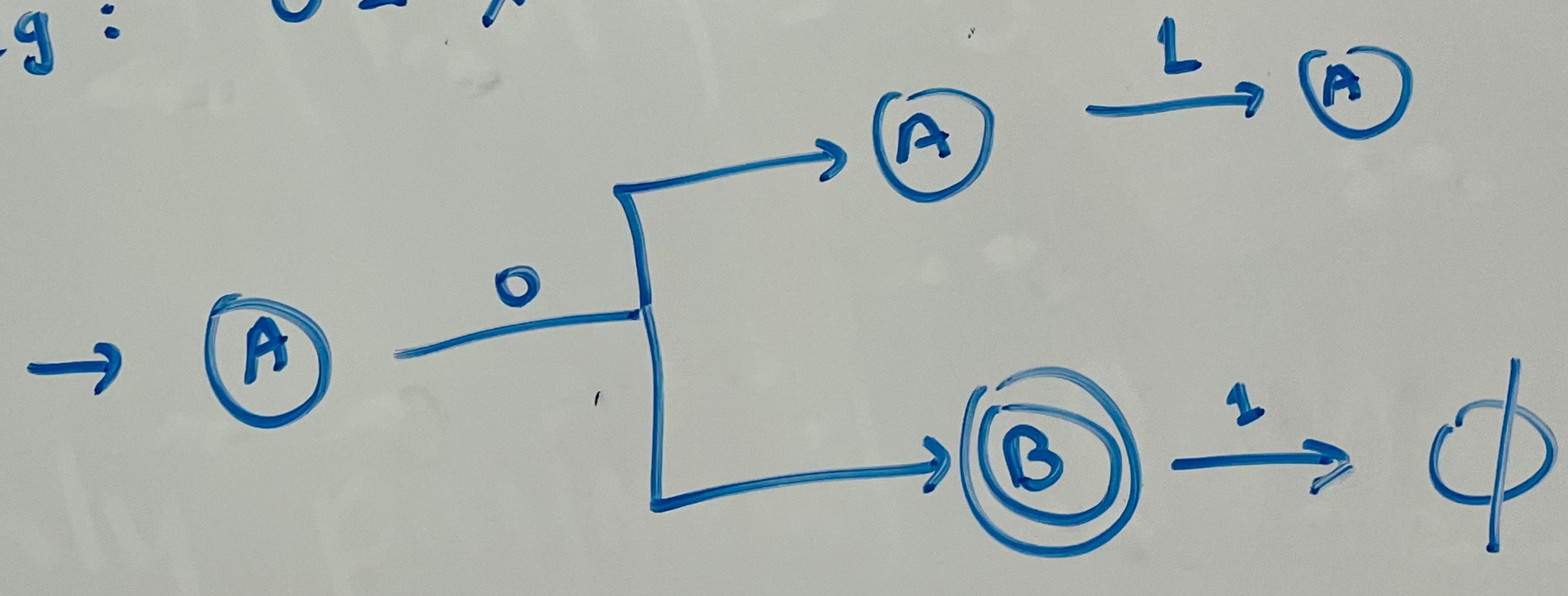


If either of the last states is final state,
then the input is acceptable.

ϕ

Dead Configuration

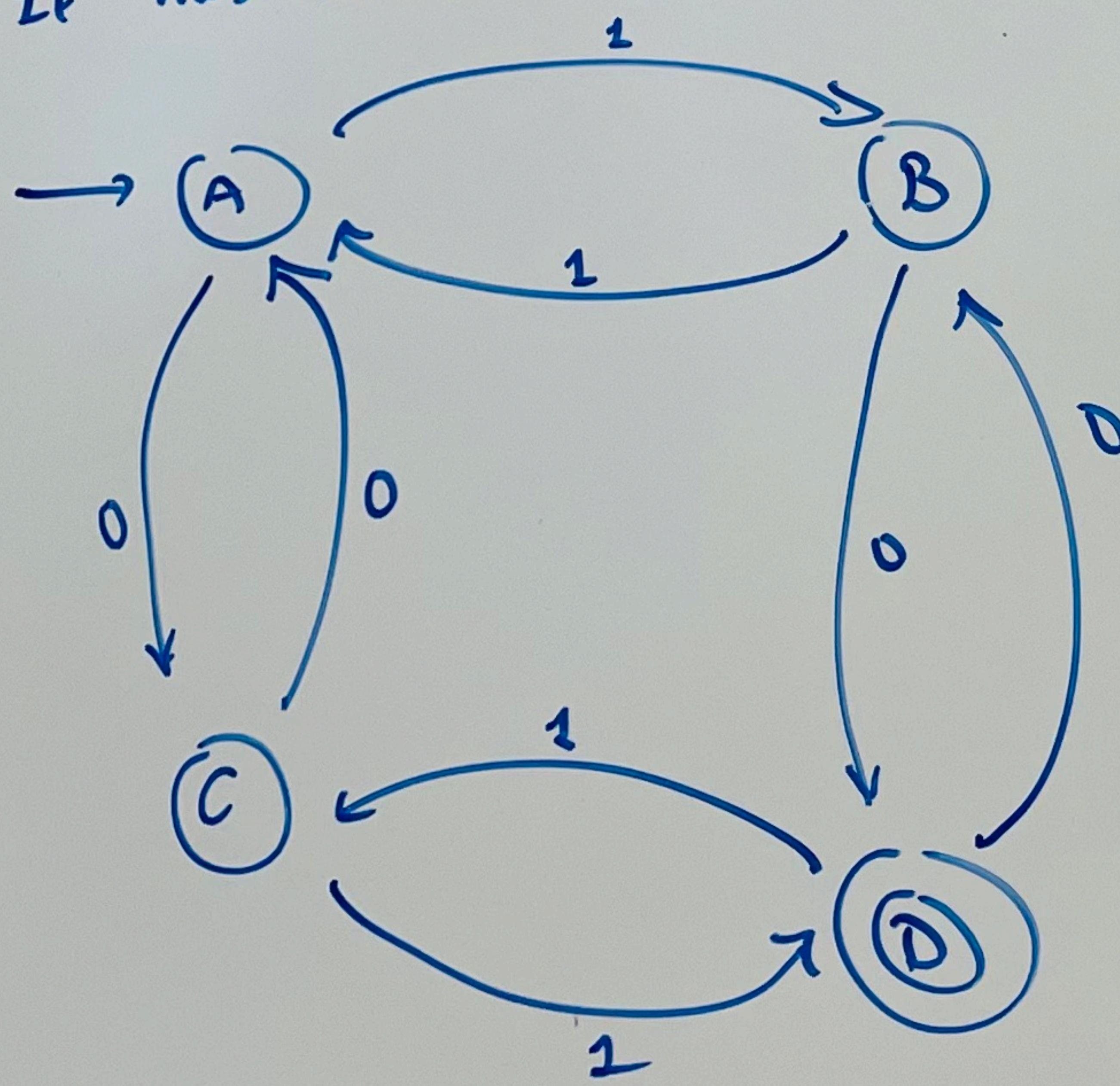
Eg : 01 X



ϕ

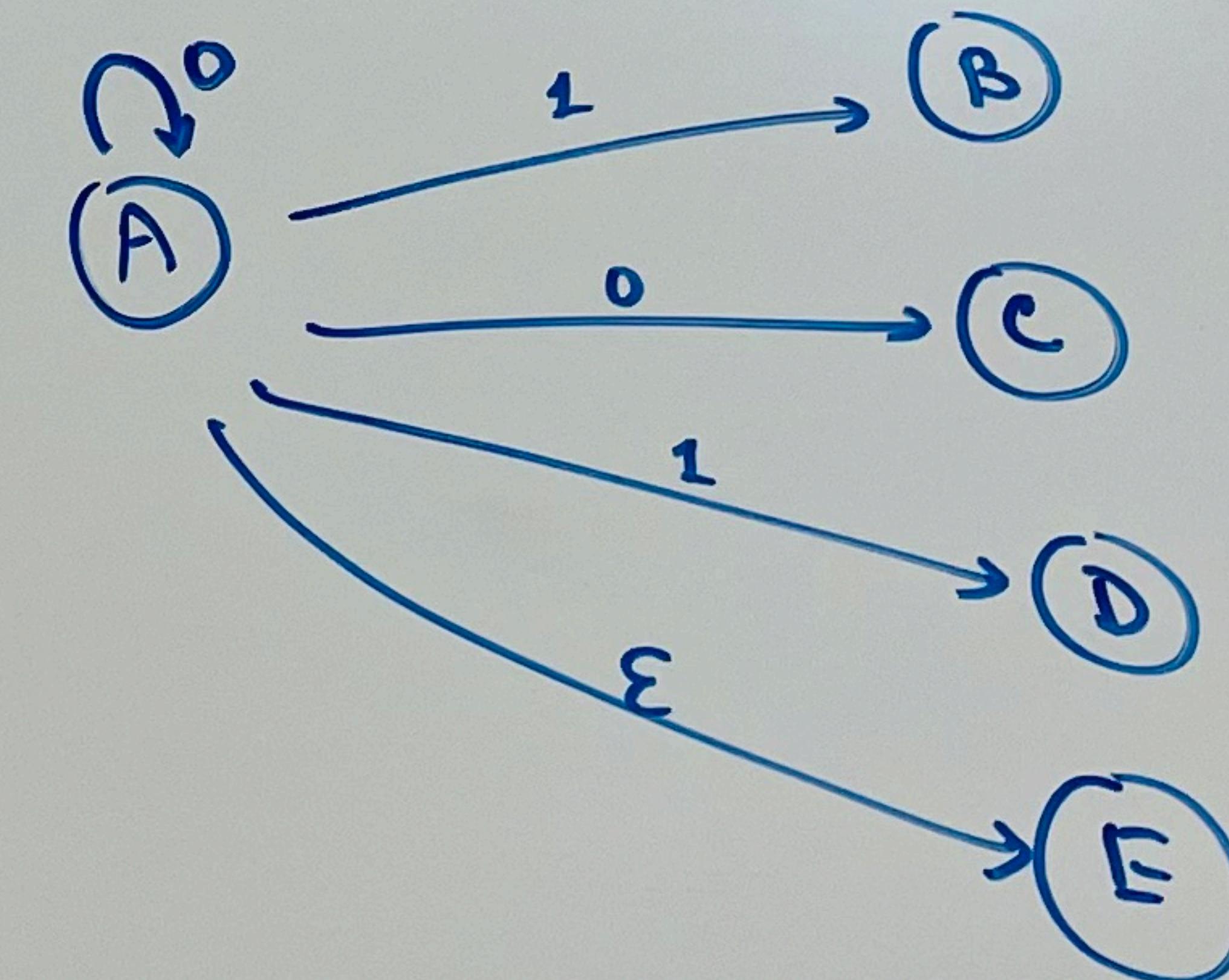
Deterministic Finite Automate (DFA)

- * In DFA, given the current state, we know where the next state will be.
- * It has only one unique next state.
- * It has no choices or randomness.



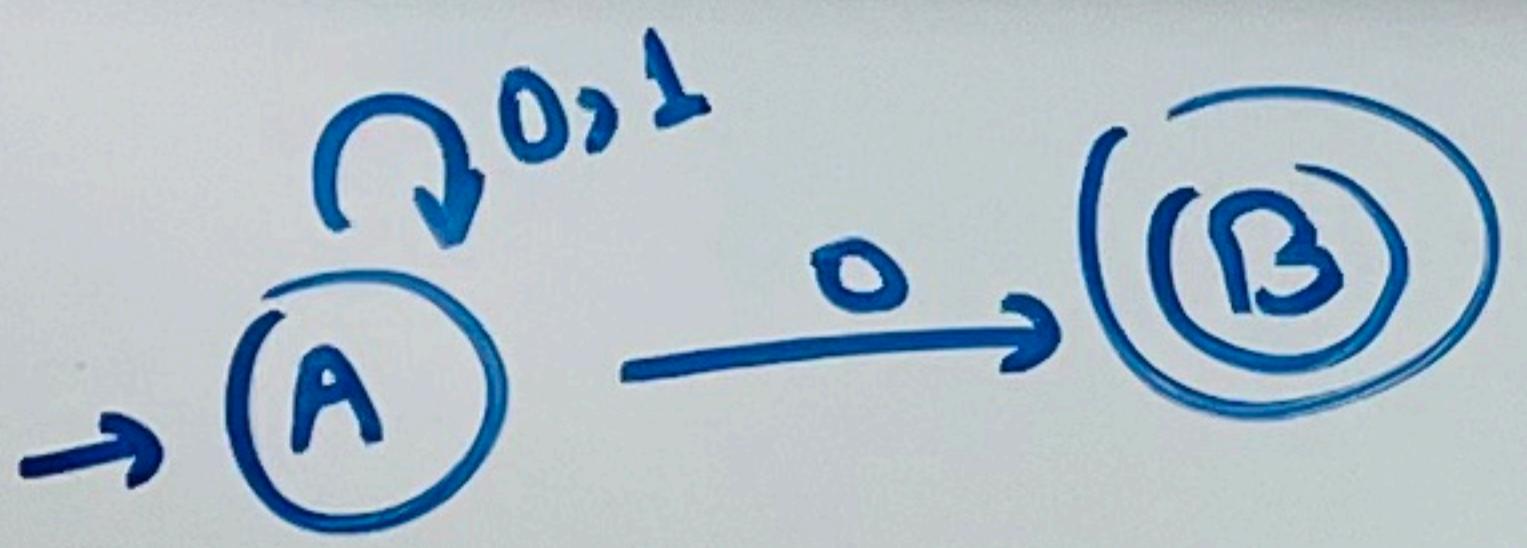
Non Deterministic Finite Automata (NFA)

- * In NFA, given the current state, there could be multiple next state.
- * The next state may be chosen at random
- * OR
- * All the next states may be chosen at parallel



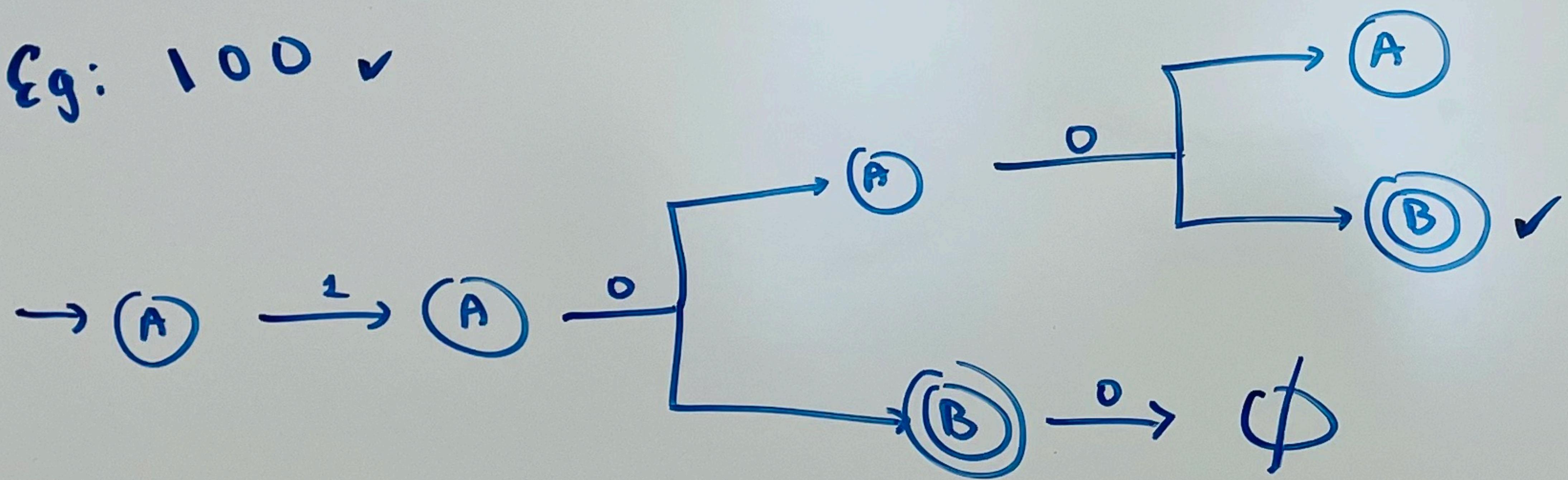
* Example 1

$L = \{ \text{Set of all strings that end with '0'} \}$



In state B, we don't go anywhere.
In NFA, you can leave it like that.

Eg: 100 ✓

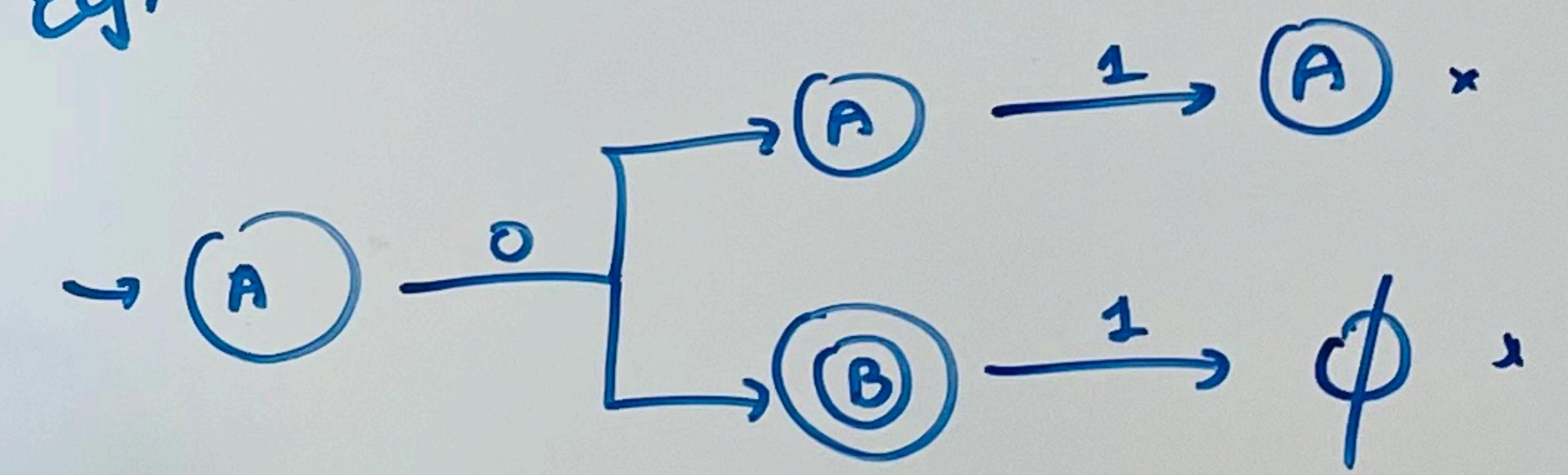


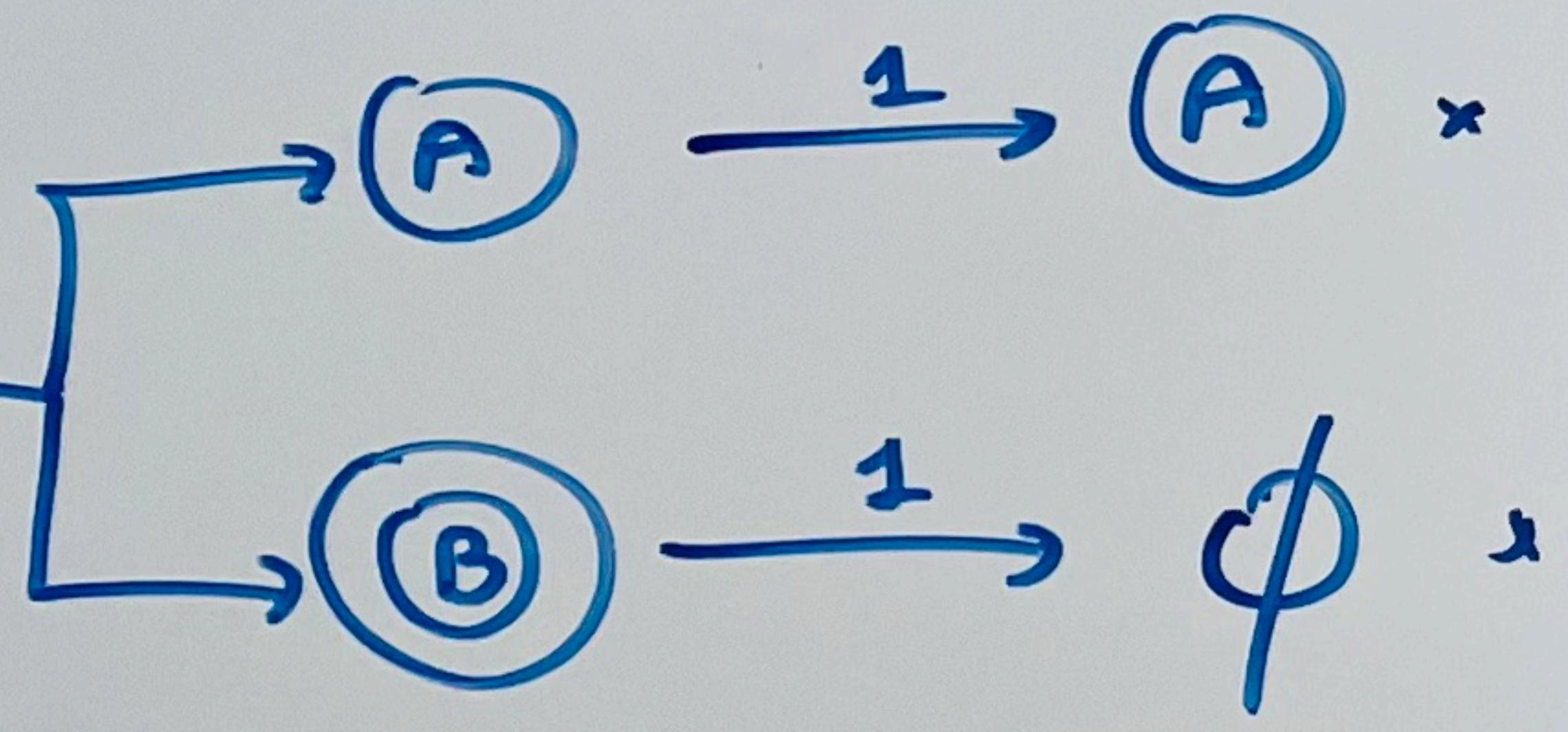
If either of the final states is an end state,
then the input is acceptable.



Dead Configuration

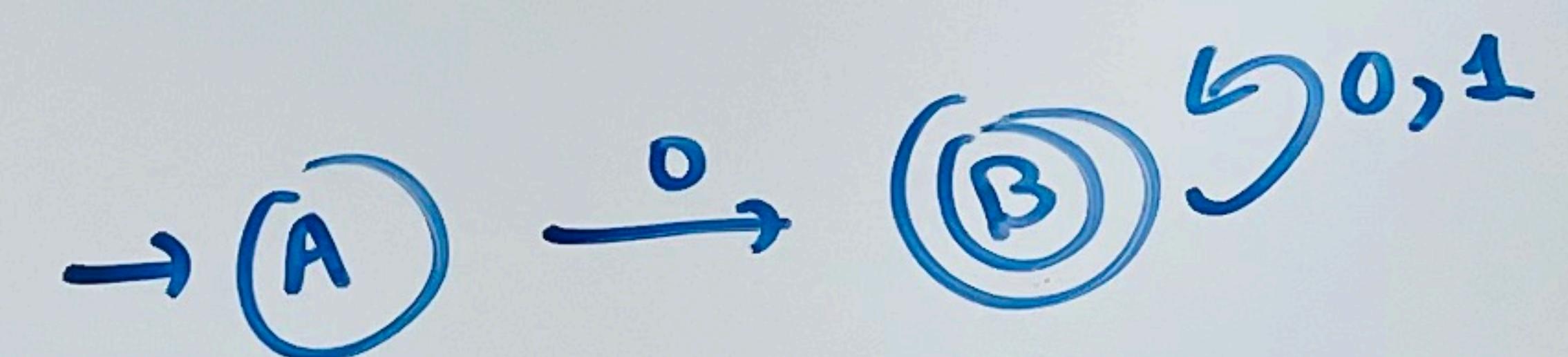
Eg: 01 ✗





* Example 2

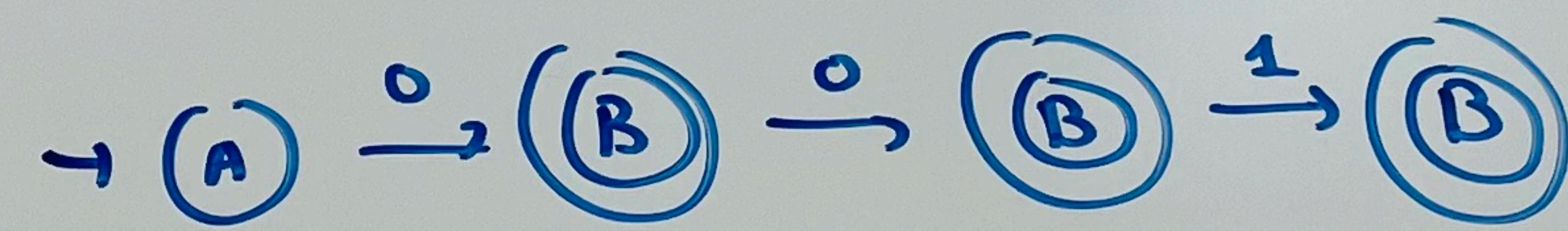
$L = \{ \text{Set of all strings that start with } 0 \}$



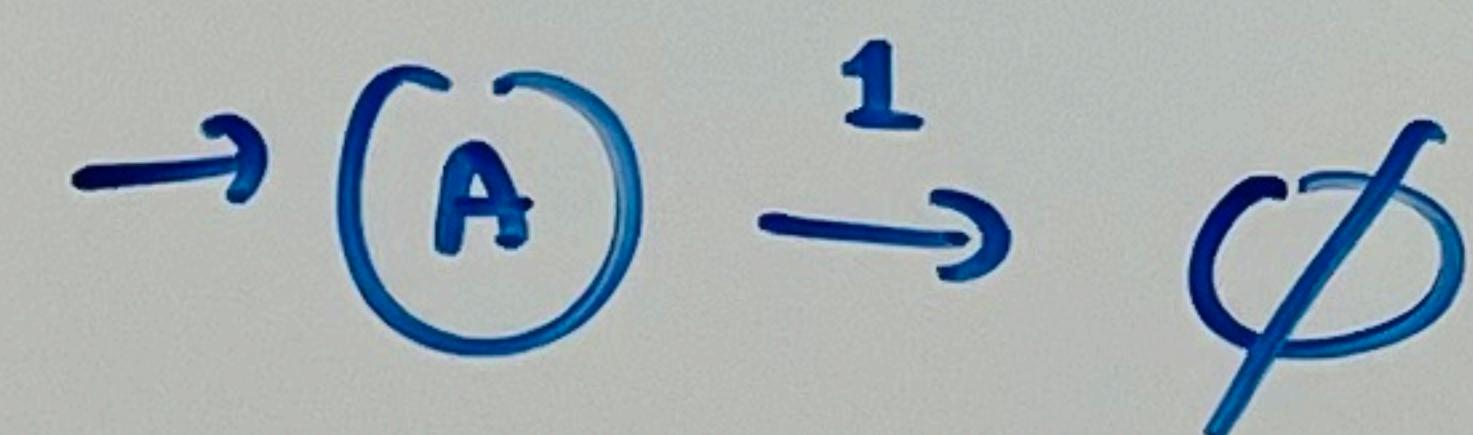
This is a complete NFA.

We don't have to mention what state A will do if it gets 1 as an input.

Eg: 001 ✓



Eg: 101 ✗



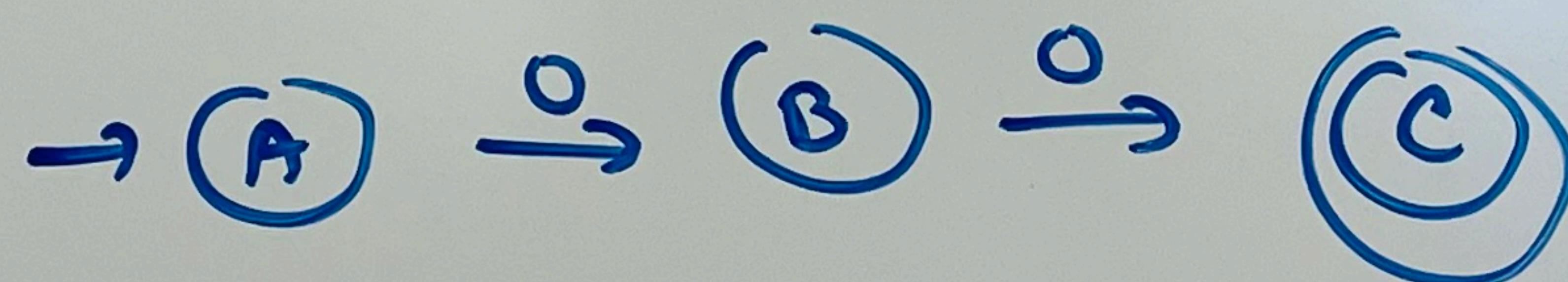
* Example 3

Construct a NFA that accepts set of all strings over $\Sigma = \{0, 1\}$ of length 2.

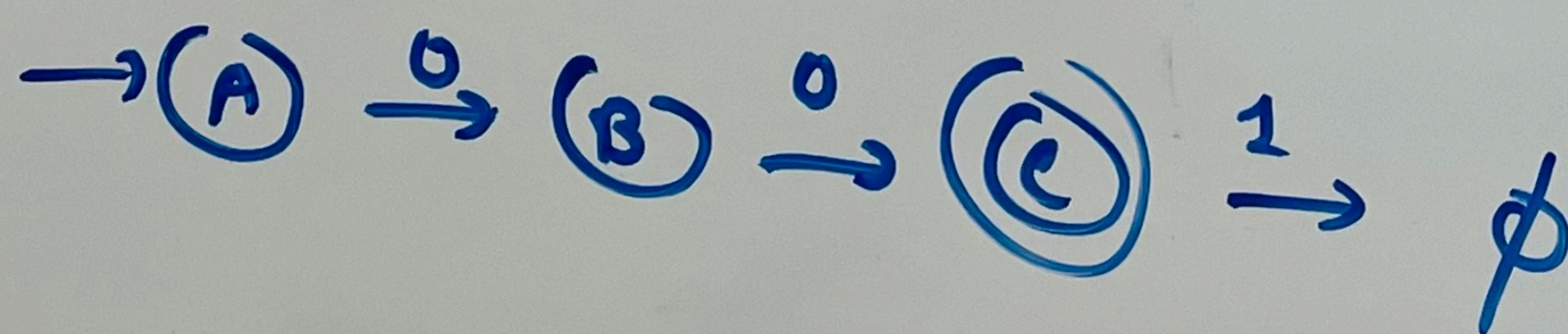
$$: \{00, 01, 10, 11\}$$



Eg: 00 ✓



Eg: 001 ✗



* Ex

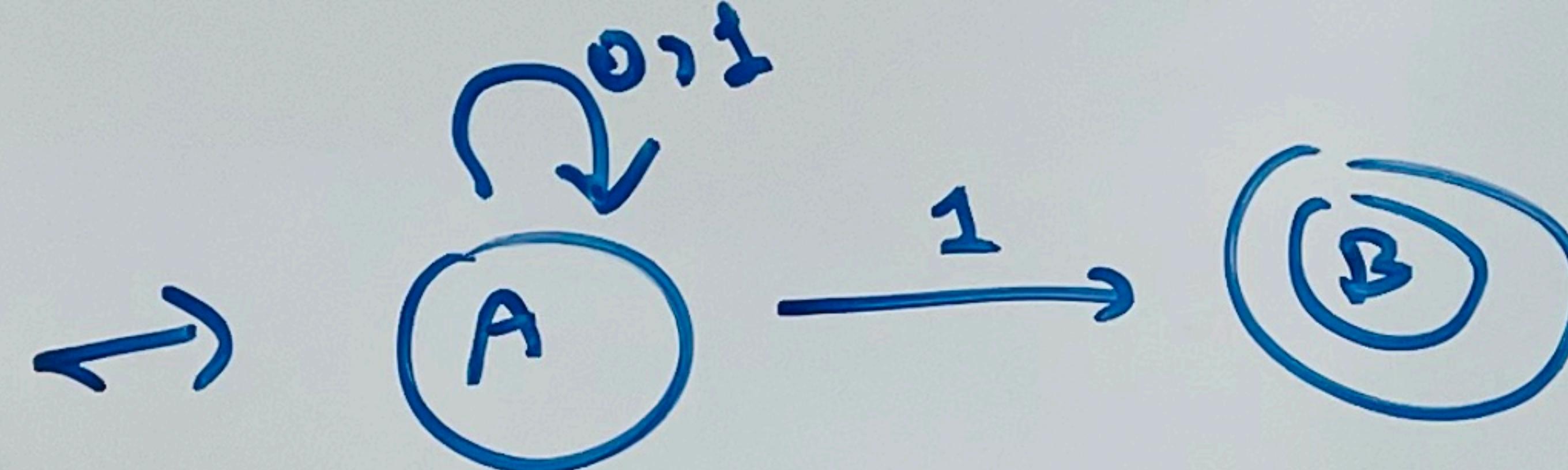
Eg:

all strings

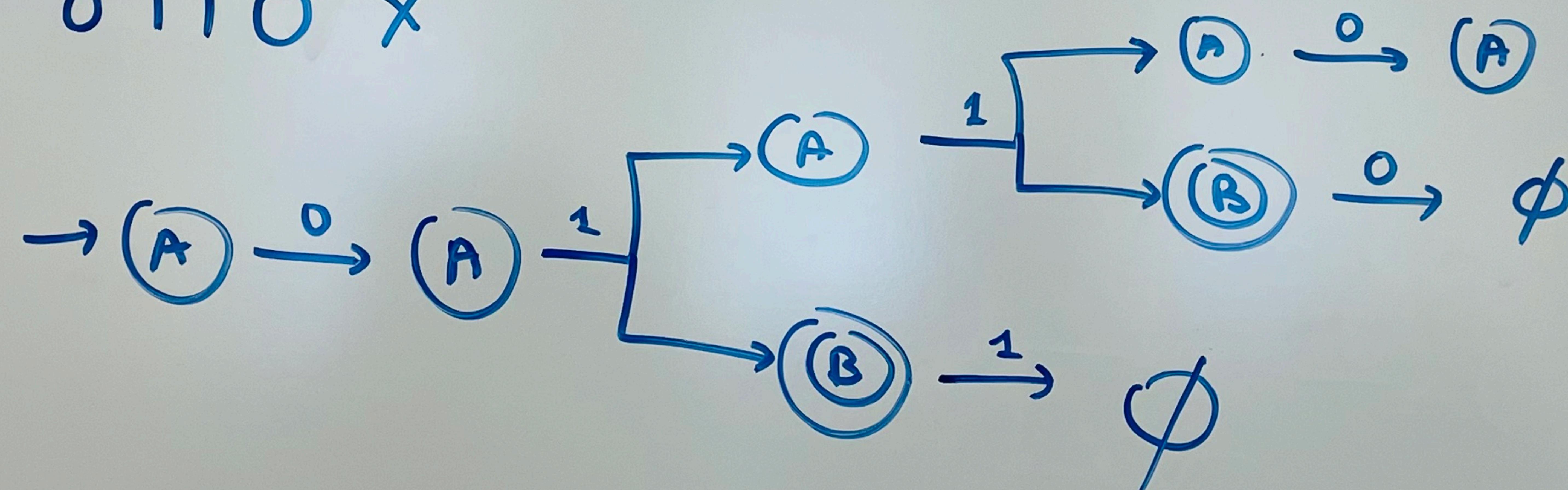
* Example 4

$L = \{ \text{Set of all strings that end with } 1 \}$

$$\Sigma = \{0, 1\}$$



Eg: 0110 X



*

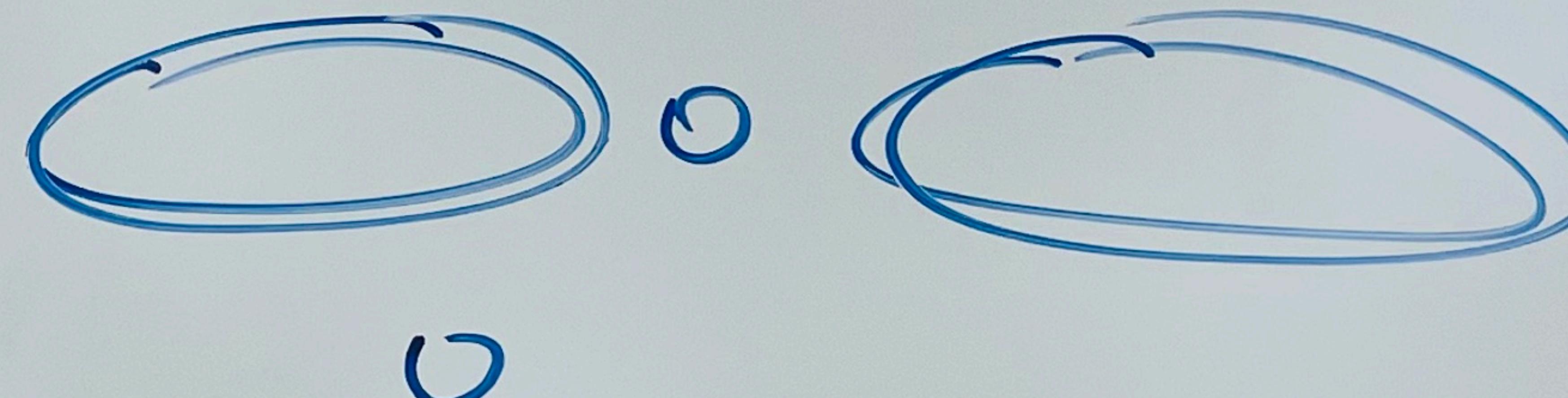
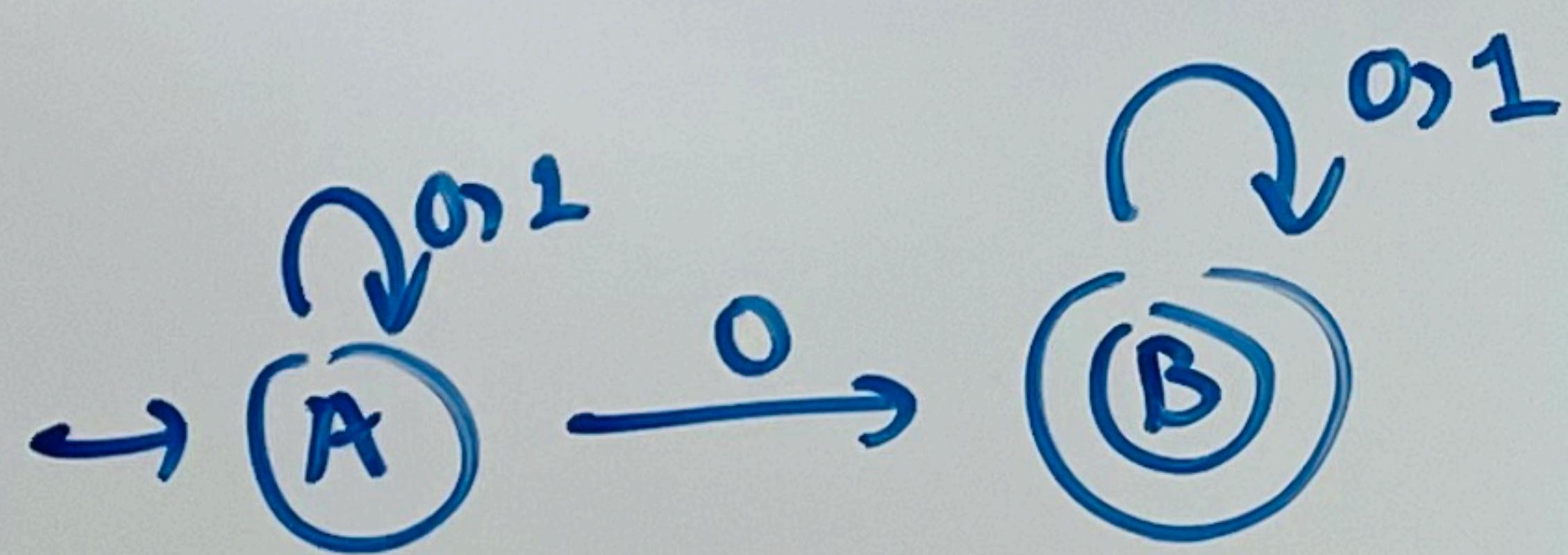
Eg:

* Example 5

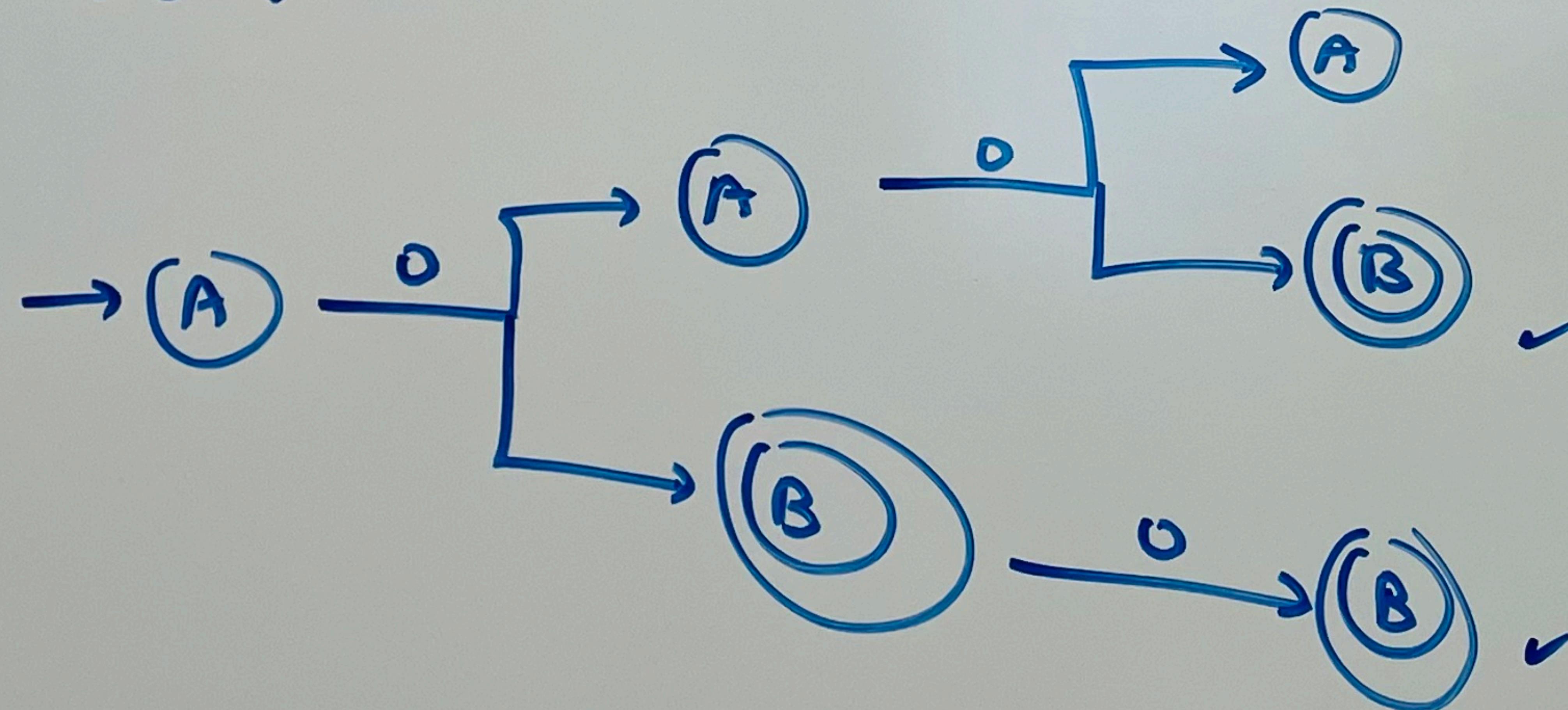
$L = \{ \text{Set of all strings}$

that contain '0' }

$$\Sigma = \{0, 1\}$$



Eg: 00 ✓



Eg: 111

