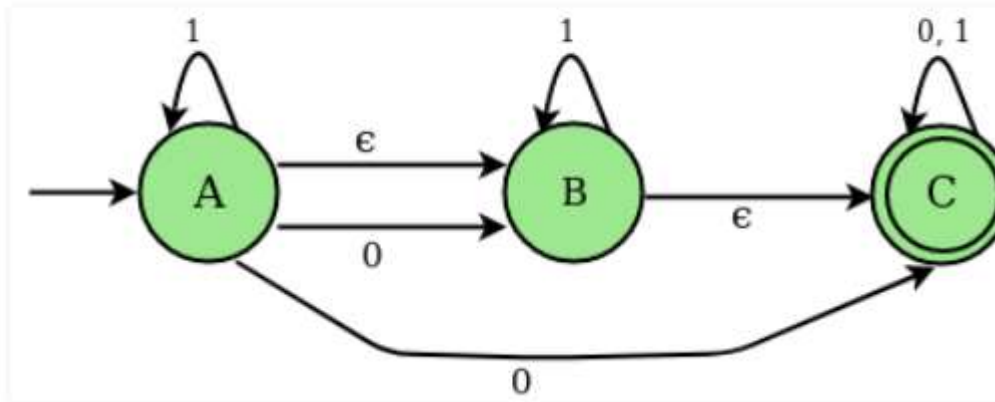


Example 1

Conversion of NFA with epsilon to DFA

Consider the following figure of NFA with ϵ move :



Transition Table for the above NFA

States	0	1	Epsilon
A	B,C	A	B
B	---	B	C
*C	C	C	--

Eclosure(ϵ) – closure : Epsilon closure for a given state X is a set of states which can be reached from the states X with only (null) or ϵ moves including the state X itself

For the given example

Eclosure(A)={A,B,C}==Initial state of DFa

Eclosure(B)={B,C}

Eclosure(C)={C}

Initial state of DFA = Eclosure of Initial of NFA= Eclosure(A)={A,B,C}

Step 1 : Take ϵ closure for the beginning state of NFA as beginning state of DFA.

Step 2 : Find the states that can be traversed from the present for each input symbol

(union of transition value and their closures for each states of NFA present in current state of DFA).

Step 3 : If any new state is found take it as current state and repeat step 2.

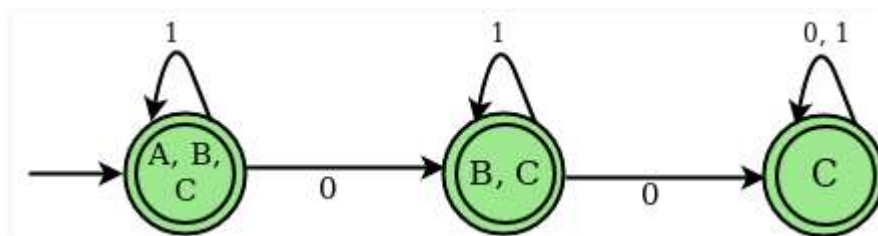
Step 4 : Do repeat Step 2 and Step 3 until no new state present in DFA transition table.

Step 5 : Mark the states of DFA which contains final state of NFA as final states of DFA.

Transition Table for DFA corresponding to above NFA

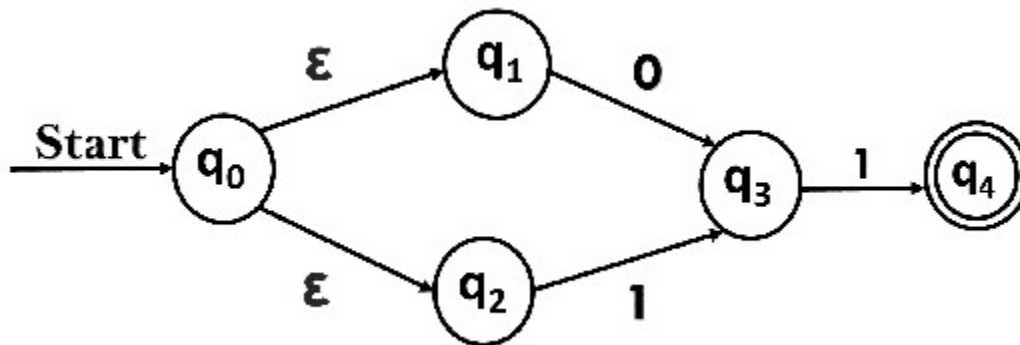
States	0	1
*{A,B,C}	Eclosure(B) U Eclosure(C)={B,C} U {C}={B,C}	Eclosure(A)U Eclosure(B)U Eclosure(C)={A,B,C}U{B,C}U{C}={A,B,C}
*{B,C}	Eclosure (C)={C}	Eclosure(B) U Eclosure(C)={B,C} U {C}={B,C}
*{C}	Eclosure (C)={C}	Eclosure (C)={C}

Transition Diagram for DFA



Example 2

Convert the NFA with ϵ into its equivalent DFA.



Transition Table for the above NFA

States	0	1	Epsilon
q0	-----	---	q1,q2
q1	q3	---	---
q2	----	q3	-----
q3	-----	q4	----
*q4	-----	---	-----

For the given example

$\text{Eclosure}(q_0) = \{q_0, q_1, q_2, \}$

$\text{Eclosure}(q_1) = \{q_1\}$

$\text{Eclosure}(q_2) = \{q_2\}$

$\text{Eclosure}(q_3) = \{q_3\}$

$\text{Eclosure}(q_4) = \{q_4\}$

Initial state of DFA = Eclosure of initial state of NFA =

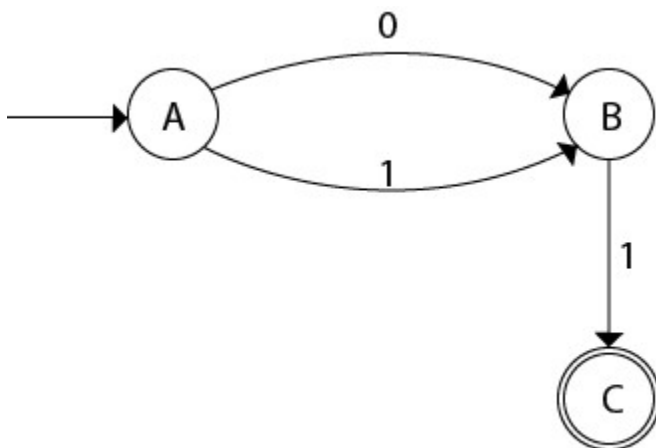
$\text{Eclosure}(q_0) = \{q_0, q_1, q_2\}$

Transition Table for DFA

States	0	1
$\{q_0, q_1, q_2\}$	$\text{Eclosure}(q_3) = \{q_3\}$	$\text{Eclosure}(q_3) = \{q_3\}$
$\{q_3\}$	$\{\}$	$\text{Eclosure}(q_4) = \{q_4\}$
$\{q_4\}$	$\{\}$	$\{\}$

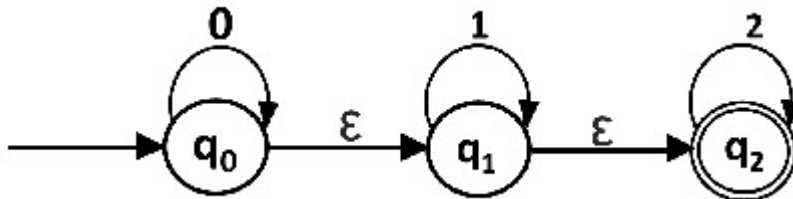
Renaming $\{q_0, q_1, q_2\}, \{q_3\}$ and $\{q_4\}$ as A, B and C respectively

Transition Diagram for DFA



Example 3:

Convert the NFA with ϵ into its equivalent DFA.



Transition Table for the above NFA

States	0	1	2	Epsilon
q0	q0	---	----	q1
q1	---	q1	---	q2
q2	----	---	q2	----

For the given example

$\text{Eclosure}(q0) = \{q0, q1, q2\}$

$\text{Eclosure}(q1) = \{q1, q2\}$

$\text{Eclosure}(q2) = \{q2\}$

Initial state of DFA = Eclosure of Initial state of NFA = $\text{Eclosure}(q0) = \{q0, q1, q2\}$

Transition Table for DFA corresponding to above NFA

States	0	1	2
$\ast\{q0, q1, q2\}$	$\text{Eclosure}(q0) = \{q0, q1, q2\}$	$\text{Eclosure}(q1) = \{q1, q2\}$	$\text{Eclosure}(q2) = \{q2\}$
$\ast\{q1, q2\}$	$\{\}$	$\text{Eclosure}(q1) = \{q1, q2\}$	$\text{Eclosure}(q2) = \{q2\}$
$\ast\{q2\}$	$\{\}$	$\{\}$	$\text{Eclosure}(q2) = \{q2\}$

Renaming $\{q_0, q_1, q_2\}, \{q_1, q_2\}$ and $\{q_2\}$ as A, B and C respectively.

Transition Diagram for DFA

