

Pushdown Automata

Formal Definition of PDA

- A PDA is a 6-tuple $M = (Q, \Sigma, \Gamma, \delta, q_0, F)$ where
 - Q : finite set of states
 - Σ : finite input alphabet
 - Γ : finite stack alphabet
 - $\delta: Q \times \Sigma_\epsilon \times \Gamma_\epsilon \longrightarrow 2^{Q \times \Gamma_\epsilon}$
e.g.: $\delta(q, a, Z) = \{(p_1, r_1), (p_2, r_2), \dots, (p_n, r_n)\}$
 - $q_0 \in Q$: start state
 - $F \subseteq Q$: set of accept states
- M accepts a string w
- The language recognized by a PDA M is
 $L(M) = \{ w \mid w \in \Sigma^* \text{ and } M \text{ accepts } w \}$

Example of PDA

Design PDA

- Examples

- $\{a^i b^j c^k \mid i, j, k \geq 0, i = j \text{ or } i = k\}$

- $\{ww^R \mid w \in \{0, 1\}^*\}$