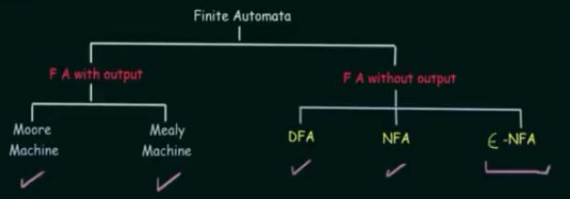
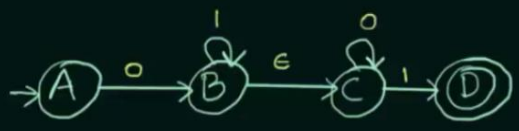
Epsilon (ϵ) - NFA

ϵ- NFA
↳ empty symbols



$\{Q, \Sigma, q_0, \delta, F\}$

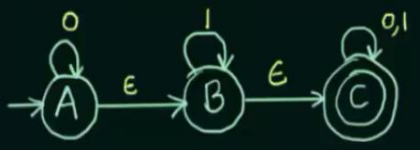
$\delta : Q \times \Sigma \cup \epsilon \longrightarrow 2^Q$



Every state on ϵ goes to itself.

Conversion of ϵ -NFA to NFA

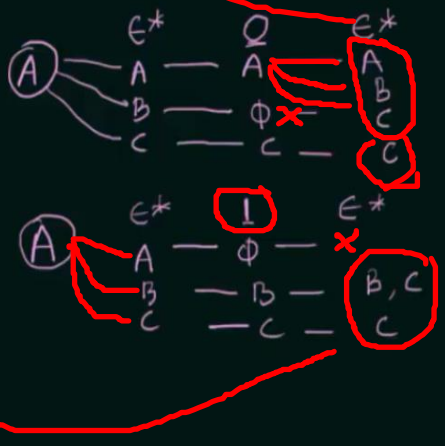
Convert the following ϵ-NFA to its equivalent NFA

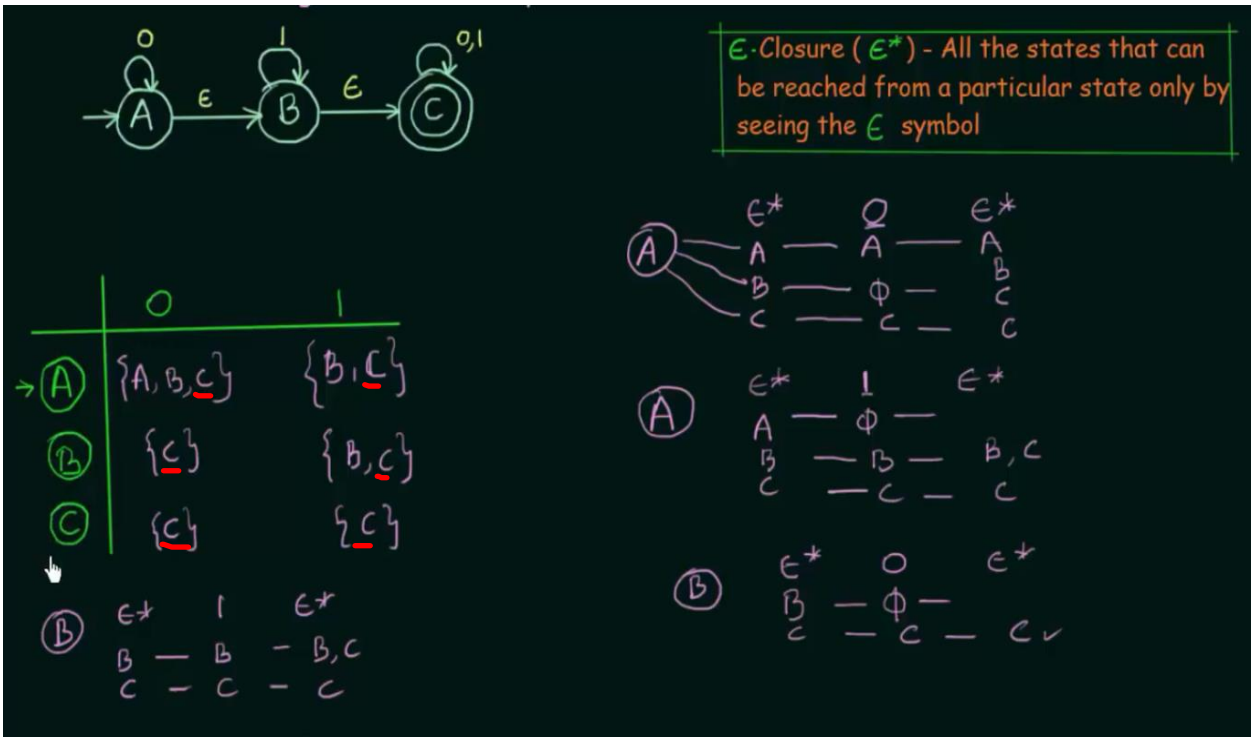


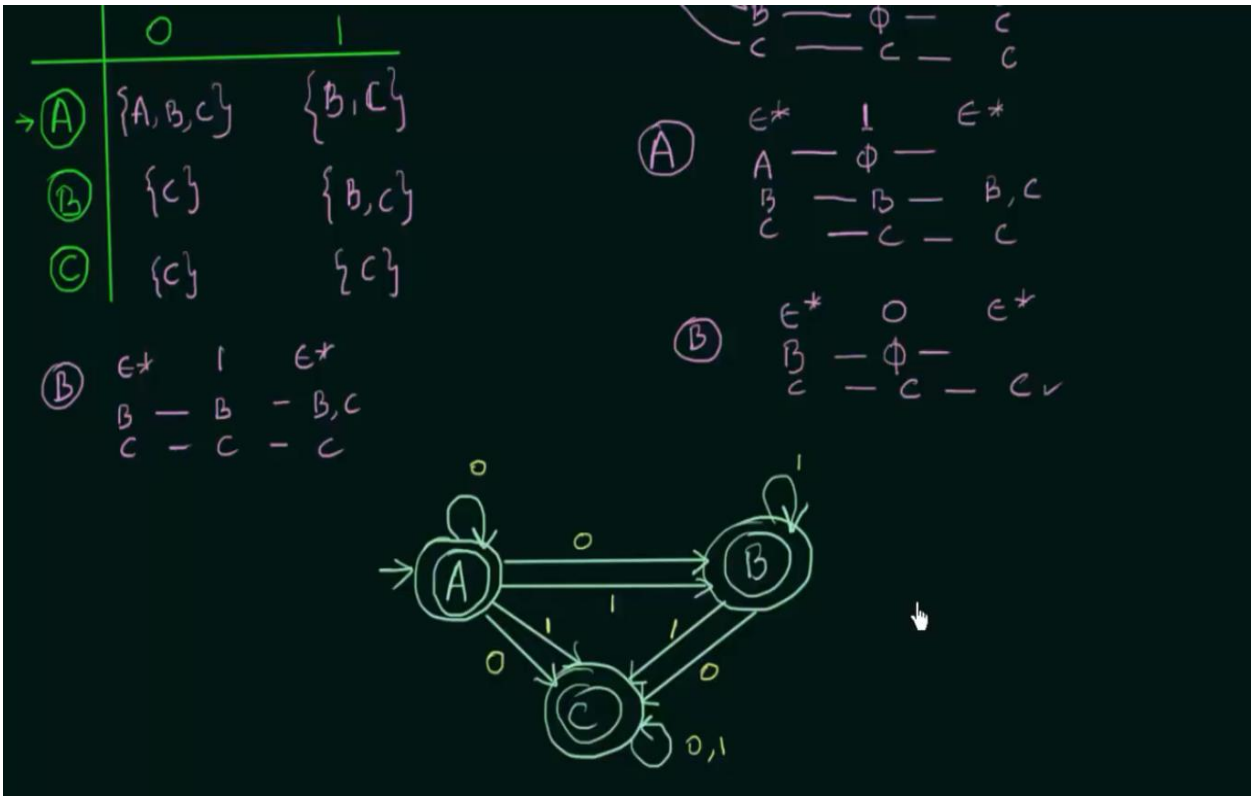
State ϵ* input ϵ*

ϵ-Closure (ϵ*) - All the states that can be reached from a particular state only by seeing the ϵ symbol

	0	1
→ A	{A, B, C}	{B, C}
B		
C		

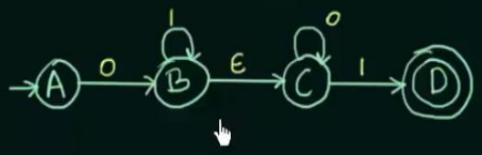



0
1
0,1
A
ε
B
ε
C
ε-Closure (ε*) - All the states that can be reached from a particular state only by seeing the ε symbol
0
1
A {A, B, C} {B, C}
B {C} {B, C}
C {C} {C}
B ε* 1 ε*
B — B — B, C
C — C — C
A ε* Q ε*
A — A — A
B — Φ — B
C — C — C
A ε* 1 ε*
A — Φ —
B — B — B, C
C — C — C
B ε* 0 ε*
B — Φ —
C — C — C


0
1
A {A, B, C} {B, C}
B {C} {B, C}
C {C} {C}
B ε* 1 ε*
B — B — B, C
C — C — C
A ε* 1 ε*
A — Φ —
B — B — B, C
C — C — C
B ε* 0 ε*
B — Φ —
C — C — C
A
B
C
0
1
0,1

Conversion of ϵ -NFA to NFA -Examples (Part-1)

Convert the following ϵ-NFA to its equivalent NFA



	0	1
→A		
B		
C		
D		

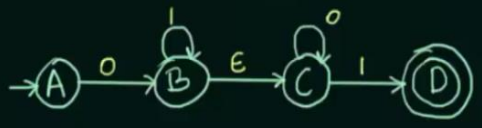
	ϵ*	0	ϵ*

	ϵ*	1	ϵ*

[Pause]

Conversion of ϵ -NFA to NFA -Examples (Part-1)

Convert the following ϵ-NFA to its equivalent NFA



NFA

	0	1
→A	B, C	ϕ
B	C	B, C, D
C	C	D
(D)	ϕ	ϕ

	ϵ*	0	ϵ*
A	A	B	B C
B	B C	ϕ C	ϕ C
C	C	C	C
D	D	ϕ	ϕ

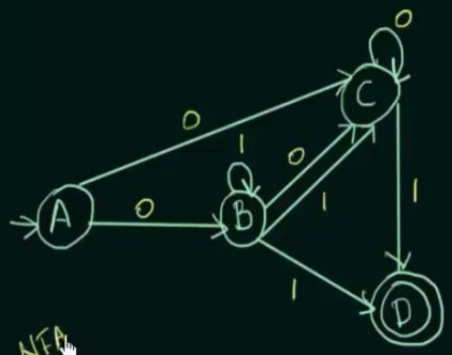
	ϵ*	1	ϵ*
A	A	ϕ	ϕ
B	B C	B D	B C D
C	C	D	D
D	D	ϕ	ϕ

NFA

	0	1
→A	B, C	ϕ
B	C	B, C, D
C	C	D
(D)	ϕ	ϕ

B	B	ϕ	ϕ
	C	C	C
C	C	C	C
D	D	ϕ	ϕ

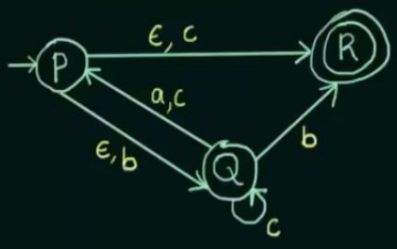
B	B	B	B
	C	D	D
C	C	D	D
D	D	ϕ	ϕ



NFA

Conversion of ϵ -NFA to NFA -Examples (Part-2)

Convert the following ϵ-NFA to its equivalent NFA



	a	b	c
→ P			
Q			
(R)			

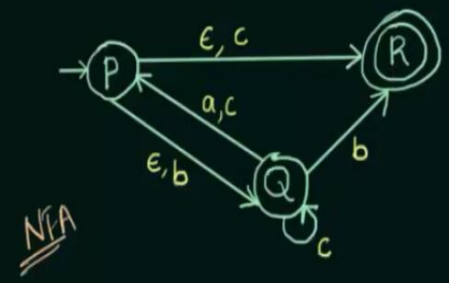
ϵ*	a	ϵ*

ϵ*	b	ϵ*

ϵ*	c	ϵ*

[Pause] **Conversion of ε -NFA to NFA -Examples (Part-2)**

Convert the following ε-NFA to its equivalent NFA



NFA

	a	b	c
→ (P)	{P, Q, R}	{Q, R}	{Q, R}
Q	{P, Q, R}	{R}	{Q}
(R)	ϕ	ϕ	ϕ

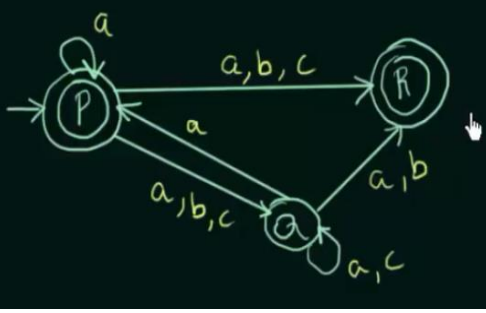
	ε*	a	ε*
P	P	ϕ	ϕ
	Q	P	P Q R
	R	ϕ	R
			-
Q	Q	P	P
			Q
			R
R	R	ϕ	-

	ε*	b	ε*
P	P	Q	Q
	Q	R	R
	R	ϕ	-
Q	Q	R	R
R	R	ϕ	-

	ε*	c	ε*
P	P	R	R
	Q	Q	Q
	R	ϕ	-
Q	Q	Q	Q
R	R	ϕ	-

	a	b	c
→ (P)	{P, Q, R}	{Q, R}	{Q, R}
Q	{P, Q, R}	{R}	{Q}
(R)	ϕ	ϕ	ϕ

Q	Q	P	P Q R
R	R	ϕ	-



NFA