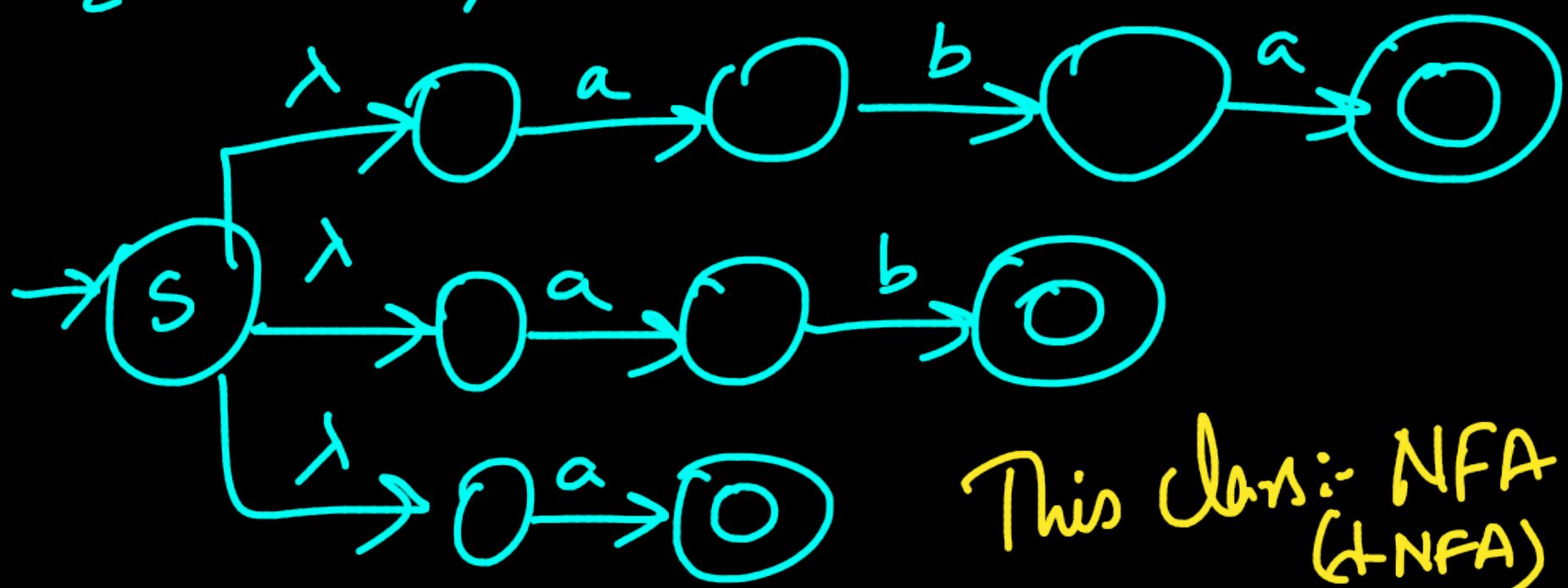
Date :- Aug 24, 2020

AFLL

Last Class :-

NFA , λ-NFA $\Longleftrightarrow$ DFA

$L = \{ aba , ab , a \}$



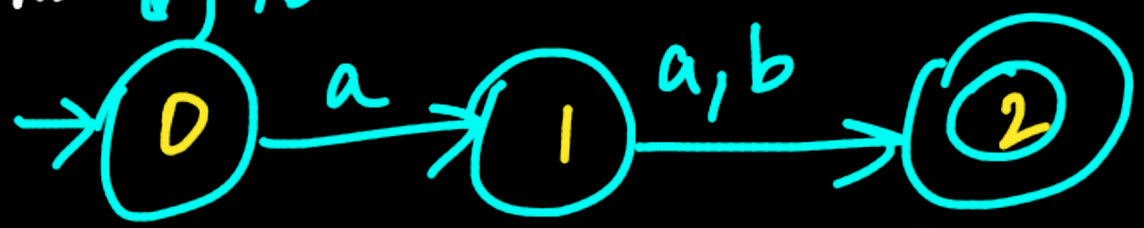
This class :- NFA → DFA
(λ-NFA)

Subset- construction Method

1) Construct a NFA where the second symbol from RHS is always 'a'. Convert this NFA to DFA. (last)

$L = \{ \ldots\ldots a \_ \}$ $\quad L = (a+b)^* a (a+b)$

NFA:



$\delta : Q \times \Sigma \to 2^Q$

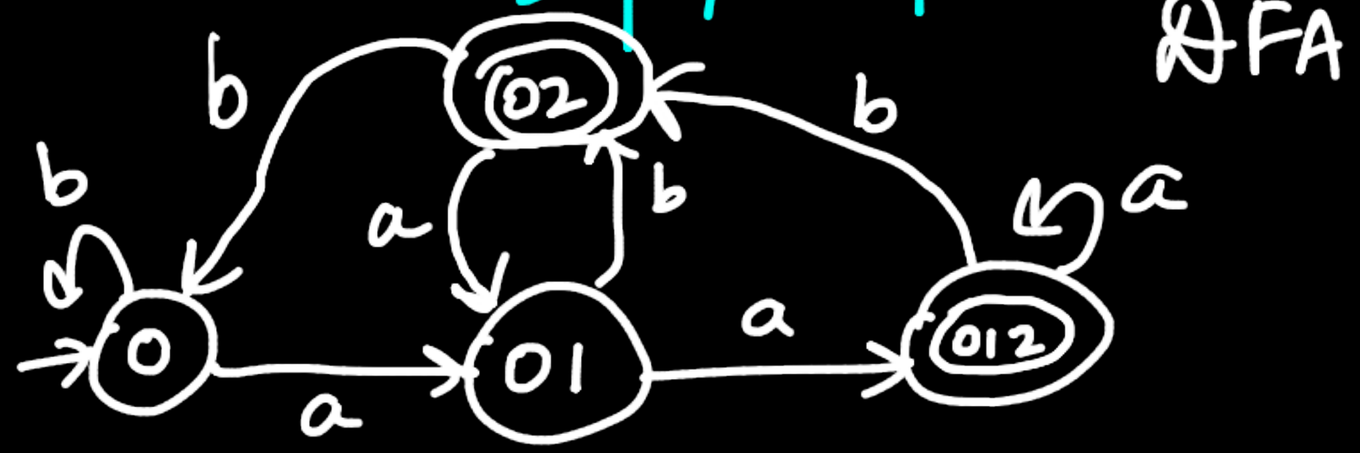
Transition Table of NFA

	a	b
→ 0	{0,1}	0
1	2	2
*2	ϕ	ϕ

T^n table of DFA

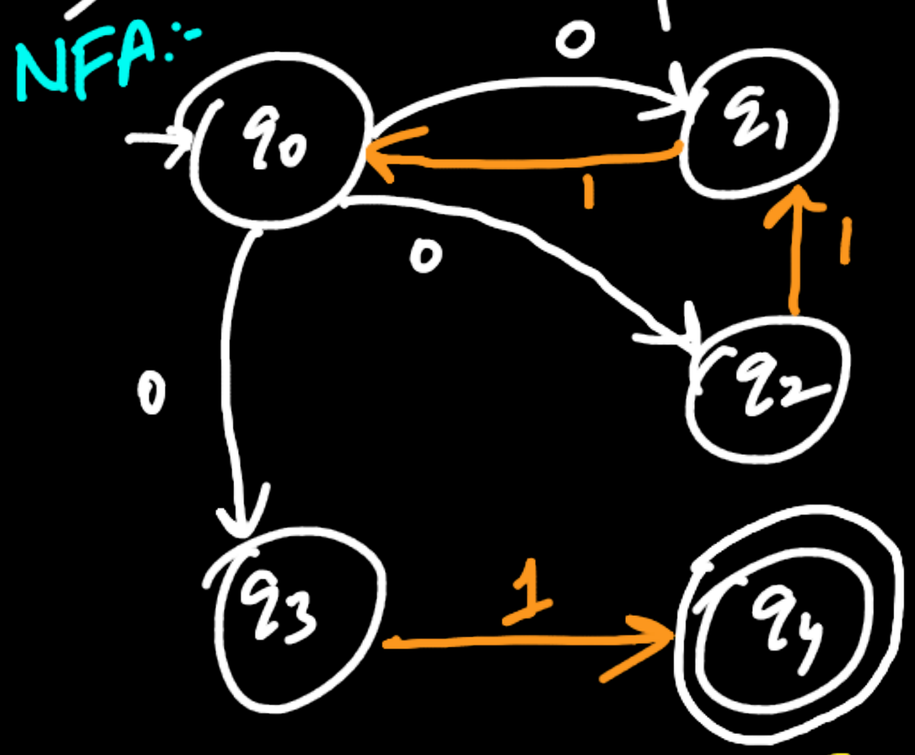
	a	b
→ 0	{0,1}	0
{0,1}	{0,1,2}	{0,2}
*{0,1,2}	{0,1,2}	{0,2}
*{0,2}	{0,1}	0

DFA



2) Convert the following NFA to DFA

NFA:-



Transition table for NFA

	0	1
→ q_0	$q_1 q_2 q_3$	ϕ
q_1	ϕ	q_0
q_2	ϕ	q_1
q_3	ϕ	q_4
* q_4	ϕ	ϕ

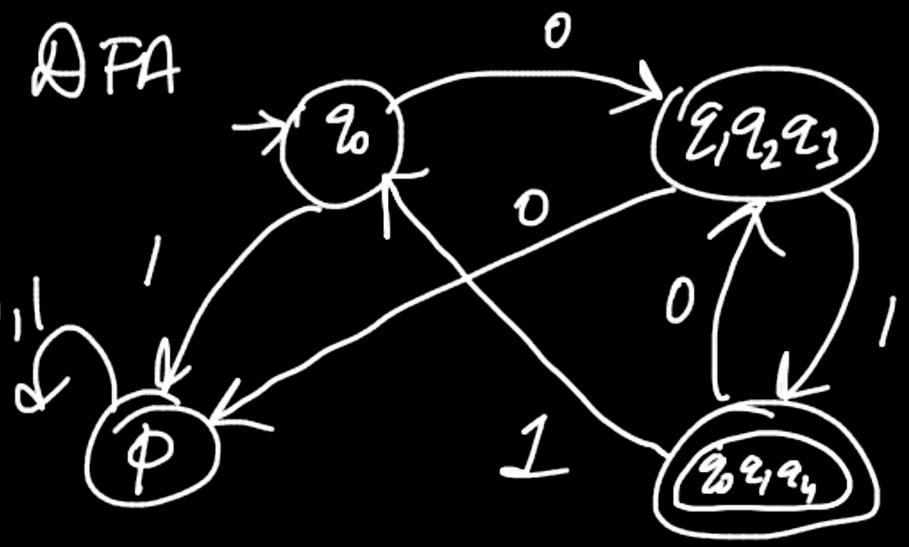
DFA

	0	1
→ S	A	D
A	D	B
D	D	D
* B	A	S

Transition table for DFA

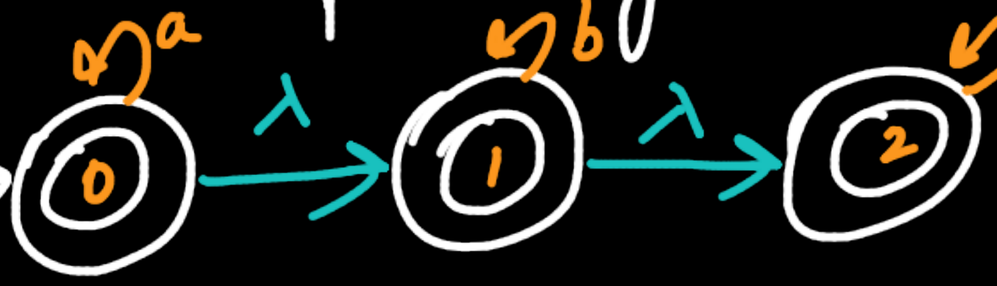
	0	1
→ q_0 (S)	$q_1 q_2 q_3$ (A)	ϕ (D)
(A) $q_1 q_2 q_3$	ϕ (D)	$q_0 q_1 q_4$ (B)
(D) ϕ	ϕ (D)	ϕ (D)
(B) * $q_0 q_1 q_4$	$q_1 q_2 q_3$ A	q_0 (S)

DFA



3) Convert the following λ-NFA to DFA

$\Sigma = \{a^* b^* c^*\}$



Which states can 0 reach without-consuming any Ip symbol (λ) :- 0,1,2
(λ-closure)

λ-closure(1) = 1,2 λ-closure(2) = 2

Tⁿ table of λ-NFA

	a	b	c	λ-closure
→ *0	0	ϕ	ϕ	{0,1,2}
[*1	ϕ	1	ϕ	{1,2}
*2]	ϕ	ϕ	2	{2}

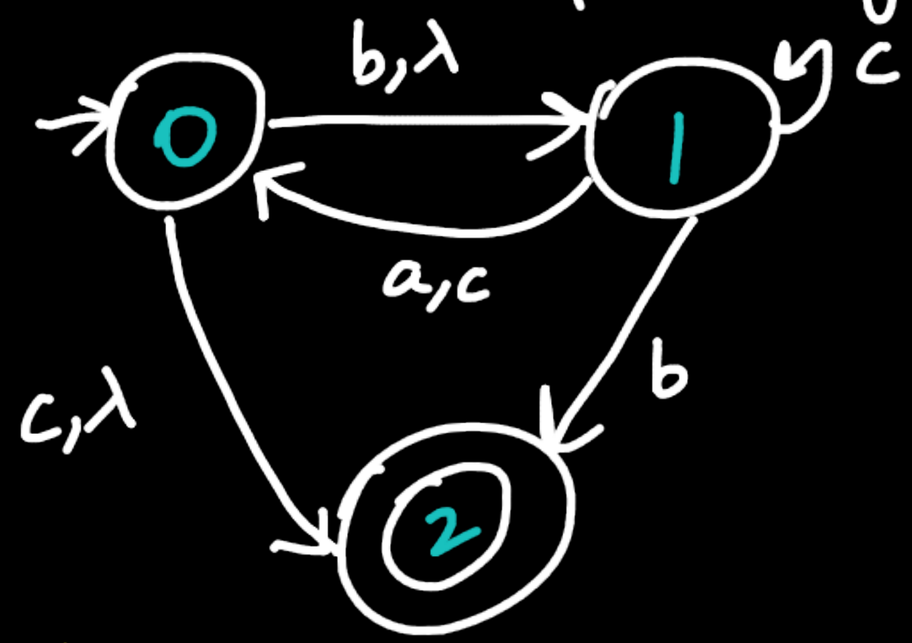
Note :-
Start state of DFA
= λ-closure (Start state of NFA)

Tⁿ table of DFA

	a	b	c
→ *{0 1 2}	λ-closure(0) {0 1 2}	λ-clos(1) {1,2}	λ-clos(2) {2}
*12	ϕ	{1,2}	{2}
*2	ϕ	ϕ	{2}
ϕ	ϕ	ϕ	ϕ

↵ λ-closure(ϕ) = ϕ

4) Convert the following λ-NFA to DFA



Tⁿ table of λNFA

	a	b	c	λ-closure
→ 0	ϕ	1	2	{0,1,2}
1	0	2	{0,1}	{1}
*2	ϕ	ϕ	ϕ	2

Tᴺ table of DFA

	a	b	c
→ *012	012	12	012
*12	012	2	012
*2	ϕ	ϕ	ϕ

{2} ∪ {0,1} ∪ ϕ

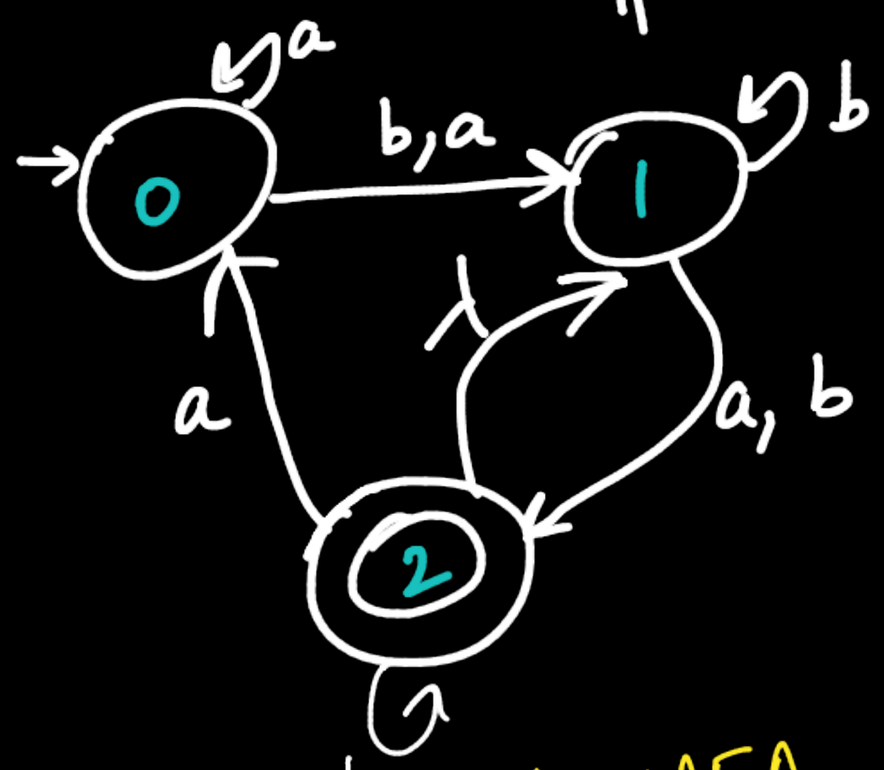
= {0,1,2}

λ-closure {0,1,2}

= λ-closure(0) ∪ λ-clos..(1) ∪ λ-clo(2)

= {012} ∪ {1} ∪ {2} = {012}

5) Convert the following λ-NFA to DFA



T^n table of λ-NFA

	a	b	λ-closure
→ 0	01	1	0 }
1	2	12	1 }
*2	0	2	12

Transition table of DFA

	a	b
→ 0	01	1
01	012	12
1	12	12
*012	012	12
*12	012	12

Q:- What happens if we apply subset construction method to a DFA?

(NFA to DFA)