L1.1 Pushdown Automata (Formal Definition)-1

Pushdown Automata (Formal Definition)

A Pushdown Automata is formally defined by 7 Tuples as shown below:

$$P = (Q, \Sigma, \Gamma, \delta, q_0, z_0, F)$$

where,

$\quad$ Q = A finite set of States

$\quad$ Σ = A finite set of Input Symbols

$\quad$ Γ = A finite Stack Alphabet

$\quad$ δ = The Transition Function

$\quad$ q_0 = The Start State

$\quad$ z_0 = The Start Stack Symbol

$\quad$ F = The set of Final / Accepting States

δ = The Transition Function

q_0 = The Start State

z_0 = The Start Stack Symbol

F = The set of Final / Accepting States

δ takes as argument a triple $\delta(q, a, X)$ where:
(i) q is a State in Q
(ii) a is either an Input Symbol in Σ or $a = \epsilon$
(iii) X is a Stack Symbol, that is a member of Γ

The output of δ is finite set of pairs (p, γ) where:
   p is a new state
   γ is a string of stack symbols that replaces X at the top of the stack

Eg. If $\gamma = \epsilon$ then the stack is popped
     If $\gamma = X$ then the stack is unchanged
     If $\gamma = YZ$ then X is replaced by Z and Y is pushed onto the stack