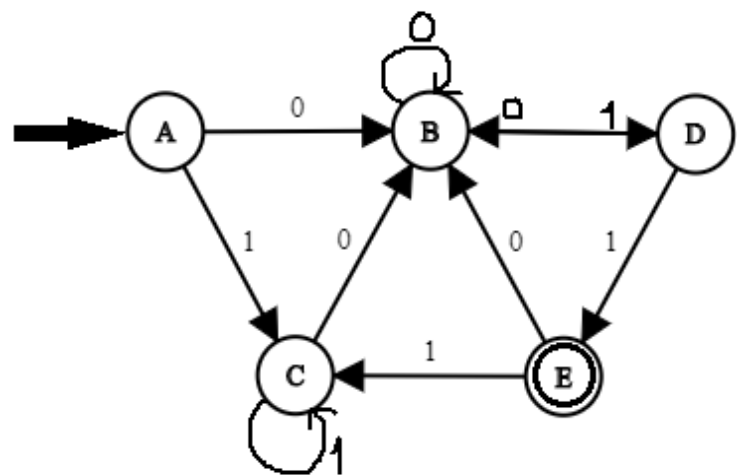


DFA State Minimization

- Equivalence Method
- Table Filling Method



	0	1
→A	B	C
B	B	D
C	B	C
D	B	E
* E	B	C

Test case:

011 (acceptable), 1011 (acceptable),
010 (not acceptable), 1110 (not acceptable)

Equivalence Method: (pairwise state equivalence transition comparison)

0 – Equivalence:

(2 sets – ‘accepting states’, ‘non accepting state’)

{A, B, C, D} {E}

1 – Equivalence:

(A, B) \Rightarrow $\delta(A, 0) = B$ $\delta(A, 1) = C$

$\delta(B, 0) = B$ $\delta(B, 1) = D$

(A, C) \Rightarrow $\delta(A, 0) = B$ $\delta(A, 1) = C$

$\delta(C, 0) = B$ $\delta(C, 1) = C$

(C, D) \Rightarrow $\delta(C, 0) = B$ $\delta(C, 1) = \text{C}$

$\delta(D, 0) = B$ $\delta(D, 1) = \text{E}$

{A, B, C} {D} {E}

2 – Equivalence:

(A, B) \Rightarrow $\delta(A, 0) = B$ $\delta(A, 1) = \text{C}$

$\delta(B, 0) = B$ $\delta(B, 1) = \text{D}$

(A, C) \Rightarrow $\delta(A, 0) = B$ $\delta(A, 1) = C$

$\delta(C, 0) = B$ $\delta(C, 1) = C$

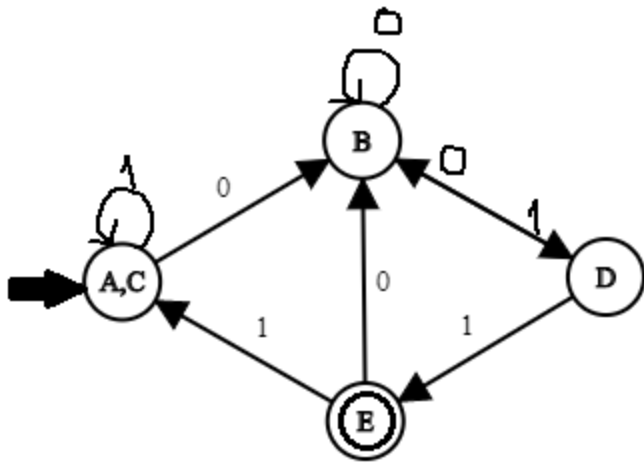
{A, C} {B} {D} {E}

3 – Equivalence:

(A, C) \Rightarrow $\delta(A, 0) = B$ $\delta(A, 1) = C$

$\delta(C, 0) = B$ $\delta(C, 1) = C$

{A, C} {B} {D} {E}



	0	1
→ A,C	B	A,C
B	B	D
D	B	E
* E	B	A,C

Table Filling Method (Myhill – Nerode Theorem):

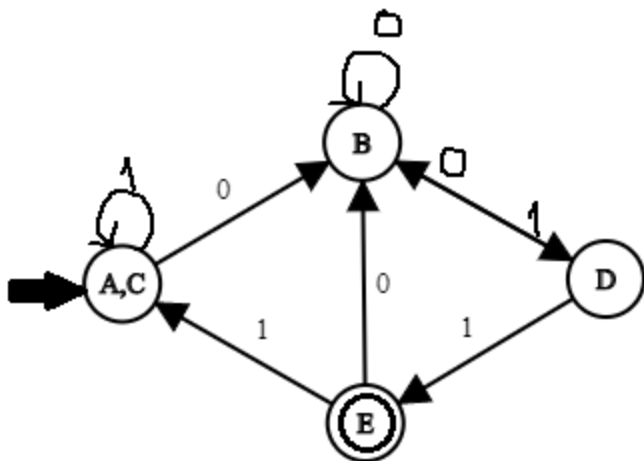
Algorithm:

// mark 'x' for not equivalence

// mark '√' for equivalence state

1. Draw a table for all pairs of states (P, Q) where P is the 'Final' state and 'Q' is the 'Non-final' state
2. Mark all pairs with '√' where $P \in F$ and mark with 'x' where $Q \notin F$
3. If there are any Unmarked pairs (P, Q) | $[\delta(P, x), \delta(Q, x)]$ is marked then mark with '√'
4. Recursively repeat the step (3) until no more marking can be made
5. Combine all '√' pairs and make them a single state in the minimized DFA.

A							A						
B	x						B						
C	√	x					C						
D	x	x	x				D						
E	x	x	x	x			E						
	A	B	C	D	E			A	B	C	D	E	



	0	1
→ A,C	B	A,C
B	B	D
D	B	E
* E	B	A,C