

Finite State Machine Maker

a|bab

Create

Solution

Graph

1. Regular Expression To Epsilon-NFA



Transition Table E-NFA

Transition Table				
Present State		Next State		
		ϵ	a	b
	q0		q1	
	q1	q9		
start	q8	q0,q2		
final	q9			
	q2			q3
	q3	q4		
	q4		q5	
	q5	q6		
	q6			q7
	q7	q9		

Graph

2. Removing Epsilon Moves



Transition Table E-NFA

Transition Table				
Present State		Next State		
		ϵ	a	b
	q0		q1	
	q1	q9		
start	q8	q0,q2		
final	q9			
	q2			q3
	q3	q4		
	q4		q5	
	q5	q6		
	q6			q7
	q7	q9		

Step 1 : ϵ -closure of each state

$$\epsilon\text{-closure}(q0) = \{q0\}$$

$$\epsilon\text{-closure}(q1) = \{q1, q9\}$$

$$\epsilon\text{-closure}(q8) = \{q8, q0, q2\}$$

$$\epsilon\text{-closure}(q9) = \{q9\}$$

$$\epsilon\text{-closure}(q2) = \{q2\}$$

$$\epsilon\text{-closure}(q3) = \{q3, q4\}$$

$$\epsilon\text{-closure}(q4) = \{q4\}$$

$$\epsilon\text{-closure}(q5) = \{q5, q6\}$$

$$\epsilon\text{-closure}(q6) = \{q6\}$$

$$\epsilon\text{-closure}(q7) = \{q7, q9\}$$

Step 2 : δ' transition for each state

$$\delta'(q0-a) = \{q1, q9\}$$

$$\delta'(q0-b) = \{\}$$

$$\delta'(q1-a) = \{\}$$

$$\delta'(q1-b) = \{\}$$

$$\delta'(q8-a) = \{q1, q9\}$$

$\delta'(q8-b) = \{q3, q4\}$
 $\delta'(q9-a) = \{\}$
 $\delta'(q9-b) = \{\}$
 $\delta'(q2-a) = \{\}$
 $\delta'(q2-b) = \{q3, q4\}$
 $\delta'(q3-a) = \{q5, q6\}$
 $\delta'(q3-b) = \{\}$
 $\delta'(q4-a) = \{q5, q6\}$
 $\delta'(q4-b) = \{\}$
 $\delta'(q5-a) = \{\}$
 $\delta'(q5-b) = \{q7, q9\}$
 $\delta'(q6-a) = \{\}$
 $\delta'(q6-b) = \{q7, q9\}$
 $\delta'(q7-a) = \{\}$
 $\delta'(q7-b) = \{\}$

Transition Table NFA

Transition Table			
Present State		Next State	
		a	b
start	q8	q1,q9	q3,q4
final	q1		
final	q9		
	q3	q5,q6	
	q4	q5,q6	
	q5,q6		
	q3,q4		
final	q1,q9		

NFA Graph



NFA Transition Table

Transition Table			
Present State		Next State	
		a	b
start	q8	q1,q9	q3,q4
final	q1		
final	q9		
	q3	q5,q6	
	q4	q5,q6	
	q5,q6		
	q3,q4		
final	q1,q9		

DFA Transition Table

Transition Table			
Present State		Next State	
		a	b
start	q8	q1,q9	q3,q4
final	q1,q9	qd	qd
	q3,q4	qd	qd
	qd	qd	qd

Graph

4. Minimization of DFA



step 1: remove unreachable states

{ qd }

step 2: DFA Transition Table

Transition Table			
Present State		Next State	
		a	b
start	q8	q1,q9	q3,q4
final	q1,q9	qd	qd
	q3,q4	qd	qd
	qd	qd	qd

step 3: Divide the states into partitions:

Partition: 1
{"q8" "q3,q4" } {"q1,q9" }
Partition: 2
{"q8" } {"q3,q4" } {"q1,q9" }
Partition: 3
{"q8" } {"q3,q4" } {"q1,q9" }

Minimized DFA Transition Table

Transition Table			
Present State		Next State	
		a	b
start	q8	q1,q9	q3,q4
	q3,q4	qd	qd
final	q1,q9	qd	qd

Graph