

## Definition

A language is *regular* iff it is the set of strings accepted by some deterministic finite automaton.

### Kleene's Theorem

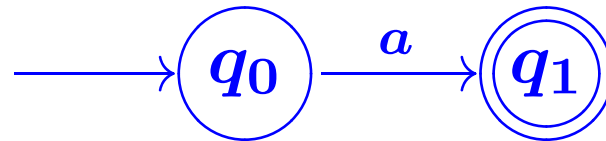
(a) For any regular expression  $r$ ,  $L(r)$  is a regular language

(cf. Slide 8).

(b) Conversely, every regular language is the form  $L(r)$  for some regular expression  $r$ .

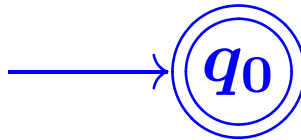
## NFAs for atomic regular expressions

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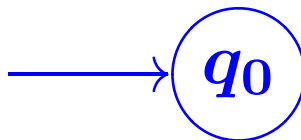
just accepts the one-symbol string  $a$

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just accepts the null string,  $\epsilon$

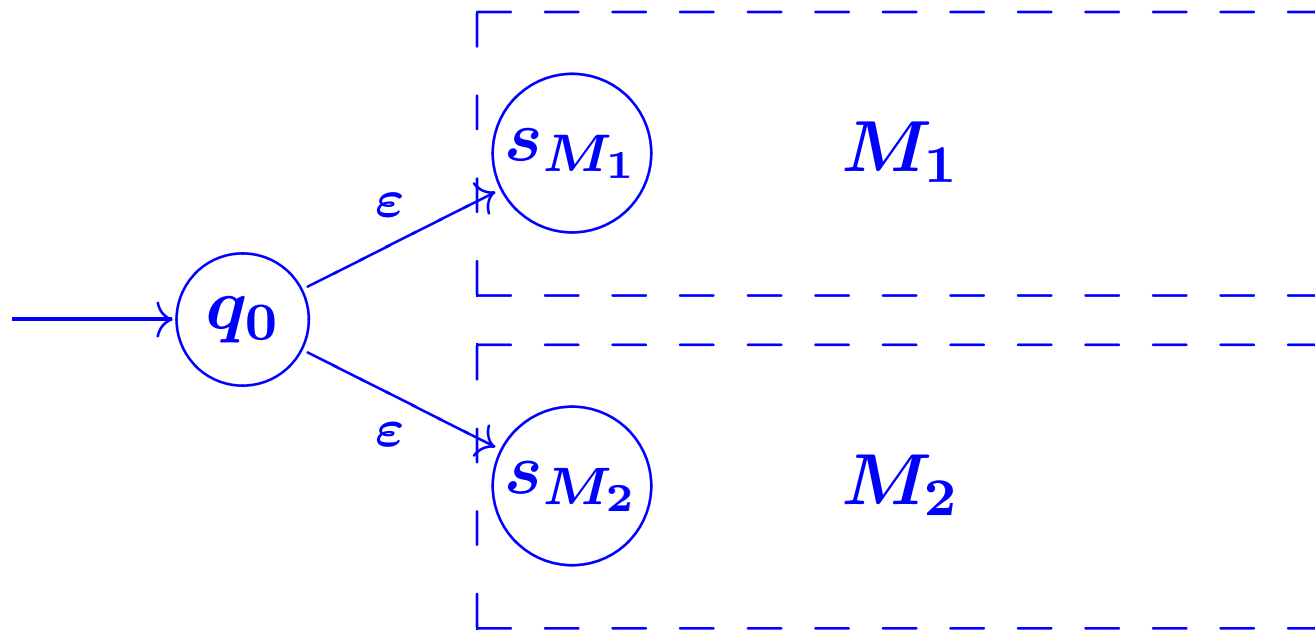
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accepts no strings

## *Union*( $M_1, M_2$ )

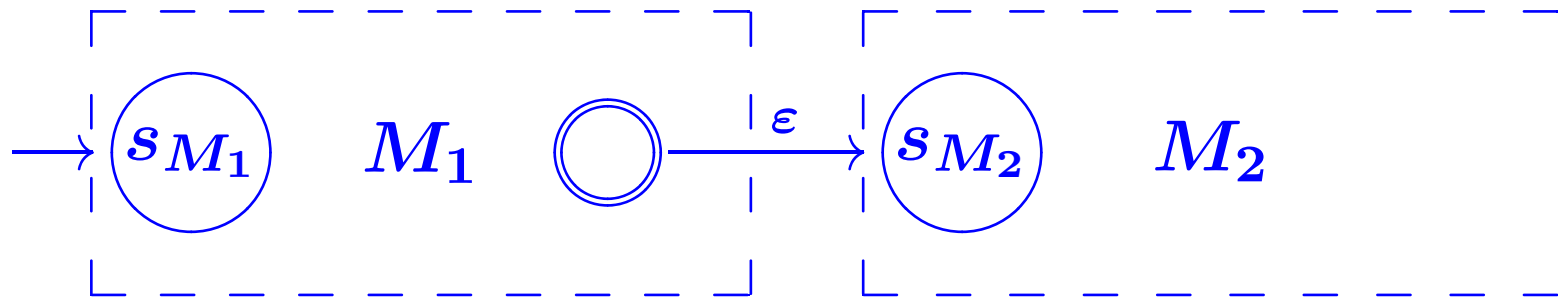
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Set of accepting states is union of  $\text{Accept}_{M_1}$  and  $\text{Accept}_{M_2}$ .

## *Concat*( $M_1, M_2$ )

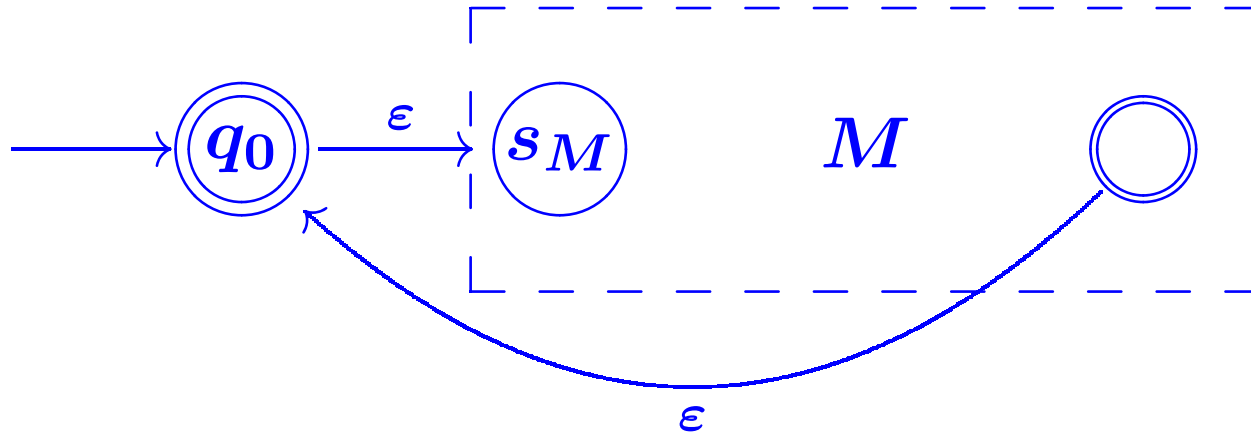
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Set of accepting states is *Accept* $_{M_2}$ .

## $Star(M)$

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The only accepting state of  $Star(M)$  is  $q_0$ .