Deterministic Finite Automata

Dr. Ankit Rajpal
Assistant Professor
Department of Computer Science
University of Delhi

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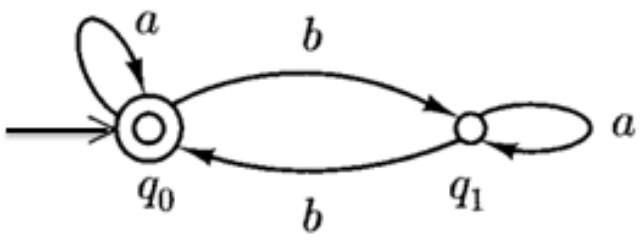
- Quintuple M = (Q, Σ, δ, s, F)
- Example:

  $Q=\{q_0, q_1\}$, $\Sigma=\{a,b\}$, $s= q_0$, $F= \{q_0\}$

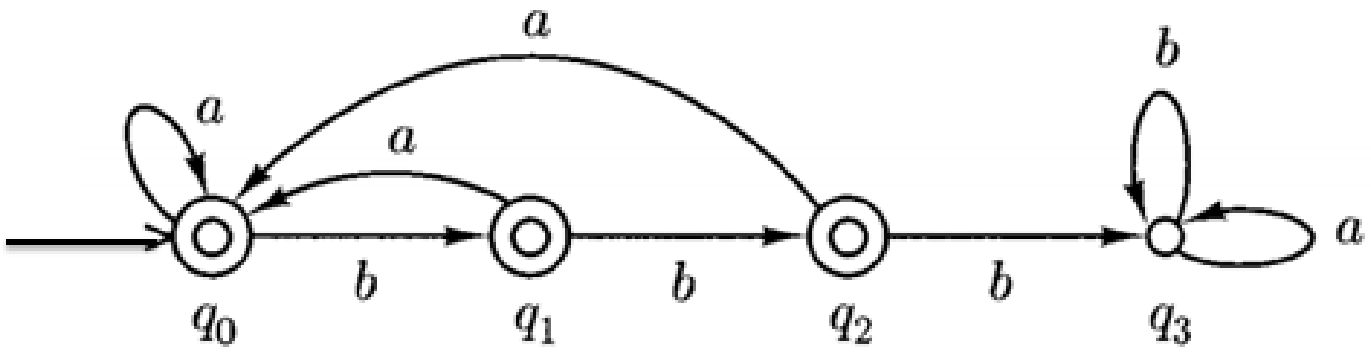
  δ is the function tabulated below:

Σ / Q	a	b
q_0	q_0	q_1
q_1	q_1	q_0



Example

$L(M) = \{w \in \{a,b\}^* : w \text{ does not contain three consecutive } b\text{'s}\}$



Exercise

Construct deterministic finite automata accepting each of the following languages.

(a) $\{w \in \{a,b\}^* : \text{each } a \text{ in } w \text{ is immediately preceded by a } b\}$.

(b) $\{w \in \{a,b\}^* : w \text{ has } abab \text{ as a substring}\}$.

(c) $\{w \in \{a,b\}^* : w \text{ has neither } aa \text{ nor } bb \text{ as a substring}\}$.

(d) $\{w \in \{a,b\}^* : w \text{ has an odd number of } a\text{'s and an even number of } b\text{'s}\}$.

(e) $\{w \in \{a,b\}^* : w \text{ has both } ab \text{ and } ba \text{ as substrings}\}$.