

COMP SCI 7411 Event Driven Computing Practice 2 Plan

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1 ϵ -NFA

The complete ϵ -NFA for RegEx `/ba+a | (bc) +/` is

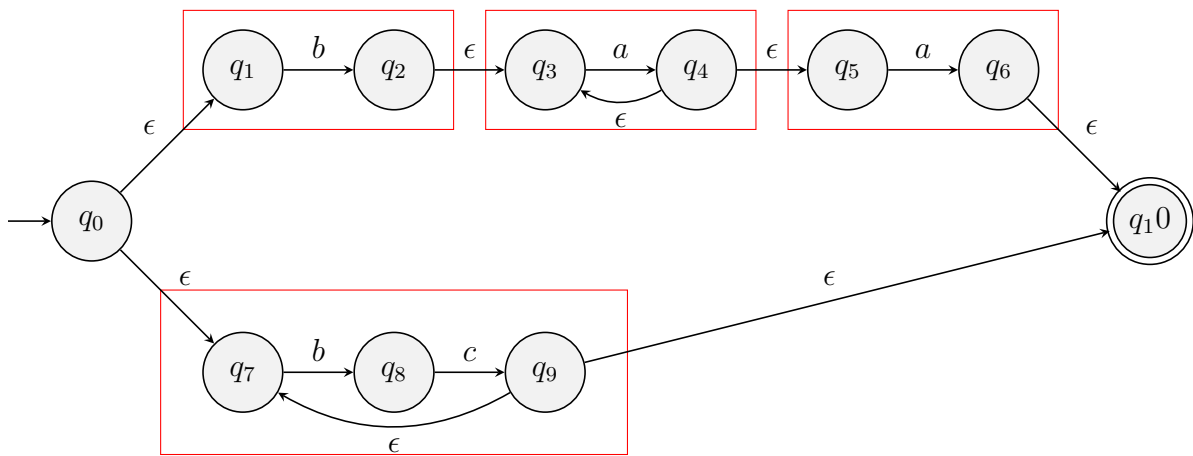


Figure 1: ϵ -NFA

which contains several unnecessary ϵ -transitions representing concatenation. By removing those ϵ -transitions, the ϵ becomes

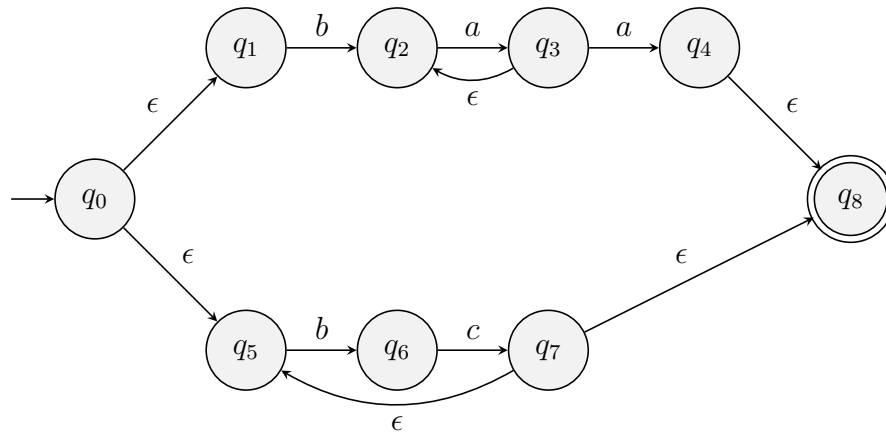


Figure 2: Simplified ϵ -NFA

and the table is

state	ϵ	a	b	c
$\rightarrow q_0$	$\{q_1, q_5\}$	\emptyset	\emptyset	\emptyset
q_1	\emptyset	\emptyset	$\{q_2\}$	\emptyset
q_2	\emptyset	$\{q_3\}$	\emptyset	\emptyset
q_3	$\{q_2\}$	$\{q_4\}$	\emptyset	\emptyset
q_4	$\{q_8\}$	\emptyset	\emptyset	\emptyset
q_5	\emptyset	\emptyset	$\{q_6\}$	\emptyset
q_6	\emptyset	\emptyset	\emptyset	$\{q_7\}$
q_7	$\{q_5, q_8\}$	\emptyset	\emptyset	\emptyset
$*q_8$	\emptyset	\emptyset	\emptyset	\emptyset

Table 1: ϵ -NFA Table

2 NFA

First, we compute the ϵ -closure table

state	ϵ -closure
$\rightarrow q_0$	$\{q_0, q_1, q_5\}$
q_1	$\{q_1\}$
q_2	$\{q_2\}$
q_3	$\{q_2, q_3\}$
$*q_4$	$\{q_4, q_8\}$
q_5	$\{q_5\}$
q_6	$\{q_6\}$
$*q_7$	$\{q_5, q_7, q_8\}$
$*q_8$	$\{q_8\}$

Table 2: ϵ -closure

By lazy evaluation, we can compute the following NFA table

state	a	b	c
$\rightarrow q_0$	\emptyset	$\{q_2, q_6\}$	\emptyset
q_1	\emptyset	$\{q_2\}$	\emptyset
q_2	$\{q_3\}$	\emptyset	\emptyset
q_3	$\{q_3, q_4\}$	\emptyset	\emptyset
$*q_4$	\emptyset	\emptyset	\emptyset
q_5	\emptyset	$\{q_6\}$	\emptyset
q_6	\emptyset	\emptyset	$\{q_7\}$
$*q_7$	\emptyset	$\{q_6\}$	\emptyset
$*q_8$	\emptyset	\emptyset	\emptyset

Table 3: NFA Table

Thus we can draw out the NFA

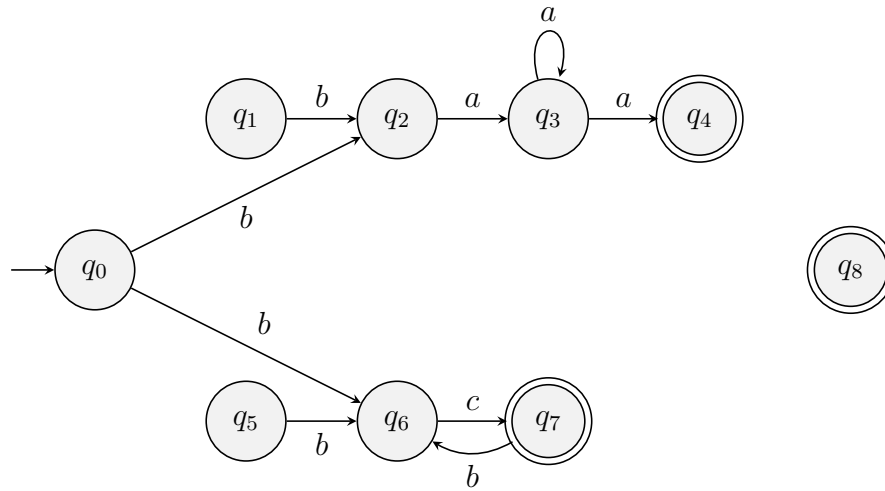


Figure 3: NFA

We can safely remove q_1 and q_5 which are source vertices but not initial states as well as the independent state q_8 . Thus the simplified NFA will be

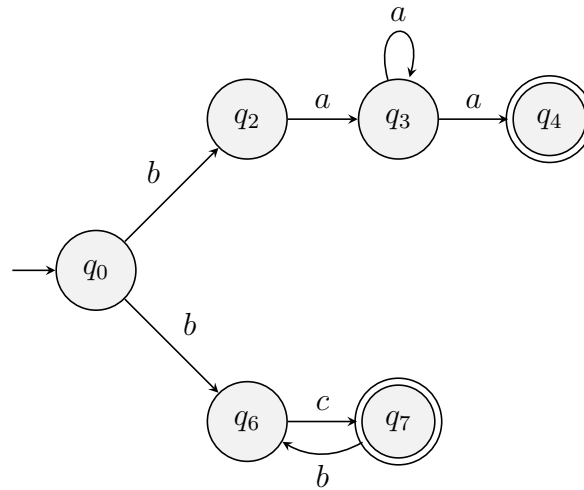


Figure 4: Simplified NFA

3 DFA

The table for DFA converted from the NFA below is

state	a	b	c
$\rightarrow \{q_0\}$	\emptyset	$\{q_2, q_6\}$	\emptyset
$\{q_2, q_6\}$	$\{q_3\}$	\emptyset	$\{q_7\}$
$\{q_3\}$	$\{q_3, q_4\}$	\emptyset	\emptyset
$* \{q_7\}$	\emptyset	$\{q_6\}$	\emptyset
$* \{q_3, q_4\}$	$\{q_3, q_4\}$	\emptyset	\emptyset
$\{q_6\}$	\emptyset	\emptyset	$\{q_7\}$

Table 4: DFA Table

Thus the DFA is

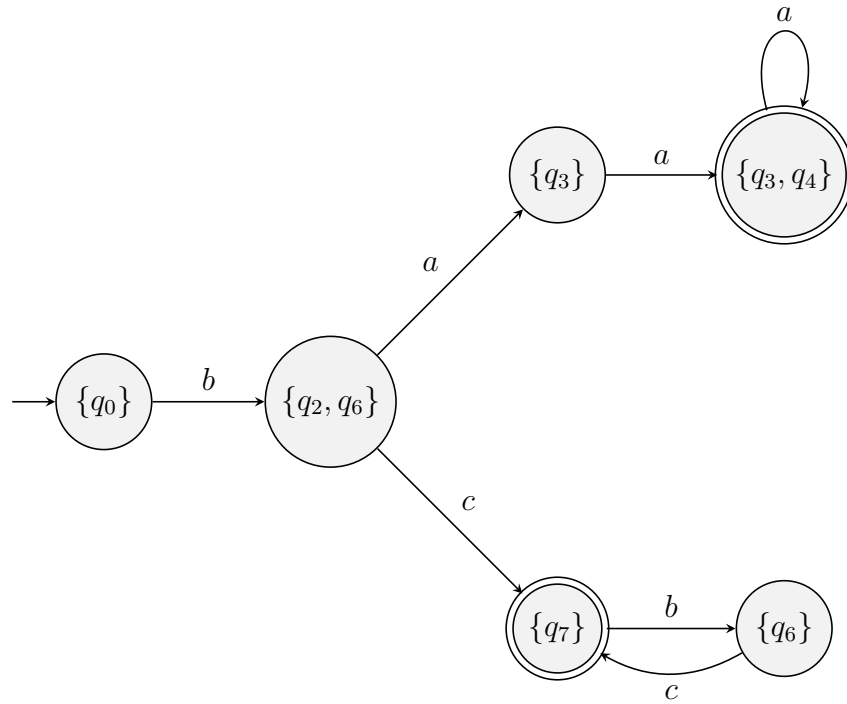


Figure 5: DFA

which kind of rearrange and simplify the original RegEx.