Tutorial - 3 - TAFL

Page

Que-1 Convert the following NFA with ε transitions to corresponding to DFA.

δ	ε	0	1
→ A	B, D	A	ϕ
B	ϕ	C	E
C	ϕ	ϕ	B
D	ϕ	E	D
*E	ϕ	ϕ	ϕ

$$ECA = (ABD)$$
$$B = (B)$$
$$C = (C)$$
$$D = (D)$$
$$E = (E)$$

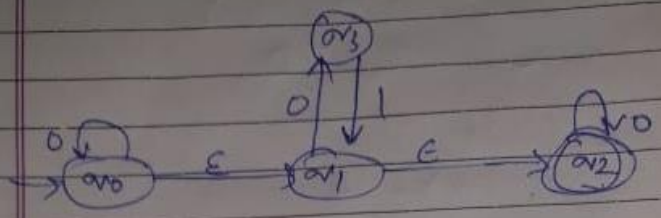
Starting State EC(A) = ABD – New State.

$$\delta(ABD, 0) = EC(\delta(A,0) \cup \delta(B,0) \cup \delta(D,0))$$
$$= EC(A \cup C \cup E)$$
$$= EC(ACE) = ABDCE \text{ New State.}$$

$$\delta(AB, 1) = EC(\delta(A,1) \cup \delta(B,1) \cup \delta(D,1))$$
$$= EC(\phi \cup E \cup D)$$
$$= EC(ED) = ED \text{ New State.}$$

$$\delta(ABDCE, 0) = EC(\delta(A,0) \cup \delta(B,0) \cup \delta(D,0) \cup \delta(C,0) \cup \delta(E,0))$$
$$= EC(A \cup C \cup E \cup \phi \cup \phi)$$
$$= EC(ACE) = ABDCE$$

Q1-2 Remove ε Transitions from the following NFA.



Epsilon Closure

$q_0 = (q_0 q_1 q_2)$

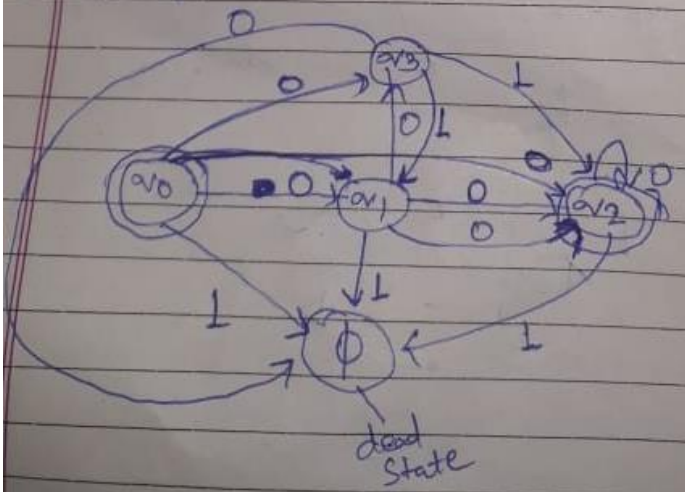
$q_1 = (q_1 q_2)$

$q_2 = (q_2)$

$q_3 = (q_3)$

NFA

δ	0	1
q_0	$(q_0 q_1 q_2 q_3)$	ϕ
q_1	$(q_3 q_2)$	ϕ
q_2	(q_2)	ϕ
q_3	ϕ	$(q_1 q_2)$



$\delta(ABDCE),1) = EC(\delta(A,1) \cup \delta(B,1) \cup \delta(D,1) \cup \delta(C,1) \cup \delta(E,1))$

$= EC(\phi \cup E \cup D \cup B \cup \phi)$

$= EC(EDB) = EDB$ – New State.

$\delta(ED),0) = EC(\delta(E,0) \cup \delta(D,0))$

$= EC(\phi \cup \phi)$

$= EC(\phi) = \phi$

$\delta(ED),1) = EC(\delta(E,1) \cup \delta(D,1))$

$= EC(\phi \cup D) = EC(D) = D$ New State.

$\delta(EDB),0) = EC(\delta(E,0) \cup \delta(D,0) \cup \delta(B,0))$.

$= EC(\phi \cup E \cup C)$

$= EC(EC) = EC$ New State.

$\delta(EDB),1) = EC(\delta(E,1) \cup \delta(D,1) \cup \delta(B,1))$

$= EC(\phi \cup D \cup E)$

$= EC(DE) = DE$ New State.

$\delta(D),0) = EC(\delta(D,0))$

$= EC(E) = E$ New State.

$\delta(D),1) = EC(\delta(D,1))$

$= EC(D) = D$

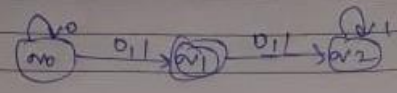
$\delta(EC),0) = EC(\delta(E,0) \cup \delta(C,0))$

$= EC(\phi \cup \phi) = \phi$

$\delta(EC),1) = EC(\delta(E,1) \cup \delta(C,1))$

$= EC(\phi \cup B) = B$ New State.

Ques 3 Convert the following NFA to DFA with minimum Number of States (Conversion done in Tut 2).



NFA

δ	0	1
q_0	$(q_0 q_1)$	(q_1)
q_1	(q_2)	(q_2)
q_2	–	(q_2)

DFA:

δ	0	1
q_0	$(q_0 q_1)$	(q_1)
$(q_0 q_1)$	$[q_0 q_1 q_2]$	$(q_1 q_2)$
q_1	q_2	q_2
$(q_1 q_2)$	q_2	q_2
q_2	ϕ	q_2
$(q_0 q_1 q_2)$	$(q_0 q_1 q_2)$	$(q_1 q_2)$