Deterministic finite automaton

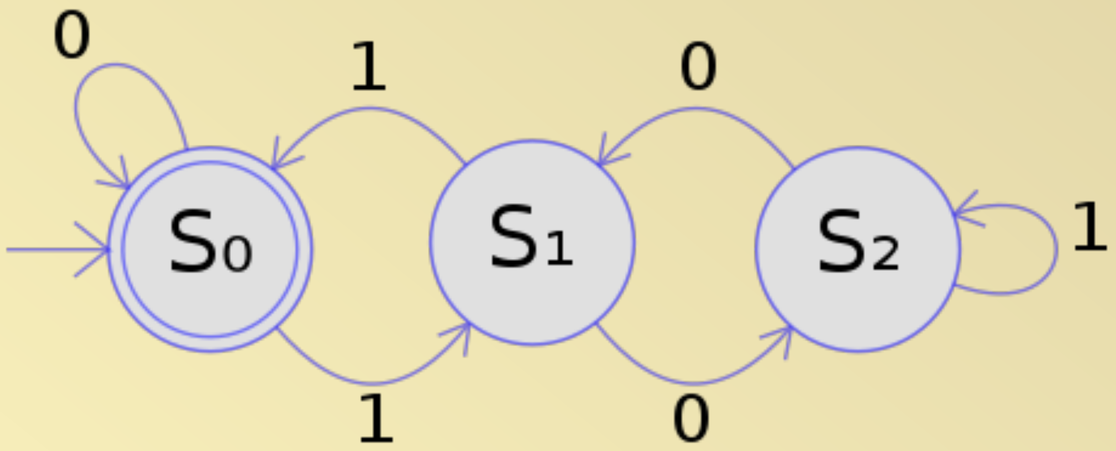
Seminar 15.5

Finite state automation

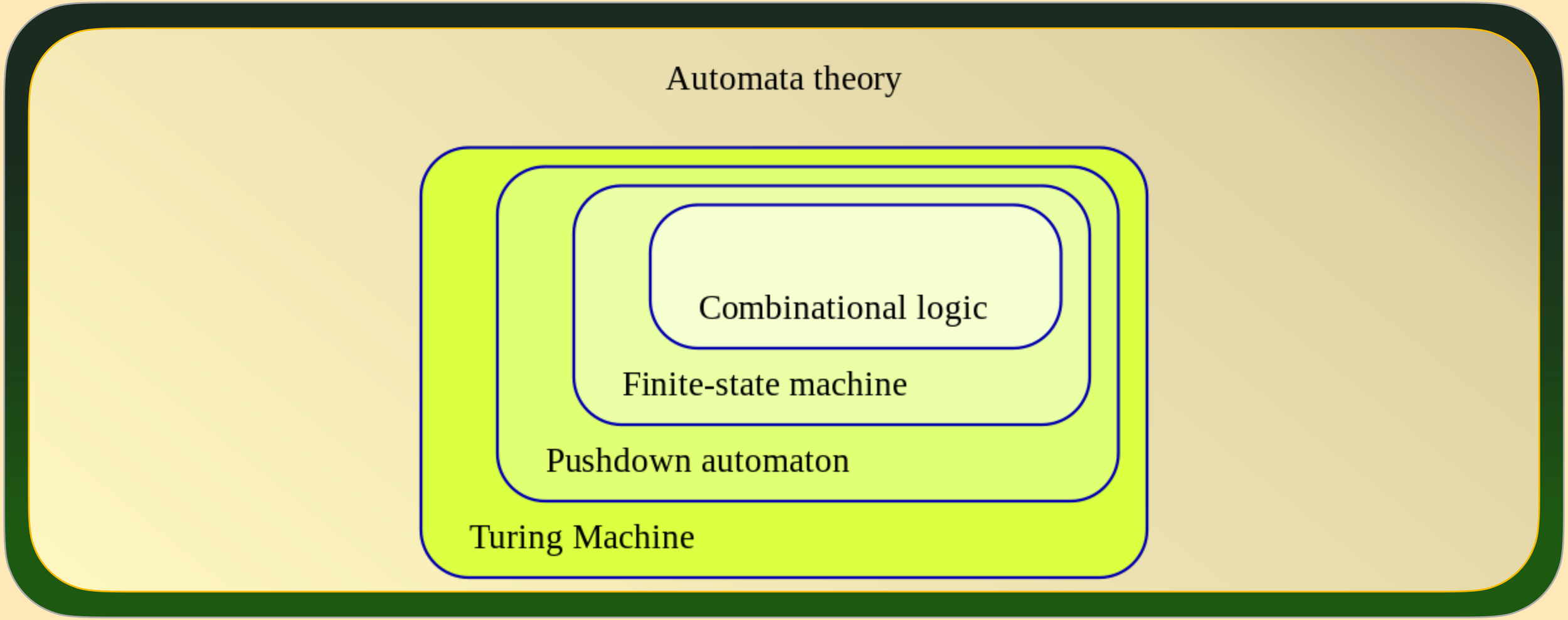
- an abstract machine that can be in exactly one of a **finite number of states** at any given time. The FSM can **transit** from one state to another in response to some inputs;
- ***FSM*** *consists of:*
  - ***Transition table*** **-** defines transitions for current state and particular inout
  - ***Current state*** **-** set of states, in which machine can be at that particular moment
  - Starting, Terminal states

Finite state automation

- ***Deterministic FSM*** — Each state has only one rule of reaction for any possible input



Turing Machine



Finite state automation

- ***Deterministic FSM*** — $(\Sigma, Q, s \in Q, T \subset Q, \delta : Q \times \Sigma \to Q)$
  - Σ -
  - Q -
  - s -
  - T -
  - δ -

Finite state automation

- ***Deterministic FSM*** — $(\Sigma, Q, s \in Q, T \subset Q, \delta : Q \times \Sigma \to Q)$
  - Σ - alphabet, out of which consists input words
  - Q - finite set of FSM's possible states
  - s - start state
  - T - set of accept states
  - δ - transition function

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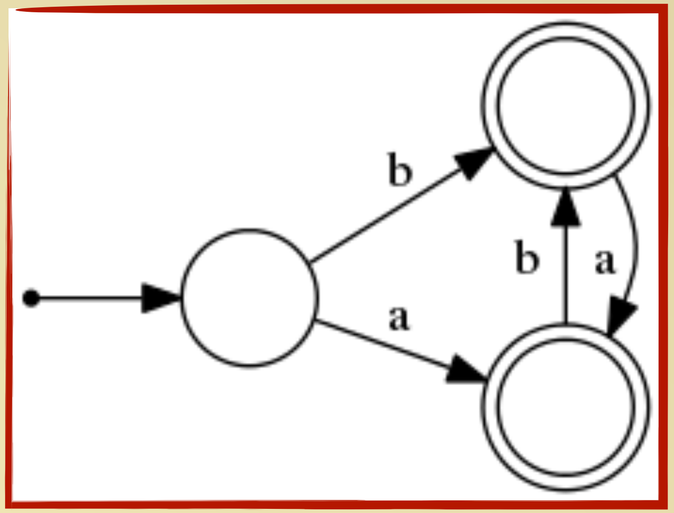

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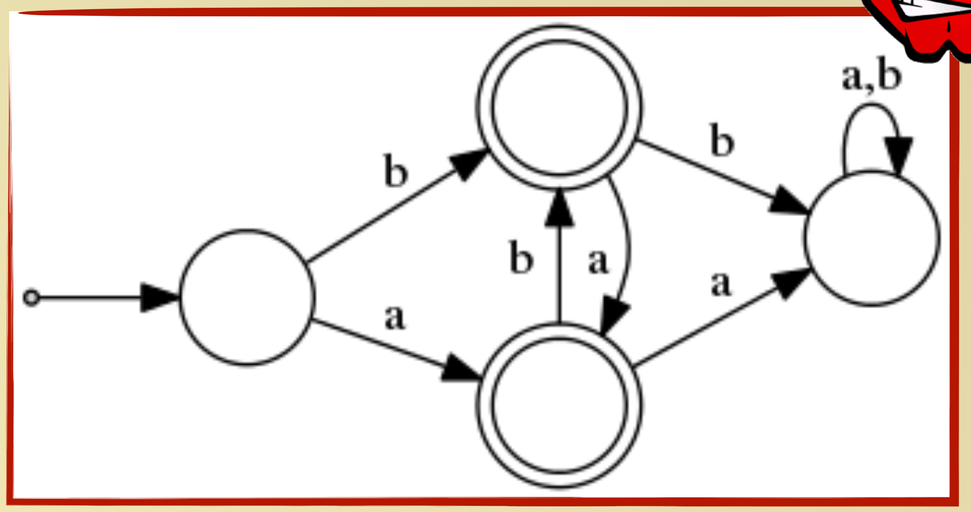

Turing Machine

- a mathematical model of computation describing an abstract machine that manipulates symbols on a strip of ***endless tape*** according to a table of rules
- memory tape is divided into discrete cells, each of which can hold a single symbol drawn from a finite set of symbols called the ***alphabet*** of the machine
- a ***head*** is positioned over one of these cells, and a ***state*** is selected from a finite set of states.
- The choice of the following transition is based on a finite ***table of rules***

Finite state automation

- ***Turing Machine*** — $(\Sigma, \Pi, B, Q, s, T, N\, \delta)$
  - $\Pi \supset \Sigma$ **-** set of symbols possible to be written by head
  - $B \in \Pi / \Sigma$ **-** blank symbol between words
  - $N \in Q$ **-** declining automation state
  - $\delta : \Pi \times Q \rightarrow \Pi \times Q \times \{ \leftarrow , \rightarrow , \downarrow \}$ **-** transition function

Maximum Flow problem

Definitions

- ***Cut*** is a set of edges, required for the connectivity of source & sink, ***s&t*** respectively
- Maximum ***s-t flow*** value equals the minimum capacity of ***s-t cut***