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- 03: Finite Automata

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Chapter 2:

Basics: Finite Automata

Finite Automata


Michael Rabin


Dana Scott

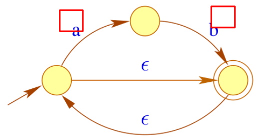
Definition Finite Automata

A non-deterministic finite automaton (NFA) is a tuple $A = (Q, \Sigma, \delta, I, F)$ with:

Q	a finite set of states;
Σ	a finite alphabet of inputs;
$I \subseteq Q$	the set of start states;
$F \subseteq Q$	the set of final states and
δ	the set of transitions (-relation)

Finite Automata

- Computations are paths in the graph.
- Accepting computations lead from I to F.
- An accepted word is the sequence of lables along an accepting computation ...



Once again, more formally:

- We define the transitive closure δ^* of δ as the smallest set δ' with:

  $(p, \epsilon, p) \in \delta'$ and
  $(p, xw, q) \in \delta'$ if $(p, x, p_1) \in \delta$ and $(p_1, w, q) \in \delta'$.

  δ^* characterizes for a path between the states p and q the words obtained by concatenating the labels along it.

- The set of all accepting words, i.e. A's accepted language can be described compactly as:

$$\mathcal{L}(A) = \{w \in \Sigma^* \mid \exists i \in I, f \in F : \quad (i, w, f) \in \delta^*\}$$